University of Southampton

Faculty of Social Sciences

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Risk Incentives, Relationship-Lending, and Innovation:
The Role of CEO Culture in the Banking Landscape

By

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Abstract

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This thesis focuses on the importance of culture, specifically the bank Chief Executive Officer (CEO) cultural heritage, in the banking landscape. To this end, we bring to the forefront three different elements to understand how they are influenced by culture. We begin with an investigation on how the cultural heritage of a bank CEO influences the relationship between compensation risk-taking incentives and bank risk. Second, we extend our analysis to incorporate loan-level data. We explore how bank CEOs' cultural heritage shapes the nexus between lending relationships and the cost of bank loans in the syndicated loan market. Finally, we examine the impact of CEOs' cultural heritage on the cost of bank loans to innovative firms.

Our research is centred on the U.S. due to its multiculturalism deriving from historical waves of immigration, and quality of data available hence, exploit the cultural diversity in U.S. bank CEOs between 1992–2017. We focus on the CEO of the lead bank as they are considered the most senior executives within the organisation and have substantial influence over strategy, decision-making and outcomes. Our investigation consists of a variety of econometric tools to conduct our empirical analysis. We provide robust evidence for the aforementioned research areas. First, we find that the risk-taking compensation incentive vega, has a negative association with bank risk however, this association is influenced by the bank CEOs' cultural heritage, namely the cultural dimension of masculinity. Second, we show that banks led by CEOs that trace their origin in more individualistic and masculine societies are less inclined to share with their borrowers the savings stemming from strong lending relationships. In contrast, banks led by CEOs that originate from societies where uncertainty avoidance and power distance are higher, exhibit a stronger propensity to reward their relationship borrowers with lower loan prices. Third, we provide evidence to show that bank CEO cultural heritage conditions the relationship between the cost of bank loans and innovative firms. Our most compelling results are from banks led by CEOs that trace their origin in more power distant, and uncertainty avoidant societies. Such CEOs are more inclined to reduce the cost of borrowing to innovative

firms. In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to exploit the borrowing firm by charging higher loan costs. In addition to statistical significance, our results provide economic significance when translated into monetary terms.

These findings are consistent with the view that certain cultural attributes affect the degree to which risk-taking compensation incentives, lending relationships, and borrower innovation are valued in the societal and business contexts. Whilst economists have previously been hesitant to rely on culture as a possible determining factor of economic outcomes, we now possess the tools to quantify previously immeasurable social dynamics, values, and characteristics due to the improvement of data collection and methodologies. The contribution of this thesis is to explore traditional issues in finance such as compensation practices, relationship-lending, and borrower innovation under a new cultural lens.

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Research Thesis: Declaration of Authorship

I, Christine Sideri Christofi-Hau declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Risk Incentives, Relationship-Lending, and Innovation: The Role of CEO Culture in the Banking Landscape

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature: Date: 25th August 2021

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Chapter 1 Introduction

1.1 Culture

Does the value system we inherit as children stay with us into adulthood? Do these values shape our preferences and characteristics? Does this influence our financial decision-making? If so, what does this mean for a bank? The influence of culture on financial decision-making has captured academic interest in the last decade and whilst this has led to a number of contributions, cultural finance remains a very niche area of research, in the early stages of its life. Although the exploration of a young research field can be daunting, it gives us the opportunity to create our own path and contribute to answering questions that are yet to be fulfilled.

Humans are complex organisms and much like computers, our brains can process information input from our external surroundings. We are able to tackle difficult problems but how we approach these problems is determined by our internal programming. Whilst the brain is the physical home to the mind where we manifest thought and perception, culture is the software of the mind. This software is developed in the family and early childhood that is reinforced later in life. These mental programs contain an element of national culture that is reflected in the values amongst people from different countries (Hofstede, 2001). This forms the building blocks of our psychological characteristics, value system, preferences, and intrinsic motivations.

Cultural preferences and beliefs can be described as having life of their own in the sense that, even when removed from their originating environment, they continue to exercise influence (Fernández, 2011). Immigrants not only bring their principles and values to their new home, but these beliefs are also passed down to their descendants even after several generations (Guiso et al., 2006). Culture is generally not location bound but is inherited and persistent even when the host is removed from the original environment. This transmission is evident throughout history where customs, traditions and beliefs live on. For example, a defining tenet for Greeks is philoxenia, the literal translation being "love of the foreign". The meaning behind this is love of strangers and eagerness to be welcoming and hospitable. These dogmas are weaved into the fabrics of culture that make up our value system.

Cross-cultural psychological studies have developed various frameworks to quantitively capture cultural differences internationally. These praxes take an instrumental approach to an ontological concept by creating an index of measurable constructs for each country. One of the most empirically utilized and popular typologies of national culture was created by (Hofstede, 1984). Such quantifiable measures of societal characteristics allow researchers to construction testable hypotheses concerning the influence of culture on economic decision-making (Nash and Patel, 2019). This allows scholars to revisit well-researched questions in finance that can be reconsidered more carefully under a new cultural light (Nadler and Breuer, 2019).

1.2 The United States

The U.S. historically experienced major waves of immigration and the idea of the "American Dream" attracted immigrants from all over the globe, hoping for a better life that entailed freedom, economic opportunity and the escape from war and famine. Whilst the U.S. has many entry ports, between 1892 and 1954 Ellis Island was the busiest station and the entry point for over 12 million immigrants to the U.S. for over 60 years. Approximately 40 percent of all current U.S. citizens can trace at least one of their ancestors to this gateway (History.com Editors, 2019). Immigration records date back to the 18th century and with available data from U.S. Federal Census from 1790. Hence, the U.S. provides solid testing ground for cross-cultural psychological studies due to its multicultural nature. It also allows us to capture the spill-over effects of culture more easily in a single country due to the homogeneity in regulatory framework and limits the cross-country differences that could be reflected in policies of each country. Therefore, we are better able to detect the influence of culture on other variables of interest.

1.3 The Banking Industry

The primary function of financial intermediaries is to facilitate the channelling of funds from those in surplus (lenders) to those in deficit (borrows). These institutions play a critical role for firm growth including capital expenditures, research and development, marketing, and expansion opportunities such as mergers and acquisitions. Hence, these intermediaries can stimulate economic growth through funding firm activities that lead to greater innovation, employment, liquidity, and overall fluidity of funds moving within an economy. Therefore, inefficiencies in this system need to be addressed due to their far-reaching consequences. For example, the detrimental impact of the 2007-2008 crisis urged banks, regulators, and academics to turn the focus inwards to look more carefully at ex-ante behaviour such as executive reward systems, lending practices, and overall governance and at the centre stage of the storm were the captains of the ships, CEOs.

1.4 Chief Executive Officers

We specifically focus on CEOs as they are considered the most senior individuals within the bank. Along with this seniority, comes the ability to navigate the strategic direction of the organisation and to influence corporate culture. Hence, the embedded preferences of a CEO infiltrate and filter down to shape the internal mechanisms of a bank. Such preferences influence decision-making within a bank and ultimately, economic outcomes. The Upper Echelon theory explains that organisational outcomes are a reflection of upper ranking executive characteristics where the experiences of executives influence their interpretations of the situations faced and in turn, influence their choices made (Hambrick and Mason, 1984). Whilst our premise is consistent with Upper Echelon theory, it goes beyond the characteristics of age, education, socioeconomic background, and career experience. We believe that bank CEO characteristics are greatly shaped by inherited cultural values and practices, absorbed during their childhood. This is continued into their adult life and impacts decision-making. For example, how they respond to rewards in compensation packages, whether they exploit relationship-lending or reward it, and the response to innovating borrowers.

1.5 Research Aims

This dissertation explores traditional issues in finance such as risk-based compensation incentives, relationship-lending, and innovation lending under a new cultural lens. Whilst economists have previously been hesitant to rely on culture as a possible determining factor of economic outcomes (Guiso et al., 2006), we now possess the tools to quantify previously immeasurable social dynamics, values and characteristics due to the improvement of data collection and methodologies. Therefore, we exploit the cultural diversity in U.S. bank CEOs to offer a new perspective on such issues and by shedding light on the conditioning effect of bank CEO cultural heritage, we can better understand the implications this has on economic outcomes. Our research questions are as follows: (1) Does the cultural heritage of bank CEOs influence the relationship between pay and risk? (2) Does the cultural heritage of a bank CEO condition the effect between relationship-lending and the cost of bank loans? (3) Does the cultural heritage of a bank CEO condition the effect between firm innovation and the cost of bank loans?

1.6 Chapter Two

Chapter two focuses on the interaction between cultural heritage and compensation schemes and the influence this has on bank risk. We exploit the cultural diversity in U.S. CEOs from a sample of 229 commercial banks between 1992–2017. Using a unique dataset, we infer ethnicity from surnames and hand-collect over 3.8 million ancestral records to determine country of origin. We implement additional techniques to verify a CEOs ethnic background and adopt Hofstede's 6-dimensional model as a proxy for culture. In our main analysis, we control for bank, year, CEO fixed effects, and a number of controls related to each component. We implement propensity score matching, alternative measures of risk, horserace analysis, alternative measures of culture, alternative levels of clustering, control for CEO power, and doubtful heritage. We find that the risk-taking compensation incentive vega, has a negative association with bank risk however, this is moderated by the bank CEOs' cultural heritage, namely the cultural dimension of masculinity.

1.7 Chapter Three

Chapter three takes a closer look at the cost of bank loans and the conditioning effect of bank CEOs cultural heritage. The data is a multi-level cross-section which allows us to control for bank, firm, and loan characteristics. In addition, we include firm, bank, year, month, quality ratings, bank-dependence, and loan type fixed effects, thus mitigating concerns regarding omitted variables stemming from other lending characteristics that could influence the cost of borrowing. We observe a sample of a sample of around 2,400 firms, 53 banks and 103 bank CEOs for the 1992–2017 period. Our results show that the cultural heritage of bank CEOs moderate the relationship between relationship-lending and the cost of bank loans. Whilst we are confident in the results presented in the tables, the strongest results come from the dimensions of individualism and uncertainty avoidance. We see that CEOs from highly individualistic cultures are likely to exploit borrowers by charging higher loan spreads, as information asymmetry is reduced due to an increase in relationship-lending. In contrast, CEOs from highly uncertainty avoidant cultures are likely to reward borrowers by charging lower loan spreads, as information asymmetry is reduced due to repeated lending. These effects are statistically and economically significant. Our results are robust to tests that address endogeneity, to different measures of relationship-lending, to different measures of culture using Schwartz dimensions, and to alternative clustering of the standard errors. To further enrich our results, we perform an additional analysis using other components of loan terms such as loan amount, maturity, and covenants.

1.8 Chapter Four

Chapter four explores how bank CEOs' cultural heritage shapes the nexus between firm innovation and the cost of bank loans in the U.S. syndicated loans market. We provide evidence to show that cultural heritage does, in fact, condition this relationship. Our most compelling results are from banks led by CEOs that trace their origin in more power distant, and uncertainty avoidant societies, are more inclined to reduce the cost of borrowing to innovative firms. In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to exploit the borrowing firm by charging higher loan costs. These findings are consistent with the view that certain cultural attributes affect the degree to which innovation is valued in the societal and business contexts. Our study highlights the importance of considering lender culture when investigating factors influencing the cost of bank loans.

1.9 Contributions

Each chapter offers a new and unique perspective on traditional issues in finance that have been revisited under a new cultural light. Chapter two contributes to the under-explored issues in the area of corporate governance, specifically CEO risk-taking compensation incentives, by providing an understanding the influence of culture between vega and bank risk. To our knowledge, this is the first study to examine such effects in banking within a single country context. Chapter three contributes to the literature in several ways. A wide stream of the literature investigates the effect relationship-lending on the cost of bank loans. Although it is widely accepted that bank-borrower relationships lower information asymmetries, it is still unclear whether borrowers are charged higher or lower costs of bank loans. We contribute to this literature by providing evidence that the cultural heritage of a bank CEO moderates the effect of relationship-lending and the cost of bank loans. We contribute to the stream that examines the effects of relationship-lending on cost of bank loans. We also contribute to the stream that examines the effect of the CEO characteristics on lending and examine how culture effects financial decision-making. Chapter four demonstrate how banks' propensity to reward (extract rents from) firm innovation, through lower (higher) loan prices, is conditioned by the bank CEOs' cultural heritage. Our findings show that such predisposition follows a pattern that is consistent with the degree to which bank CEOs' cultural heritage influences this relationship. Therefore, this chapter contributes to the stream of the literature that investigates lending with regards to firm innovation. Furthermore, the empirical literature on the conditioning effects of banks' characteristics on the association between innovation and loan pricing is still scarce. Our study highlights the importance of considering lenders' culture when investigating the effects of innovation on the cost of bank loans. This chapter also adds to the emerging literature that examines the effect of culture and CEO heritage on the economic outcomes of corporate firms. Specifically, our study contributes to the area of literature that focuses on the banking sector. Surprisingly, studies that focus on the impact of bank CEO attributes on lending policies using loan-level data are comparatively scarce. Some recent studies investigate how bank CEO attributes impact lending behaviour. Our study also fits within this emerging stream of the literature. Whilst these elements have been studies individually, no studies have investigated these factors collaboratively (i.e., lending, innovation, and CEO cultural heritage).

1.10 Thesis Structure

This thesis is structured around the influence of bank CEO cultural heritage from three distinct areas of finance. Hence, each chapter is dedicated to a theme within this umbrella of research. The next sections are organised in the following way. Chapter two focuses on vega and bank risk. Chapter three focuses on relationship-lending and the cost of bank loans. Chapter four examines borrower innovation and the cost of bank loans. Each of these areas are traditional issues in finance but have yet to be examines under the light of culture. The final chapter provides an overall summary to the thesis, contributions, and scope for future work in the growing area of cultural finance.

Chapter 2 Born to dare: does cultural heritage change the relationship between pay and risk?

Born to dare: does cultural heritage change the relationship between pay and risk?

Abstract

Compensation practices and bank risk-taking has received a great deal of attention from governments, industry leaders and academics. This paper assesses the influence of such schemes by exploring an alternative avenue. We exploit the cultural diversity in U.S. CEOs from a sample of 229 banks between 1992–2017 and evaluate how cultural heritage affects the relationship between compensation and risk. Using a unique dataset, we infer ethnicity from surnames and hand-collect over 3.8 million ancestral records to determine country of origin. We implement additional techniques to verify a CEOs ethnic background and adopt Hofstede's 6-dimensional model as a proxy for culture. To the best of our knowledge, this is the first paper to examine the influence of cultural heritage on the association between vega and bank risk. We find that the risk-taking compensation incentive vega, has a negative association with bank risk however, this is moderated by the bank CEOs' cultural heritage, namely the cultural dimension of masculinity.

JEL Classification: G2, G3, M14, M52, Z1

Keywords: bank risk, CEO compensation, cultural heritage

2.1 Introduction

The impact of the 2007-2008 crisis urged banks, regulators, and academics to turn the focus inwards to look more carefully at ex-ante behaviour. Financial deregulation (Crotty, 2009; Roy and Kemme, 2012), defective risk management systems (Ellul and Yerramilli, 2013; Anginer et al., 2018), and corporate cultures (Li et al., 2013; Liu, 2016; Bushman et al., 2018) have all been offered as explanations for the errant behaviour of banks. However, the spotlight still shines bright upon executive compensation schemes. Traditionally, executive contracts are used as a corporate governance tool to align the interest of agents and principals, yet conventional knowledge suggests that compensation in the financial industry is a large contributor to the credit crisis. However, empirical studies that examine the effect of compensation practises on bank risk, find mixed results. For example, remunerating bankers with equity-based compensation induces risk-taking that played a central role in the financial crisis and solvency issues within these firms (Minhat and Abdullah, 2016; Gande and Kalpathy, 2017).

Other research argues that shareholder-friendly corporate governance reduces agency costs towards equity but can increase risk-shifting with respect to creditors such as debtholders and government (John and Senbet, 1998). This is especially prevalent in countries with substantial financial safety nets as too-big-to-fail guarantees allow banks the luxury of shifting risk toward the government and ultimately taxpayers (Anginer et al., 2018). Furthermore, Ongena et al. (2018) document that these risk-shifting incentives are more prominent during macroeconomic downturns. In contrast, Fahlenbrach and Stulz (2011) argue that CEO pay is not to blame for the crisis and find no evidence that banks with better interest alignment between CEOs and shareholders had higher stock returns during the crisis. They explain that neither cash bonus nor options had an adversative influence on bank performance midst the crisis. These differing findings suggest there is still scope for further research. Moreover, the financial landscape is constantly evolving with new variables coming into play overtime such as changes to the reporting of executive stock options, bonus-awarding rules, and new financial products.

The economic environment has become more sophisticated, with risk being potentially disguised among complex securities as witnessed in the 2008 crisis. Banks are subject to greater regulations, such as capital and disclosure requirements not only because of their importance in the economy but due to the opaque nature of the industry. Morgan (2002) notes the pattern of disagreement that exists between bond analysts indicates that banks are more opaque than other types of firms. This opacity is valued by managers as it makes it more difficult to discipline them (Wagner, 2007) and because they are inherently opaque institutions(Gorton, 2013) greater attempts are made to restore balance of information and interests, that can be achieved through corporate governance devices, mainly compensation schemes. However, we posit that there are other factors that influence the effectiveness of such schemes. We propose that the response to risk-based compensation incentives are influenced by cultural heritage.

The issue that must be addressed is whether the incentives given are compatible with the cultural preferences of the recipient and if this dictates how effective these 'tools' are. While it seems intuitive to incentivise agents by tying their wealth to firm performance, if incentive schemes are not properly designed, they can induce risk-taking behaviour. Thus, if ideals surrounding incentives are dictated by culture, the successfulness of these rewards come into question. These components of pay will have a different value for each CEO. In addition, there is evidence to suggest that certain forms of compensation carry different connotations depending on the values prominent in a society (Tosi and Greckhamer, 2004). These preferences are woven into the cultural fabric that are not location bound. Hence, with the movement of people comes these symbolic connotations and values.

We specifically focus on CEOs as they are considered the most senior individuals within the bank. Existing research provides strong supporting evidence regarding the critical role of CEOs (Tsui et al., 2006; Berson et al., 2008; Sheikh, 2018). The embedded preferences of a CEO infiltrates and filters down to shape a firm's corporate culture. Such preferences influence economic decision-making within a firm and ultimately, firm performance. This 'potent force' that is culture, then feeds into the organisation and to employees from the leader (Lo, 2015). Hence, the importance of considering the factors that determine their preferences and values. Especially as 'the organisational design of a bank's risk management functions is a reflection of top management's values and risk priorities, and these choices can transmit theses values and priorities throughout the organisation' (Bushman et al., 2018). There is empirical and real-world evidence which supports the notion that CEO culture plays a vital role in a bank's lending policy. Hagendorff et al. (2019) measure a lenders trust level using the average trust attitude in the CEO's ancestral country of origin and examine the implications of a lender's trust in corporate loans. Additionally, they obtain direct evidence on CEOs setting their bank's lending strategies for implementation by loan officers using a survey whereby over 90% of respondents agreed that the CEO shapes the bank's overall lending strategy and follow lending policies set by them. Therefore, the way in which these key decision-makers are remunerated is crucial. Specifically, we focus on U.S. bank CEOs as U.S. provides solid ground for this study due to its multicultural nature that stems from a long immigration history. It also allows us to capture the spill-over effects of culture more easily in a single country due to the homogeneity in regulatory framework. It also limits the cross-country differences that could be reflected in policies of each country. Therefore, we are better able to detect the influence of culture on the association between risk-taking compensation incentives and bank risk. This approach is in line with previous similar studies (Nguyen et al., 2018; Hagendorff et al., 2019).

This study provides empirical findings that add to the understanding of how compensation incentives influence bank risk by exploiting the cultural heritage of CEOs. Prior studies mainly focus on the effect of culture on the economic outcomes of a firm (Guiso et al., 2006; Ashraf et al., 2016; Liu, 2016; Nguyen et al., 2018) and on the influences of compensation schemes on economic outcomes (Fahlenbrach and Stulz, 2011; Minhat and Abdullah, 2016; Gande and Kalpathy, 2017; Ongena et al., 2018). Whilst other studies examine reward preferences (Chiu et al., 2002; Chiang and Birtch, 2006; Hofstede, 2010), they do not address the influence such preferences have on shaping bank risk. There is very little literature that fuses these concepts together. In contrast, we contribute to the under-explored issues in these areas by providing an understanding on influence of the cultural heritage of CEOs on the association between incentive schemes and bank risk. We use a unique dataset with over 3.8 million hand-collected ancestral records to determine CEO country of origin. To our knowledge, this is the first study to examine such effects in banking within a single country context. Highlighting these issues can provide awareness and practical solutions for remuneration committees and policy makers that set reward guidelines. To design more effective reward systems, one must be aware of the cultural preference of the recipient. This can benefit both the firm and employees, through more efficient economic resource allocation as well as maximising the effect of rewards on employees. Tailored plans rather than a generic industry pay structure, that fails to efficiently reward agents or fulfil the purpose of the positive reinforcement, can ultimately help mitigate excessive bank risk and therefore wider systemic risk.

The rest of the thesis is organised as follows. Section 2.2 discusses and develops the conceptual framework and hypothesis. Section 2.3 describes sample construction, defines the variables, and reports summary statistics. Section 2.4 provides the model specification and presents results from the baseline model. In section 2.5 we present our robustness tests, and finally, section 2.6 concludes.

2.2 Hypothesis Development

2.2.1 CEO Incentives and Risk in the Banking Sector

Since the financial crisis of 2007-2008, the world turned its attention to banks and their shortcomings that led to the global event. Specifically, the finger was pointed at the reward systems of executives. "Compensation practices at some banking organisations have led to misaligned incentives and excessive risk-taking, contributing to bank losses and financial instability." Chairman Ben S. Bernanke (Board of Governors of the Federal Reserve System, 2009). Incentive schemes are often viewed through the lens of the bank. The economic perspective of a firm takes priority over those of the individual employees, typically designing pay programs that suit the needs of the organisation (Conlon and Parks, 1990). The objective of executive compensation package is to attract, retain, and motivate CEOs. The typical approach for understanding executive pay is via the principal-agent model (Conyon, 2006). Compensation policies are designed to mitigate agency problems and to maximise shareholder value however, the incentives generated by such compensation practices may encourage excessive risk-taking in the financial industry (Palia and Porter, 2004; Chen et al., 2006; Bebchuk et al., 2010; Gande and Kalpathy, 2017).

Dittmann et al. (2017) argue that shareholders consider risk-taking incentives when designing CEO contracts, as CEOs are often heavily exposed to firm-specific risk through their own stock and option holdings and bear employment risk. Thus, if CEOs are risk-averse, they are more likely to reduce such risk, even if doing so diminishes its value, and therefore, incorporating risk-taking incentives such as vega can help overcome this. An abundance of empirical studies has observed the positive association with risk-taking in financial firms and vega embedded in CEO compensation contracts (Hagendorff and Vallascas, 2011; DeYoung et al., 2013; Marques and Oppers, 2014; Gande and Kalpathy, 2017). The risk-taking associated with vega comes in a variety of activities such as cash holdings, projects, investments, merges and acquisitions, misreporting, and exchange rate exposure. For example, Tong (2010) finds that risk-averse CEOs keeps greater cash holdings to reduce firm risk at the expense of shareholder value, whereas firms with higher CEO risk incentives have less cash holdings. Coles et al. (2006) find that that riskier policy choices are associated with compensation structures with higher vega values. These CEOs implement riskier policy choices such as higher investment in R&D, less investment in PPE, and higher leverage. Similarly, CEOs with higher pay-risk sensitivity (vega) participate in risk-inducing mergers (Hagendorff and Vallascas, 2011), and are more likely to invest in acquisitions (Croci and Petmezas, 2015) consistent with the theory that managers receive incentives to invest in riskier projects, especially when the potential loss from underinvestment in valuable risk-increasing projects is highest (Guay, 1999). Vega related risk is not limited to risky investments. Francis et al. (2017) find that vega increases exchange rate exposure. Furthermore, evidence suggests that a positive relation between vega and misreporting (Armstrong et al., 2013). The ample research suggests that vega, provides risk-averse CEOs with an incentive to increase their firms' risk (Armstrong and Vashishtha, 2012).

However, lesser explored effect of vega gives rise to the contrary. "The common folklore that giving options to agents will make them more willing to take risks is false. The common folklore clearly has its genesis in the observation from option pricing theory that an increase in the volatility of an option makes it more valuable" (Ross, 2004).[1] This is consistent with the view where option compensation does not strictly lead to greater risk-taking but where giving the agent more options causes them to reduce volatility (Carpenter, 2000). Iqbal and Vähämaa (2019) examine the risk of financial institutions in the U.S. and find a negative association with compensation based risk-taking incentives. Parallel to this, additional empirical evidence documents a negative relationship between risk and the risk-sensitivity of CEO compensation (Bai and Elyasiani, 2013; Bharati and Jia, 2018). Compensation elements commonly thought to be the riskiest components however, Acrey et al. (2011) find that unvested options, are either insignificant or negatively correlated with common risk variables. Consistent with the view that there is little or no evidence to suggest such incentives promote risk-taking but instead, offset, or induce executives to adopt less risky policies (Carpenter, 2000; Ross, 2004; Bai and Elyasiani, 2013; Serfling, 2014; Bharati and Jia, 2018; Doukas and Mandal, 2018; Feng and Rao, 2018; Chakraborty et al., 2019; Iqbal and Vähämaa, 2019).

2.2.2 Culture's Influence on Reward Preferences

The effects of culture on economic outcomes attract an increasing stream of research (Liu, 2016; Nguyen et al., 2018). Hofstede (1984) defines culture as "the collective programming of the mind which distinguishes the members of one group or society from those of another". Thus, culture reflects the values of individuals that originate from a given society (Hofstede, 2001; Desmet et al., 2017). The transmission of culture is evident throughout history. Fernández (2011) describes cultural preferences and values as having "a life of their own" because even case they are removed from the environment in which they originate, they continue to exercise influence over individuals' behaviour. Immigrants, for example, not only bring their principles and values to their new home, but these beliefs are also passed down to their descendants even after several generations (Guiso et al., 2006).

Variations in preferences and values that stem from cultural heritage are important drivers of economic behaviour (Henrich, 2000; Falk et al., 2018). This is due to culture serving as an informal institutional mechanism that calibrates individuals' behaviour in economic transactions

[1] Managers that have significant human capital tied to the firm and are less diversified compared with outside investors i.e., shareholders, and could therefore, forego risk-increasing positive net present value projects (Amihud and Lev, 1981; Smith and Stulz, 1985).

(North, 1990; Licht et al., 2005; Tabellini, 2010). Several studies show that cultural characteristics influence individuals' financial decisions such as savings (Carroll et al., 1999; Falk et al., 2018), spending (Gentina et al., 2014), investment (Grinblatt and Keloharju, 2001; Chui et al., 2010; Georgarakos and Pasini, 2011; Eun et al., 2015), risk-taking (Li et al., 2013; Berger et al., 2021) and other economic outcomes (Guiso et al., 2006; Liu, 2016). On the basis that individual values and preferences about financial decisions and risk differ between cultures, it is plausible that the responsiveness to compensation incentives also differs.

Compensation incentives are often viewed through the lens of the organisation. The economic perspective of the firm takes priority over those of the individual employees, typically designing pay programs that suit the needs of the firm (Conlon and Parks, 1990). However, this is a counter-intuitive approach. Shareholders are utility maximisers. Therefore, it would be rational to incentivise employees with rewards that they value. In this way, employees' willingness to strive towards shareholders' desired goals could increase. On the other hand, economic resources are inefficiently applied when rewards are not valued by the recipient (Robbins S. P., 1988).[2] Compensation incentives are extrinsic motivation factors because they attempt to influence individuals' behaviour through an external financial reward system. Maslowian interpretation of human motivation does not explicitly consider cultural differences (Maslow, 1943).[3] As the theory developed and became further researched, it was found that the model is less suitable in the presence of cultural heterogeneity (Hofstede, 1984; Gambrel and Cianci, 2003).

Hence, to appropriately appeal to employee motivation with extrinsic incentives such as employee compensation packages, one must appeal to an individual's underlying culturally driven preference for such incentives. These cultural preferences represent intrinsic motivation factors. They could influence individuals' response to extrinsic incentives such as compensation packages through individuals' internal values (Guiso et al., 2006). Culturally driven preferences embody key intrinsic motivating elements regarding the response to extrinsic incentives. Tosi and Greckhamer (2004) provide evidence that CEO compensation packages differ substantially across countries in a manner that is consistent with variability in the (Hofstede et al., 1990) cultural preferences and values. Thus, it is vital to consider cultural preferences when considering the degree to which compensation packages incentivise employees (Newman and

[2] See Herzberg (1964) Dual-Factor Theory; 'hygiene' factors include employee remuneration. Demotivated employees can lead to poor decision-making and lack of concern for undesirable firm-related outcomes.
[3] See Maslow's Hierarchy of Needs Theory (1943).

Nollen, 1996; Kanungo R. N. and Mendonca M., 1997; Chiu et al., 2002; Chiang and Birtch, 2006).

2.2.3 Hypothesis

We posit that the cultural heritage of bank CEOs could mediate the relationship between the risk-taking compensation incentive of bank CEOs (vega) and bank risk. We use the four main cultural dimensions in the Hofstede (2001) framework to explore how the relationship between risk and vega changes according to each dimension. This approach captures the following 4 dimensions: Masculinity versus Femininity (MAS), Power Distance Index (PDI), Individualism versus Collectivism (INV), and Uncertainty Avoidance Index (UAI). Next, we break down each dimension that drives these underlying cultural preferences that shape risk-taking behaviour.

Bank CEO Masculinity and Vega

The masculinity versus femininity dimension is the degree to which stereotypical gender connotations and values, are preferred in each society. Masculine societies are often associated with traits such as striving for material success, recognition of performance, high achievement, aggressiveness, and competitiveness. In contrast, femininity, encompasses values related typically to more nurturing and softer attitudes with higher importance placed on cooperation. Based upon the characteristics of these two bi-polar types, we believe that CEOs that trace their origin in more masculine societies are more likely to respond strongly to risk-taking compensation incentives, namely vega, for two key reasons. Firstly, masculine cultures highly value achievement, financial rewards, and material success (Hofstede, 1980; Hofstede, 2001). In these societies there is a strong 'workaholic' ethos where organisations place greater emphasis on results and reward achievement-based performance (Hofstede, 2010). Masculinity, therefore, strongly relates to materialistic ideals and preferences (Zheng et al., 2012). Ashraf et al. (2016) note that masculine individuals pursue risky choices, generating wealth and showing-off. Richins and Rudmin (1994) posit that materialism is a crucial explanatory attribute of individuals' desire for increased financial success, motivation derived from this desire, and satisfaction by achieving their wealth targets. Secondly, individuals that trace their origin in more masculine societies are more likely to feel comfortable with increased risks. Meier-Pesti and Penz (2008) show that individuals' association with masculine attributes increases financial risk-taking.[4] Individuals in such societies strive for achievement, financial rewards, and status recognition which, in turn,

[4] Many studies explore the influence of masculine attributes on risk-taking and find a positive relationship (Sheaffer et al., 2011; Ahmed et al., 2019).

promotes aggressive behaviour with little consideration given to the potential consequences (Doney et al., 1998; Hofstede, 2001; Jing and Graham, 2008; Zheng et al., 2012). Hence, the importance of making money, and of striving for material success is likely to promote increased risk-taking in order to attain this goal, especially if increased risk-taking is further motivated using compensation incentives.

Based on the above discussion, we formulate our first hypothesis as follows:

H1: The association between CEO risk-taking compensation incentives (Vega) and bank total risk would be significantly more positive for bank CEOs that trace their origin to more masculine societies.

Bank CEO Power Distance and Vega

Power distance is the degree to which a difference in power and status are accepted without justification (Hofstede, 2001). The countries who score highly on power distance index, accept a hierarchical order within society. In these situations, privilege and status symbols are considered the norm. Such an unequal power distribution in the organisational hierarchy, is met with little resistance and willingly accepted. This is evident in the salary system where an extensive pay gap exists (Hofstede, 2010). Bank CEOs that trace their origin in high power distance societies are likely to place a great value on their high-ranking position and status and thus, may avoid excessive risk-taking to preserve said position and status. Traditionally, agents face severe consequences such as the loss of employment, should the bank fail (Cornett and Saunders, 2006). Furthermore, there is a plethora of studies that find an association between high levels of power distance and risk-aversion, and vice versa. Power distance has a substantial negative effect over firm risk-taking (Shane, 1993; Kreiser et al., 2010; Mihet, 2013). Similarly, Thompson (2009) finds individuals from high power distance cultures encourage conservatism as they exhibit less independent and autonomous behaviours when decision-making. The predominance of authoritarian norms and conformity discourages uncontrollability and deviations from the status quo. As a result, predictability is highly regarded (Hofstede, 1984; Doney et al., 1998). Hence, a compensation incentive which encourages additional risk may have little appeal to their embedded risk-averse intrinsic nature.

H2: The association between CEO risk-taking compensation incentives (Vega) and bank total risk would be significantly less positive for bank CEOs that trace their origin to more power distant societies.

Bank CEO Individualism and Vega

The individualism versus collectivism dimension describes the extent to which a society reflects the "I" or "we" self-image. It is the degree to which an individualistic nature prevails in each society and is reflected in societal interactions (Hofstede, 1984). Those from such societies place greater emphasis on oneself, with less regard for others (Hofstede, 2010). In contrast, those from collectivist cultures prefer to be integrated into cohesive groups with closely-knit relationships, forming strong bonds (Hofstede, 2001; Li et al., 2013). Collectivist societies have evolved to form strong bonds as a defence mechanism to mitigate exposure to high risk and dangerous situations (Fincher et al., 2008; Nash and Patel, 2019).[5] Whereas individualistic societies have not required such an evolutionary defence and have therefore, been able to embrace greater freedom and self-interest ideals with less concern required for riskier situations. With regards to individualism in an organisational setting, individualistic societies organise work in such a way that the employees' interest are aligned with the employers (Hofstede, 2010). Therefore, an individualistic CEO is more likely to focus on their own career advancement, which coincides their firm's financial gain. They are more likely exhibit a higher propensity to increase their own wealth, as well as their employers. The potential increase in wealth can be achieved via higher risk investment strategies. This is further reinforced by their desire for financial independence and autonomy. As a result, are more likely to seize such opportunities when presented. i.e., high risk high reward strategies. Furthermore, there is a strong link between individualism and overconfidence, specifically related to financial decision-making and investment behaviour (Chui et al., 2010; Ferris et al., 2013; Breuer et al., 2014). Evidence suggest that overconfidence is a cognitive bias (Harvey, 1997; Moore et al., 2018) where the confidence in one's judgment is unreliably greater than an objective judgement. This is particularly relevant as overconfidence has been frequently linked to risk-taking (Malmendier and Tate, 2005; Chuang and Lee, 2006). Meikle et al. (2016) investigates the role of overconfidence within an organisation, focusing on ways in which, on an individual level, can manifests itself and finds that the consequences of overconfidence can be significant, especially when it stems from those at the top of an organisation. Moreover, overconfidence and optimism are a common feature of individualistic societies. Those from individualistic societies judgement may be clouded by their overconfidence and do not fully recognise certain market threats which is then further exasperated by compensation incentives such as vega.

[5] For example, societies with greater risk for contagious disease, a more collectivistic (less individualistic) society may form to mitigate exposure to pathogens (Faulkner et al., 2004; Park et al., 2007; Fincher et al., 2008; Nash and Patel, 2019).

Based on the above discussion, we formulate our third hypothesis as follows:

H3: The association between CEO risk-taking compensation incentives (Vega) and bank total risk would be significantly more positive for bank CEOs that trace their origin to more individualistic societies.

Bank CEO Uncertainty Avoidance and Vega

Uncertainty avoidance is traditionally associated with risk-aversion. It is the degree to which society members feel uncomfortable with future uncertainty and demonstrate a strong dislike ambiguity. Those from high uncertainty backgrounds have developed ways to alleviate this anxiety, for example, the creation of laws, and establishing rules, and rejecting divergent ideologies, to try and limit uncertain situations (Singh, 1990; Hofstede, 2010). Whilst uncertainty avoidance does not necessarily mean risk avoidance, it does however, address risk preference, risk perception and a reliance on risk-reducing strategies (Doney et al., 1998). Empirical findings show that such cultures demonstrate more conservative behaviour in financial decision-making and greater safety measures against risk (Ramirez and Tadesse, 2009; Frijns et al., 2013). There is strong evidence to suggest that the characteristics of individuals originating from high uncertainty avoidant societies also manifest themselves in the banking industry. Managers originating from such societies tend to be more conservative, prudent and endeavour to reduce their exposure to future uncertainty and display a stronger preference for predictable returns (Fidrmuc and Jacob, 2010; Frijns et al., 2013; Zheng et al., 2013). This may also be mirrored in the proportion of compensation that is dependent on performance in such societies (Tosi Jr and Gomez-Mejia, 1989). Therefore, bank CEOs from high uncertainty avoidant backgrounds, may reflect their preference to minimise uncertainty by navigating away from higher risk strategies that are encouraged by compensation incentives such as vega.

H4: The association between CEO risk-taking compensation incentives (Vega) and bank total risk would be significantly less positive for bank CEOs that trace their origin to more uncertainty avoidant societies.

2.3 Data and Methods

2.3.1 Sample Selection

This study investigates how CEOs compensation incentives (vega) and cultural heritage interact to shape bank risk. The sample consists of three key components: compensation data, bank risk data, and CEO cultural data. We gather data from several sources including, but not limited to

Execucomp, CRSP, Compustat Bank and Ancestry.com. To construct the sample of banks, we obtain data from several sources. As the study requires compensation data, we use Standard and Poor's (S&P) Execucomp database to begin the formation of the sample. We search and download the entire database, including all variables for the period 1992-2017. This yields 287,579 firm-year observations. To filter our sample, we extract all firms with a Standard Industry Classification (SIC) code between 6020 (Commercial Banking) to 6282 (Investment Advice). We use a similar method to Fahlenbrach and Stulz (2011), we exclude firms that are not in the lending or deposit taking business. For example, we remove all firms with SIC codes 6211 (Security Brokers and Dealers). This provides a homogenous sample that contains SIC codes 6020 (Commercial Banks), 6021 (National Commercial Banks), 6022 (State Commercial Banks), 6035 (Savings Institutions, Federally Chartered) and 6036 (Saving Institutions, Not Federally Chartered). We then remove all non-CEO executives based on the annual CEO flag provided by Execucomp. Our final sample contains 351 CEOs across 229 banks, yielding 1,586 observations. To avoid any survivorship bias, we include firms that did not survive the full 26-year period of our study. For transparency, the final sample of banks used in this study are shown in Appendix 1. We use Compustat to collect bank financial data. We download all variables for all U.S. commercial banks between 1992-2017. We merge this dataset with the governance data from Execucomp using the Global Company Key (GVKEY) as a unique identifier. Once the financial and governance data have been matched, we obtain the daily share price data from the Center for Research in Security Prices (CRSP) and match using the Committee on Uniform Securities Identification Procedures (CUSIP) code.

2.3.2 CEO Cultural Heritage

The Execucomp database includes the full names of all bank CEOs. First, we manually search each CEO name to check for any spelling errors in the database. The spelling of certain names, particularly those with accents, have missing characters. For example, the spelling of the surnames Carrión, Fernández and Sánchez are listed as Carrin, Fernndez and Snchez in the database. In addition, the database does not provide information on the previous family names of CEOs. For example, the database listed a JP Morgan CEO with the name Dimon however, this was changed from Papademetriou, which is of Greek origin (McDonald, 2009). We also search for the maiden names of female CEOs. For example, the married name Luciani, is of Italian origin whereas the maiden name Alemany is of Spanish origin. This is necessary as the results can vary significantly depending on the surname's country of origin. For example, according to Hofstede's model, the Masculinity dimension would give a score of 42/100 for Spain compared to 70/100 for Italy. We use a variety of sources including obituaries, news articles, biographies, and State digital archives of marriage certificates to determine the maiden names.

Once the list of original names has been finalised, we record any information found during the investigation regarding the background of the CEO i.e., family origin or immigration details. However, as we did not find this information for all CEOs, we use alternative methods to determine their country of origin. Many studies use surnames to infer cultural heritage (Lauderdale and Kestenbaum, 2000; Kerr and Lincoln, 2010; Pan et al., 2015; Gompers et al., 2016) and more closely related to this paper, Liu (2016) use the surnames of bank insiders (i.e., officers and directors) to find their country of origin. Like these methodologies, to find country of origin using surnames we adopt a triangulation approach. First, we use Forebears, a database that brings together a range of genealogical sources that have been geographically indexed and cross-referenced (Forebears, 2019). We use Forebears as our starting point to give us an indication of the country of origin of surnames. For example, searching the name Cappelli will show that in Italy the name is most prevalent and has the highest density.

Second, we use the 1940 United States Federal Census as it is the largest and most recent census available for public access. This census is no longer subject to the "72-Year Rule" (92 Stat. 915; Public Law 95-416; October 5, 1978) limiting access to the records, excluding those individuals named on the record or their legal heir (U.S. Census Bureau, 2019). Census enumerators were instructed to "visit every house, building, tent, cabin, hut, or other place in which any person might live or stay, to ensure that no person is omitted from the enumeration" and to count "each person alive at the beginning of the census day, i.e., 12:01 A.M. on April 1, 1940". It is estimated that 87 percent of Americans can be linked with at least one relative in the 1940 United States Federal Census (Ancestry, 2019). We hand-collect 100% of the records available at the time of collection for all CEOs in our sample. For example, the name Hassell contains 3,126 records. However, for more common surnames such as Smith contain 1,390,228 records, we take a sample of 10,000. The total number of records collected from the 1940 census is approximately 2,096,470. We then use this information to find the most frequent place of birth and the oldest record to determine the country of origin for each unique surname. For example, the surname Cappelli shows that those who bear that name are most frequently born in Italy as well as showing Italy being the oldest record in the census for that name search. However, for some names the most frequent place of birth and oldest place of birth do not match. For example, the surname Nocella shows the most frequent place of birth to be New York but the oldest records show Italy. Therefore, we use a third method of determining the country of origin.

We use immigration and travel records, specifically the New York, Passenger and Crew Lists (including Castle Garden and Ellis Island) between 1820-1957. These records are available from Ancestry.com which provides a database to the passenger lists of ships arriving from foreign ports at the port of New York. This information includes passenger name, arrival date, birth year, port of departure, ethnicity and ship name. Particularly, Ellis Island was the entry point for over 12 million immigrants to the U.S. and was the busiest station for over 60 years and approximately 40 percent of all current U.S. citizens can trace at least one of their ancestors to this gateway (History.com Editors, 2019). Similar to the aforementioned method, we acquire 100% of the records available at the time of collection for all CEOs in our sample and for those with more common surnames, we take a sample of 10,000. The total number of records collected from the database is approximately 1,705,479. For each surname we find the most frequent occurring ethnicity. For example, approximately 80% of those who bear the name Cappelli are of Italian ethnicity. This system utilises the idea that CEOs with the surnames Wu or Cheng are likely of Chinese ethnicity, those with surnames Nocella or Terracciano of Italian ethnicity, those with surnames Champagne of French ethnicity and so on.

To determine our final sample, we use a surname-ancestry country matching list from Origins Info Ltd. This is a recognised commercial entity of name classification services that utilises sources such as the American Dictionary of Family name. The accuracy of the vendors matching has been validated in previous studies i.e., Webber (2007). We use Origins Info Ltd to verify our existing sample collection methods and find a very high match rate. For the remaining discrepancies we use the commercial vendor to finalise our sample. For example, we find the surname Larsen to be of Danish origin however, the database shows the name to be of Swedish origin.

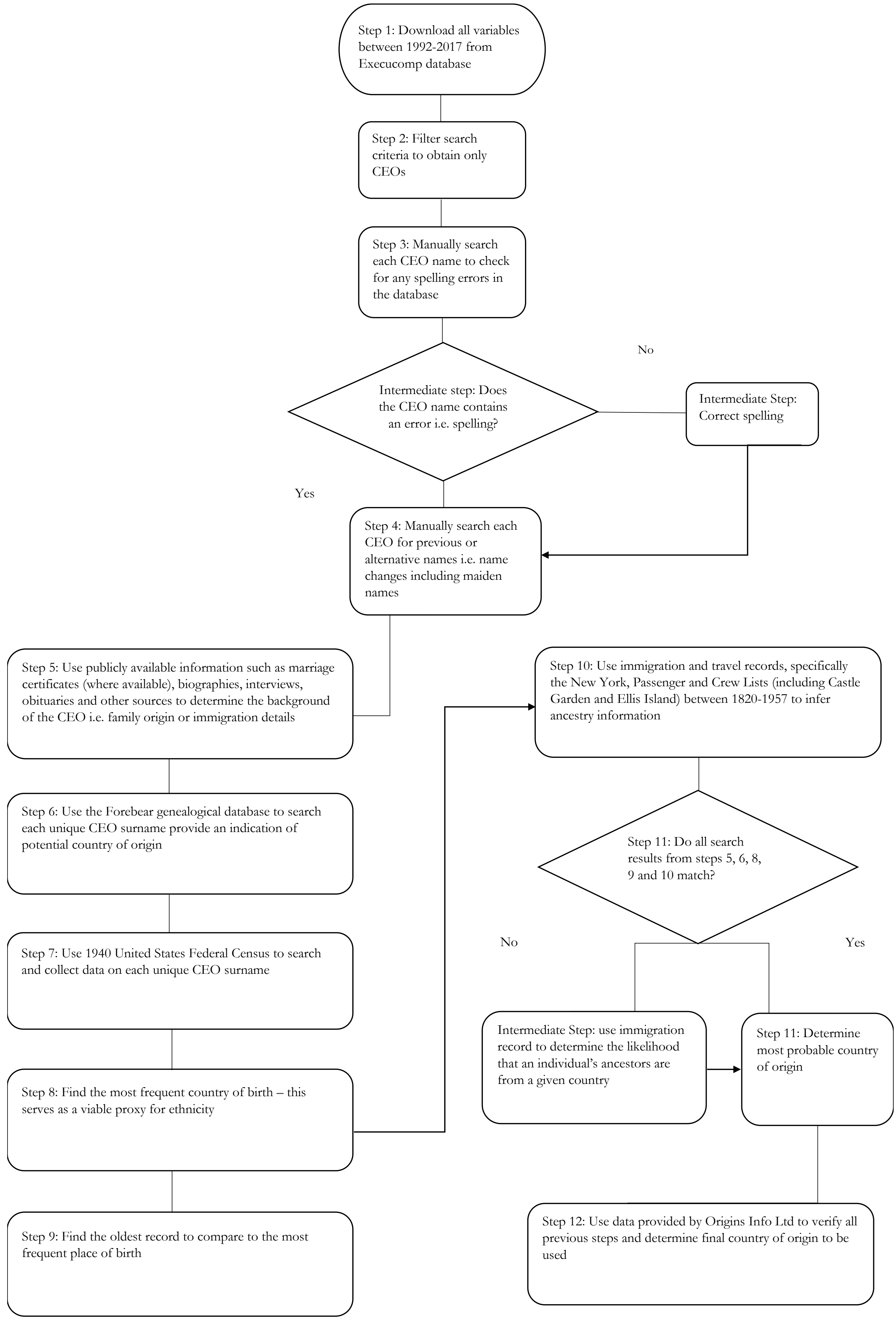
We acknowledge that there may be CEOs of mixed ancestry in our sample and whilst relying on surnames to infer ethnicity is a noisier approach (Nguyen et al., 2018), this is a factor that cannot be observed without constructing the CEOs family tree. However, sociological studies show that cross-cultural marriages were not common amongst immigrants in the 20th century e.g., Pagnini and Morgan (1990) explain that endogamy was strong during this period, within ethnic groups, immigrants tend to marry other immigrants. In addition, Nguyen et al. (2018) note that fewer than 15% of CEOs come from mixed ancestry within their sample of U.S. CEOs.

Finally, we follow Pan et al. (2015) and aggregate historical countries to their modern-day counterparts. For example, we group different German origins such as Bavarian and Prussian under Germany. In other cases, we further group smaller nationalities into larger groups. For example, United Kingdom includes those that identified as British, English, Scottish and Welsh. This is necessary for the ethnicities to fall under the dimensions explained in the next section. Appendix 2 compares methodologies from similar studies.

Figure 1. Bank CEO Scorecard

Full Name	Ellen R. Alemany
Previous Surname	Luciani
Family Origin (Search)	Not Found
Forebear (Prevalent)	Italy
Forebear (Density)	Italy
1940 Census Country (Frequency)	Italy
1940 Census (Oldest Recorded)	Italy
Immigration Country (Frequency)	Italy
Our Determined Country	Italy
Origins Info: Type description of family name	ITALY
Group description of family name	WESTERN EUROPEAN
Continent	Europe
Final Country Determined	Italy
Match (1 or 0)	1
Power Distance Index (PDI)	50
Individualism (IDV)	76
Masculinity (MAS)	70
Uncertainty Avoidance Index (UAI)	75

Figure 2. Heritage Flowchart



Hofstede originally constructed the dimensions by analysing the survey results of IBM employees in more than 50 countries between 1978 and 1983. Subsequently, the study has been replicated and expanded to include other populations and additional countries with more cultural dimensions added to the model (Hofstede, 2001). Once we infer the CEO ethnicities, we adopt Hofstede's cultural framework and use the four key dimensions as a proxy for culture. We obtain our data from two sources, the first from Geerthofstede.com using the latest dimensions (2015 version) and second, the Hofsted-Insights.com.[6] However, some of the dimension scores fall outside the 0-100 continuum, therefore we use the 2014 values that fall within the 0-100 range. For example, the Uncertainty Avoidance Index (UAI) of Greece is 112 and becomes scaled down to 100. Our sample contains 351 CEOs, with 4 countries that make up 71.49% of the sample: United Kingdom (47%), Germany (16%) and Ireland (10%) and Italy (3%). The remaining are from all other countries that made up 3% or less, individually such as Japan, Greece, South Korea and so on.

2.3.3 CEO Risk Incentives

Dittmann et al. (2017) argue that shareholders consider risk-taking incentives when designing CEO contracts, as CEOs are often heavily exposed to firm-specific risk through their own stock and option holdings and bear employment risk. Thus, if CEOs are risk-averse, they are more likely to reduce such risk, even if doing so diminishes its value, and therefore, incorporating risk-taking incentives such as vega can help overcome this. Empirical studies have observed the positive association with risk-taking in financial firms and vega embedded in CEO compensation contracts (Hagendorff and Vallascas, 2011; DeYoung et al., 2013; Marques and Oppers, 2014; Gande and Kalpathy, 2017). Therefore, we use the vega of equity-based compensation as our main variable to capture CEO risk-taking incentives, calculated as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility (Core and Guay, 1999; Coles et al., 2013).[7]

2.3.4 Bank Risk Measures

Our primary risk measure is captured by total risk, which is defined as the annualised variance of daily stock returns for each fiscal year (DeYoung et al., 2013; Ellul and Yerramilli, 2013; Ongena et al., 2018). Stock-return volatility reflects the market views of riskiness and captures

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[6] Data available from: https://geerthofstede.com/research-and-vsm/dimension-data-matrix/ and country comparison tool from https://www.hofstede-insights.com/product/compare-countries/

[7] We thank Coles, Daniel and Naveen for sharing their data on CEO incentives online. Please refer to Coles et al. (2006), Coles et al. (2013), and (Core and Guay, 1999).

all past and present information as well as expectations of future cashflows. We decompose the total risk into three further components: systematic, unsystematic and downside tail risk. To compute the systematic and unsystematic risk, we follow the standard methodology and use the CRSP value-weighted returns as our proxy for the returns on the market portfolio (Bhattacharyya and Purnanandam, 2011; DeYoung et al., 2013; Ongena et al., 2018). The unsystematic risk is then the annualised variance of the residuals from the regression. The market betas are calculated by regressing bank excess returns on market excess returns. The systematic risk is then the annualised variance of the product of bank beta and the market daily returns.[8] For our last measure of risk, we use downside tail risk. As standard in the literature, we compute tail risk by taking the average return of each banks' equity over the 10% worst return days for a given year (Ellul and Yerramilli, 2013; Bushman et al., 2018; Ongena et al., 2018). As this is a negative figure, we multiply results by (-1) hence, higher values signify higher risk.

2.3.5 Control Variables

We use a standard set of controls that may influence our independent variable. We control for bank size using total assets (Demirgüç-Kunt and Huizinga, 2010; Delis and Kouretas, 2011; Anginer et al., 2018) as larger banks are better diversified (Demsetz and Strahan, 1997). We include ROA as a profitability measure (Khan et al., 2017; Du and Palia, 2018) as banks that do not achieve their target returns may be motivated to undertake riskier investments in order to reach them next period (Ongena et al., 2018). We also implement debt and regulatory ratios in our list of controls as these may influence risk-shifting incentives. These variables include leverage (Sila et al., 2016; Anginer et al., 2018; Mourouzidou-Damtsa et al., 2019) that provide insight to a bank's equity position and risk. Due to the nature of the banking industry, there is heavy reliance on debt in the capital structure, which naturally comes at a cost and thus we include capital tier 1 measured using the ratio of tier-1 capital to total risk-weighted assets, a key measure of a bank's financial strength (Laeven et al., 2016). In addition, we include total deposits to total assets in our set of controls as banks with higher quantity of deposits are more likely to receive government support in times of financial distress (Ongena et al., 2018) due to the wider systemic impact of the bank failure. In line with other studies, we use provisions (for loans and asset losses) to total assets as studies have shown discretion in loan provisioning can impact banks' risk-taking behaviour (Bushman and Williams, 2012). Therefore, using provisions to assets can help assess the quality of bank assets that has previously been responsible for bank

[8] We verify our systematic and unsystematic risk by using the coefficient of determination R-squared (systematic risk proportion) and 1-R-squared (unsystematic risk proportion) and obtain similar results.

failures (Mourouzidou-Damtsa et al., 2019). Further, we use common ordinary equity to total assets (Mamatzakis and Bermpei, 2015) as this ratio represents the portion of a bank's assets that is financed by equity that shareholders have a residual claim to.

We also include a number of alternative compensation variables in our set of controls to account for both performance and non-performance-based incentives. This includes cash compensation separated into salary, and bonus. However, following the implementation of regulatory standards FASB 123R (effective for reporting periods after 15th December 2005) we make the necessary adjustments to these compensation variables for post-2006 periods.[9] We follow the methodology provided by Hayes et al. (2012) to make these transformations. Parallel to vega, we include the delta of equity-based compensation to capture the performance incentives. We measure CEO performance incentives by delta, measured as the change in the dollar value of the CEO's equity-based compensation for a 1% change in the stock price (Core and Guay, 1999; Coles et al., 2006; Coles et al., 2013). All compensation variables are stated in thousands of dollars and are winsorized at the 1st and 99th percentiles (as in Coles et al. (2006), Hayes et al. (2012), and Ongena et al. (2018)). Finally, to capture the effect of inflation, we use the annual GDP deflator to convert the compensation variables to 1992 dollars. Table 1 provides a variable definitions table.

2.4 Empirical Findings

2.4.1 Regression Specification

To test our hypotheses, we use the following multivariate linear regression equation:

$$Bank\ Risk_t = a + \beta_{1(Vega)t-1} + \beta_{2(CEO\ Cultural\ Heritage)t-1} + \beta_{3(Vega\,*\,CEO\ Cultural\ Heritage)t-1} + Bank\ Controls_{t-1} + CEO\ Controls_{t-1} + Bank\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon \quad (1)$$

The primary dependent variable is total risk, equal to the annualised variance of daily stock returns during a bank's fiscal year. The independent variables include risk-taking compensation incentive, vega and, the 4 cultural dimensions described in Table 1. A Hofstede index score is assigned to each individual country for each of the cultural dimensions. For example, CEOs with an Italian background, receive a score of 76 for individualism. All risk and compensation

[9] Details of reporting changes to compensation variables can be found: https://www.fasb.org/summary/stsum123r.shtml

variables enter the regressions in natural logarithmic forms. We use a standard set of control variables including bank financial characteristics as previously described.[10]

In equation (1), we are particularly interested in the coefficient $\beta 3$. Our models include the interaction terms between vega and the four key cultural dimensions of Hofstede (2010); masculinity (MAS), power distance index (PDI), individualism (INV), and uncertainty avoidance (UAI). In line with the literature, we introduce each cultural dimension separately in our initial analysis (Chui and Kwok, 2008; Zheng et al., 2012; El Ghoul and Zheng, 2016). We take these steps due to the cross correlation of the cultural dimensions (Mihet, 2013). Following the prior literature, all independent variables are lagged by 1 year (Iqbal and Vähämaa, 2019). Our main regression models include bank fixed effects to control for unobservable effects that vary across banks but are constant over time, and year fixed-effects to control for time-specific unobservable factors i.e., macroeconomic variations over time which may influence risk. Robust standard errors are clustered at bank level (Liu, 2016; Ongena et al., 2018). The summary statistics and correlation matrix are provided in Table 2 and 3, respectively. The summary statistics are similar to other studies that utilise similar risk and bank variables (Ellul and Yerramilli, 2013; Ongena et al., 2018). We note that the Hofstede's cultural heritage variables yield similar statistics to those in the studies of Nguyen et al. (2018) and (Hagendorff et al., 2019).

In our analysis we opt for a fixed effects rather than a random effects estimator for the following reasons. We use the Hausman test to determine the most appropriate estimator (see diagnostic results presented in Appendix 9). Moreover, due to the nature of our dataset i.e., panel data observed at regular time intervals. We are interested in analysing the impact of our chosen variables over a period of 25 years. By using a fixed effects estimator, we are able to explore the relationship between the predictors (i.e., size, ROA, leverage) and outcome variables within each bank (i.e., bank risk). Each bank and firm have their own individual characteristics that could influence the predictor variables such as the business policies of a bank or firm which may influence its level of risk. Hence, we assume that a characteristic of the bank or firm may impact or bias the predictor or outcome variables and hence, control for this. Finally, we follow standard literature within this area fixed effects estimators are commonly used in this field of literature (i.e., Li et al. 2013; Liu, 2016; Nguyen et al., 2017).

[10] See section 2.3.5 Control Variables

2.4.2 Baseline Results

We employ the baseline equation (1) to test the hypotheses (i.e., H1-H4) that the association between CEO risk-taking compensation incentives (vega) and bank total risk changes depending on the bank CEOs cultural heritage. In Table 4, model 5, we find the individual effect of vega has a negative relationship with total risk, indicating that this CEO risk-taking incentive does not lead to increases in total bank risk. However, we note this result is not statistically significant. This is consistent with the view where option compensation does not strictly lead to greater risk-taking but where giving the agent more options cause them to reduce volatility (Carpenter, 2000). Similarly, Ross (2004) explains "the common folklore that giving options to agents will make them more willing to take risks is false. The common folklore clearly has its genesis in the observation from option pricing theory that an increase in the volatility of an option makes it more valuable".

There are a number of studies parallel to this less recognised (alternative) view. Empirical evidence has shown a negative relationship between risk and the risk-sensitivity of CEO compensation (Bai and Elyasiani, 2013; Bharati and Jia, 2018). Compensation elements are commonly thought to be the riskiest components; however, Acrey et al. (2011) find that options are either insignificant or negatively correlated with common risk variables. Consistent with this view, several empirical studies find that compensation incentives either do not influence or decrease risk taking by inducing executives to adopt less risky policies (Carpenter, 2000; Ross, 2004; Bai and Elyasiani, 2013; Serfling, 2014; Doukas and Mandal, 2018; Feng and Rao, 2018; Chakraborty et al., 2019; Iqbal and Vähämaa, 2019).

As noted from Table 4, the coefficient estimates for CEO vega in model 5 are negative yet statistically insignificant, suggesting that risk is not affected by CEO risk-taking incentives. Iqbal and Vähämaa (2019) find similar results using risk-based dependent variables. In addition, Ongena et al. (2018), Ellul and Yerramilli (2013), (Acharya et al., 2014), and (Chesney et al., 2020) also report vega to be an insignificant determinant of bank risk. However, after the inclusion of the culture interaction in model 1, the coefficient estimate for vega (Vega) is negative and statistically significant and the coefficient for the interaction variable vega x masculinity (Vega*MAS) is positive and highly significant, at the 1% level. Accordingly, our estimates indicate that the negative association between vega and risk is weakened (i.e., risk increases) by bank CEOs who originate from more masculine societies. In model 1 of Table 4, the main effect shows that a 1% increase in vega, decreases risk by -0.0621%, when masculinity is zero. However, when vega interacts with masculinity, risk increases yielding a coefficient of

0.00098%. Hence, a one standard deviation increase (13.47) in masculinity translates into a 0.0132% (0.00098*13.47) increase in total bank risk.

These results are economically significant. To illustrate, we use the masculinity score of two countries in our sample. A CEO of Slovakian origin would score 100 on the masculinity index, and a CEO of Hungarian origin would score 88. The difference in masculinity between Slovakia and Hungary is 12, this being similar to one standard deviation of masculinity (13.47). The results of model 1 of Table 4a imply that for a Slovakian CEO, a 1% change in vega leads to a 0.0359% increase in bank risk (-0.0621+(100*0.00098)). The results of model 1 of Table 4a, imply that for a Hungarian CEO, a 1% change in vega leads to a 0.0241% increase in bank risk (-0.0621+(88*0.00098)), falling within similar ranges of studies examining vega and bank risk (Ongena et al., 2018).

As expected, we find this result of the masculinity dimension to support our hypothesis H1: the association between CEO risk-taking compensation incentives (vega) and bank total risk would be significantly more positive for bank CEOs that trace their origin to more masculine societies. Member of such societies place a high value on material success, money, and financial rewards (Hofstede, 2001). Masculinity, therefore, strongly relates to materialistic ideals and preferences (Zheng et al., 2012). It follows, that materialism is a critical explanatory attribute of an individual's desire for increased financial success with motivation deriving from this desire (Richins and Rudmin, 1994). In line with our result, (Meier-Pesti and Penz, 2008) show that individuals' association with masculine attributes increases financial risk-taking. The drive for financial rewards, and status recognition promotes an aggressive behaviour with little concern on the consequences of their actions (Hofstede, 1984; Doney et al., 1998; Hofstede, 2001; Jing and Graham, 2008; Zheng et al., 2012). Hence, CEOs that trace their origin in more masculine societies are more likely to feel comfortable with actively taking increased risks in order to achieve their objective. This behaviour may facilitate increased risk-taking actions, especially if increased risk-taking is reinforced with compensation incentives. For these reasons, we suggest that CEOs that trace their origin in more masculine societies are more likely to respond strongly to risk-taking compensation incentives such as vega.

In models 2-4 of Table 4, we present the results from the remaining three dimensions: power distance (PDI), individualism (INV), and uncertainty avoidance (UAI). In each of these models, the interaction between vega and the respective cultural dimension yield sign directions consistent with that of our hypothesis (H2-H4). The coefficient for the interaction variables of power distance, and uncertainty avoidance are -0.000145 and -5.74e-05, respectively. As expected, negative association between vega and risk is further decreased by bank CEOs who originate from such societies. This is consistent with prior studies that find the association between power distance and risk-aversion, where high levels of power distance have a substantial negative effect over firm risk-taking (Shane, 1992; Kreiser et al., 2010; Mihet, 2013). Similarly, empirical findings show that uncertainty avoidant cultures demonstrate more conservative behaviour in financial decision-making and greater safety measures against risk (Ramirez and Tadesse, 2009; Frijns et al., 2013). In contrast, the coefficient for the interaction variable of individualism is 0.000262. As expected, individualism increases bank risk-taking. There is a strong link between individualism and overconfidence, specifically related to financial decision-making and investment behaviour (Chui et al., 2010; Ferris et al., 2013; Breuer et al., 2014). Hence, CEOs from high individualism cultures are likely to seize such opportunities when presented. i.e., high risk high reward strategies. However, the results from these three dimensions, shown in model 2, 3, and 4 are statistically insignificant hence, we reject hypothesis H2 to H4. As expected, masculinity is the most likely dimension that would respond to risk-taking compensation incentive, vega. It yields the most (and only) important finding. As discussed above, this dimension combines the key characteristics i.e., aggressiveness, materialism, financial drive etc., that would bolster bank risk especially when compared to the other cultural dimensions.

2.4.3 CEO Fixed Effects

The baseline estimations in Table 4 may still be subject to some omitted variable issues, despite employing fixed effects, and control variables to reduce such concerns. Omitted variables issues could relate to the bank CEO attributes. In this subsection, we provide the results from tests that attempt to attenuate such issues. In our baseline models, we employ bank fixed effects. In this way, we control for all time-invariant bank characteristics. In addition, we include year fixed effects help capture variations in bank risk over time. Furthermore, we use control variables for size, capitalisation, profitability, and other key compensation elements. However, some time-invariant characteristics could correlate with bank CEOs' cultural heritage (e.g., religion). Secondly, some other time-invariant characteristics could affect bank CEOs' preferences and, hence, the investment strategy they implement. A couple of such examples is gender and birth period (Malmendier and Nagel, 2011; Malmendier et al., 2011; Faccio et al., 2016). To lessen such concerns, we carry out estimations that use bank CEO fixed effects. This type of fixed effects also controls for an additional important time-invariant bank CEO characteristic. The latter is the generation of immigration that each bank CEO belongs to (e.g., first-generation immigrant versus second-generation immigrant). The specifications that comprise bank CEO fixed effect are available in models 1-4 of Table 5. These results are analogous to those shown in Table 4. In model 1, the individual coefficient estimate for vega (Vega) is negative and statistically significant and the coefficient for the interaction variable Vega*MAS is positive and highly significant, at the 1%, and 5% level, respectively. Accordingly, our estimates indicate that the negative association between vega and risk is weakened (i.e., risk increases) by bank CEOs who originate from more masculine societies. We find no such significance in the dimensions of power distance, individualism, and uncertainty avoidance. Hence, the results from the specifications that use CEO fixed effects continue to provide support to hypotheses H1. We note that CEO fixed effects induce the individual effect of the cultural heritage characteristics to drop from the models due to collinearity. Overall, the test that controls omitted variables bias at the bank CEO level provide consistent evidence supporting hypotheses H1 (masculinity).

2.4.4 CEO Origin and Religion Control

Endogeneity can stem from important variables being omitted from the model (omitted variable bias). In our estimations so far, we employ bank, year, CEO fixed effects, and a number of control variables to help alleviate such concerns. The source of endogeneity in our study could arise from other factors that correlate with the culture of a country of origin such as religion. Several studies have found that religiosity has an influence on an array of economic matters that are woven into the risk profile of a firm for example, attitudes, risk exposure, accounting regulations, lending, and corporate risk-taking (Iannaccone, 1998; Hilary and Hui, 2009; Maali and Napier, 2010; He and Hu, 2016; Díez-Esteban et al., 2019). Initially, we attempt to treat these concerns using an instrumental variable analysis, following the literature, and incorporating instruments for culture. Specifically, we instrument for masculinity using a measure of genetic distance between the population of a given country and the population of Japan (Cavalli-Sforza et al., 1995; Spolaore and Wacziarg, 2009), a country-level measure of distance to the equator based on country's latitude (Hall and Jones, 1999), average temperature in Celsius (Parker, 1997), and two additional instruments we test based on existing theory. (1) Existing studies have identified a link between a country's climate and its masculinity score (Hofstede, 2001; Tang and Koveos, 2008) whereby warmer climates contribute to the formation of masculine cultures. We expand upon this and use height as our instrument, which is also associated with climate. As with other species, human variation in body size appears to be strongly influenced by climatic factors (Leonard and Katzmarzyk, 2010). One of the "ecogeographical rules" explain that body mass increases with decreasing temperatures (Bergmann, 1847). Based on this theory, we collect data on the average male height for each country in our sample and find a negative association between masculinity and height.[11] (2) Ricketts and Hudson (1980) create an 'Index of Homophobia' which is a self-report that generates a score based upon the respondent's answers. We build upon this and use the LGTBQ+ safety score of each country in our sample as an instrument for masculinity.[12] The score takes into account key laws such as legalised same-sex marriage, adoption recognition, transgender legal identify laws and many more. We use this as an instrument based on the idea that stereotypical masculine societies would be less accepting of attitudes surrounding homosexuality, as this does not conform to their traditional heterosexual family unit norms hence, a negative association. We test the aforementioned instruments; however, these did not pass the weak identification (WIT) and under identification (UIT) tests.

Nash and Patel (2019) note that Hofstede's cultural value masculinity dimension has seen the least amount of attention in the culture and finance literature, and as a result, identify fewer candidates as potential successful instruments, especially compared to dimensions such as individualism. As an alternative to remedy this we run additional tests. To treat endogeneity, in Panel A of Table 6, we employ CEO country of origin fixed effects. In model 1, the individual coefficient estimate for vega (Vega) is negative and statistically significant and the coefficient for the interaction variable vega x masculinity (Vega*MAS) is positive and highly significant, at the 5% level. We note that CEO country of origin fixed effects induce the individual effect of the cultural heritage characteristics to drop from the models due to collinearity. Next, we control for the bank CEO religion for example, Greek Orthodox, Russian Orthodox, Christian Protestant, Roman Catholic, Jewish, Buddhist and so on. The estimation results are presented in Panel B of Table 6. We see an increase in significant when controlling for religion. In model 1, the individual coefficient estimate for vega (Vega) is negative and statistically significant and the coefficient for the interaction variable vega x masculinity (Vega*MAS) is positive and highly significant, at the 1% level. Whilst the CEO religion control variable is not significant, the sign direction is consistent with our expectations. As our sample is predominantly Christian Protestants, we expect a positive relationship with our dependent variable. The work of Weber (1958) suggests that the Protestant ethic was at the centre of the development of capitalism. Overall, we find the results provided in Panel A and B of Table 6 consistent with our baseline estimations in Table 4 and 5. Our estimates indicate that the negative association between vega and risk is weakened by bank CEOs who originate from more masculine societies (H1). As expected, we find no such significance in the other cultural dimensions.

[11] Data available from: NCD Risk Fact Collaboration http://ncdrisc.org/data-downloads-height.html
[12] LQTBQ+ score can be found at: https://www.asherfergusson.com/lgbtq-travel-safety/

2.4.5 Matching Sample

Our baseline findings could be subject to some selection bias issues. For example, the CEO and bank matching may not be completely random. CEOs with specific cultural characteristics may gravitate towards employers i.e., banks where risk-taking compensation incentives are high. Similarly, banks may seek to hire CEOs with characteristics that make them more prone to risk-taking. This selection bias could influence our results. We utilise the propensity score matching (PSM) methodology to address, to some extent, CEO-bank matching. In this instance, we address CEO-bank matching based on observable bank and CEO characteristics. However, we recognise that this may be a source of concern as CEO-bank matching on unobservable factors is not addressed by this methodology.

Following prior studies, we apply a propensity score matching (PSM) approach (Bharath et al., 2011; Hasan et al., 2014). PSM is a widely used method in empirical research to match treated and non-treated (control) groups based on observed characteristics to eliminate relevant differences. We use the dimension of masculinity to illustrate the process. We begin the matching process with a logit regression of a high masculinity (a value of one for above the sample median of the masculinity dimension and zero otherwise) on several bank and compensation controls. Next, we perform a one-to-one nearest neighbour match with the propensity scores we obtain from the logit estimation. To ensure no significant differences in terms of the bank characteristics between the treated and the control samples, we match with no replacement and a 10% caliper. Hence, we match highly masculine CEOs with low masculine CEOs of banks with similar characteristics. Consequently, we estimate the baseline models using only the treatment and controls (i.e., the matched samples). We depict the results from these tests in Table 7. Panel A provides the results using bank, and year fixed effects whilst Panel B also includes CEO fixed effects, parallel to Table 4 and 5, respectively. Panel A shows that the interaction between vega and bank CEOs' masculinity carry the same positive sign coefficient as shown in our baseline model. In model 1 of Panel B, the individual coefficient estimate for vega is negative and statistically significant and the coefficient for the interaction variable Vega*MAS is positive and highly significant, at the 5% level. Hence, providing further evidence supporting hypotheses H1. Whilst the sign directions are as expected, we find no such significant in the power distance, individualism, and uncertainty avoidance.

2.5 Robustness Tests

2.5.1 Alternative Measures of Risk

In our study so far, we use total risk defined as the annualised variance of daily stock returns for each fiscal year (DeYoung et al., 2013; Ellul and Yerramilli, 2013; Ongena et al., 2018). As discussed in section 2.3.4, we deconstruct our primary risk measure into three further components: downside tail risk, systematic, and unsystematic. In line with the prediction of our main hypothesis H1, we obtain a negative and statistically significant coefficient on the interaction term for vega*masculinity in all specifications using alternative measures of risk. As previously seen, the sign directions are as expected for power distance, individualism, and uncertainty avoidance however, consistent with our earlier results, we find no such significance in these dimensions. Panel A provides the results using bank, and year fixed effects whilst Panel B also includes CEO fixed effects, parallel to the estimations in Table 4 and 5, respectively.

To capture the bank downside risk, we estimate our baseline regressions using the Tail Risk measure. In Panel A of Table 8a, the main effect shows that a 1% increase in vega, decreases tail risk by -0.0363%, when masculinity is zero. However, when vega interacts with masculinity, risk increases yielding a coefficient of 0.000633%. Similarly, in Panel B of Table 8a, the main effect shows that a 1% increase in vega, decreases tail risk by -0.0358%, when masculinity is zero. However, when vega interacts with masculinity, risk increases yielding a coefficient of 0.000528%. Both the individual and interaction coefficient estimates are highly significant. Next, we show that our results hold for non-diversifiable. We find that in Panel A of Table 8b, the main effect shows that a 1% increase in vega, decreases systematic risk by -0.122%, when masculinity is zero. When vega interacts with masculinity, systematic risk increases yielding a coefficient of 0.00184%. In Panel B of Table 8b, the main effect shows that a 1% increase in vega, decreases systematic risk by -0.0828%, when masculinity is zero. However, when vega interacts with masculinity, systematic risk increases yielding a coefficient of 0.000960%. Both the individual and interaction coefficient estimates are significant. Focusing on unsystematic (diversifiable) risk is important because it helps alleviate the concern that our initial bank risk measure, total risk, is correlated with the macroeconomic state (Ongena et al., 2018). Following prior literature, we re-estimating equation 1 with unsystematic risk and find similar results. In Panel A of Table 8c, the main effect shows that a 1% increase in vega, decreases unsystematic risk by -0.0547%, when masculinity is zero. However, when vega interacts with masculinity, unsystematic risk increases yielding a coefficient of 0.000870%. In Panel B of Table 8a, the main effect shows that a 1% increase in vega, decreases unsystematic risk by -0.0402%, when masculinity is zero. However, when vega interacts with masculinity, unsystematic risk increases yielding a coefficient of 0.000420%. Both the individual and interaction coefficient estimates are mostly significant. Overall, our estimates indicate that the negative association between vega and risk, whether using tail, systematic or unsystematic risk, is weakened (i.e., risk increases) by bank CEOs who originate from more masculine societies, in line with hypothesis H1.

2.5.2 Controlling for all Dimensions and Horserace Model

In our baseline estimations, we have used one cultural heritage variable per model, that corresponds with the respective interaction (i.e., vega*masculinity). This is a common approach in similar studies as the cultural dimensions exhibit high correlation. In Table 5, our analysis includes CEO fixed effects, which controls for all the cultural heritage measures, which are time-invariant. However, in this section we re-estimate each model to include all the cultural dimensions. The results from these specifications are available in models 1-4 of Table 9. The output from these estimations shows is consistent with our baseline results. In model 1, the individual coefficient estimate for vega is negative and statistically significant and the coefficient for the interaction variable Vega*MAS is positive and highly significant, at the 5% level. Hence, providing further evidence supporting hypotheses H1. Whilst the sign directions are as expected, we find no such significant in the power distance, individualism, and uncertainty avoidance in models 2-4.

In additional tests, provided in models 5 and 6 of Table 9, we use a horserace analysis that comprises of the interactions of all cultural heritage attributes of bank CEOs with risk-taking compensation incentive, vega. In order to reduce the collinearity issues common in such tests, we replace the cultural heritage values with the residuals from regressions that use as dependent variable, a cultural heritage characteristic and as explanatory variables the rest of the three cultural heritage characteristics. For example, to obtain the residual for the masculinity dimension, we use this as our dependent variable and run a regression using the remaining dimensions (power distance, individualism, and uncertainty avoidance) as explanatory variables. Hence, the residuals we derive from these regressions proxy for the portion of each cultural heritage characteristic that is not explained by the remaining cultural heritage characteristics. In model 5, we use bank, and year fixed effects whereas in model 6, we also include CEO fixed effects which drops the individual dimension residuals. The results from this horserace exercise are consistent with the baseline findings and statistically significant hence, supporting hypothesis H1.

2.5.3 Alternative Measures of Culture

Our main measures of culture are based on the Hofstede cultural framework. However, whilst this framework is widely used in the literature, it has not been without criticisms. For example, the use of many respondents does not necessarily guarantee representativeness of a population (Bryman, 1988). In addition, McSweeney (2002) notes that upon closer inspection of the questionnaires used by Hofstede, exposes that the average per country was small, and for some was even minuscule. They also note that the cross-cultural difference is critiqued as the primary data were obtained from a pre-existing deposit of employee attitude surveys undertaken around 1967 and 1973 within a single company (IBM). Therefore, we re-estimate out baseline results using alternative cultural dimensions from House et al. (2004) as an additional robustness test. In Table 10, use the comparable dimensions from the GLOBE cultural framework: Assertiveness, Power Distance, In-group Collectivism, and Uncertainty Avoidance. These dimensions are useful for our study and could proxy to a certain extent, for Hofstede's variables of Masculinity, Power Distance Index, Individualism, and Uncertainty Avoidance.[13] Panel A provides the results using bank, and year fixed effects whilst Panel B also includes CEO fixed effects, parallel to the estimations in Table 4 and 5, respectively. These results are largely consistent with our main baseline regressions observed using Hofstede's cultural dimensions. We did not expect a perfect comparison between the two frameworks however, the results in Panel B hold and remain significant and thus, supporting hypothesis H1.[14]

2.5.4 Alternative Clustering of Standard Errors

In our previous estimations, we cluster standard errors at the bank level. However, we also consider that the cultural heritage measures we use, display variability at the CEO level. Hence, in Table 11a, we cluster standard errors by bank CEO. We also estimate models where we cluster the standard errors by the ancestral country of origin of each bank CEO, available in Table 11b. Panel A of Table 11a and 11b provides the results using bank, and year fixed effects whilst Panel B of Table 11a and 11b also includes CEO fixed effects, parallel to the estimations in Table 4 and 5, respectively. The results from these models are similar to the findings of our main analysis.

[13] These include five variables sourced from the Global leadership and Organizational Behaviour Effectiveness (GLOBE) research program.

[14] We also test the Schwartz cultural metrics but find no significant results to report.

2.5.5 CEO Control

Whilst the CEO fixed effects in Table 5 should account for the variations in tenure, we run additional robustness tests to mitigate potential endogeneity concerns related to compensation that could be influence by tenure. Following the literature, we use tenure as a proxy for CEO control (Fahlenbrach, 2009; Ongena et al., 2018; Agrawal, 2019). Tenure is an appropriate measure for power as a CEO becomes more acclimatised to the bank, boards' control over the CEO dampens. This weakening in the board's monitoring allows a CEO greater influence over internal policies and exert more control over the bank and in turn, risk-taking (Baker and Gompers, 2003; Coles et al., 2014). To assess whether the cultural link between risk-taking compensation incentives and bank risk is sensitive to CEO power, we include the dummy variable CEO Tenure, which equals 1 where banks whose CEOs have a tenure exceeding 5 years and 0 otherwise. Those with a longer tenure periods (> 5 years) are considered to have high CEO control and those with lower tenure periods (≤ 5 years) are considered to have low CEO control. We use 5 years as our cut-off point for two reasons: first, studies have found the optimal tenure period to be 4.8 years (Xueming et al., 2013), and second, 5 years is the median tenure length of S&P 500 companies (Equilar, 2018). Panel A provides the results using bank, and year fixed effects whilst Panel B also includes CEO fixed effects, parallel to the estimations in Table 4 and 5, respectively. The results from these models support the findings of our main analysis and remain significant in both panels hence, supporting our hypothesis H1. As expected, find so such significance in the models 2-4 for power distance, individualism, and uncertainty avoidance.

2.6 Conclusion

We examine the influence of bank CEO cultural heritage on the association between risk-taking compensation incentive vega and bank risk by exploiting the cultural diversity in U.S. CEOs from a sample of 229 banks between 1992–2017. We show that bank CEOs' cultural heritage attributes influence the response to risk-taking incentives. Banks led by CEOs that trace their origin to more masculine societies (H1) weaken the negative association between vega and risk (i.e., risk increases). In line with our expectations, the results from masculinity survive across the numerous additional robustness tests and is consistent to the degree that this cultural dimension prompts risk-taking behaviour. This is very much aligned with prior studies (Meier-Pesti and Penz, 2008; Ashraf et al., 2016). We find no evidence that power distance, individualism, and uncertainty avoidance exert such an influence on the association between vega and bank risk-taking.

The results of this study have useful research and managerial implications. Prior studies mainly focus on the effect of culture on the economic outcomes of a firm (Guiso et al., 2006; Ashraf et al., 2016; Liu, 2016; Nguyen et al., 2018) and on the influences of compensation schemes on economic outcomes (Fahlenbrach and Stulz, 2011; Minhat and Abdullah, 2016; Gande and Kalpathy, 2017; Ongena et al., 2018). Whilst other studies examine reward preferences (Chiu et al., 2002; Chiang and Birtch, 2006; Hofstede, 2010), they do not address the influence such characteristics have on shaping bank risk. There is very little literature that fuses these concepts together. We aim to do so, using a unique dataset with over 3.8 million hand-collected ancestral records to determine CEO country of origin. To our knowledge, this is the first study to examine such effects in banking within a single country context. Highlighting these issues can provide awareness and practical solutions for remuneration committees and policy makers that set reward guidelines. To design more effective reward systems, one must be aware of the cultural preference of the recipient. This can benefit both the firm and employees, through more efficient economic resource allocation as well as maximising the effect of rewards on employees.

Table 1: Definitions

Variable	Definition	Data Source
A. Risk Measures		
Total Risk	The annualised standard deviation of daily stock returns during a bank's fiscal year.	CRSP
Tail Risk	We compute tail risk by taking the average return of each banks' equity over the 10% worst return days for a given year.	CRSP
Systematic Risk	The annualized variance of the product of bank beta and the market daily returns	CRSP
Unsystematic Risk	The annualised variance of the residuals by regressing bank excess returns on market excess returns	CRSP
B. Cultural Measures		
Masculinity (MAS)	The degree to which a society is considered masculine versus feminine in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Power Distance (PDI)	The degree to which a difference in power and status is accepted without justification in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Individualism (INV)	The degree to which a society is considered individualistic versus collectivist in terms of "I" and "We" in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Uncertainty Avoidance (UAI)	The degree to which society members feel uncomfortable with future uncertainty in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
C. CEO Compensation Measures		
Vega	The change in the dollar value of the CEO's equity-based compensation for a 1% change in stock price volatility. We use the natural log of the variable.	Execucomp
Delta	The change in the dollar value of the CEO's equity-based compensation for a 1% change in the stock price. We use the natural log of the variable.	Execucomp
Bonus	The dollar value of the bonus earned by a CEO during the fiscal year.	Execucomp
Salary	The dollar value of the base salary earned by a CEO during the fiscal year.	Execucomp
D. Bank Financial Characteristics		
Bank Size	The natural logarithm of bank total assets.	Compustat Bank Fundamentals
Return on Assets	The net income divided by the total assets of the bank.	Compustat Bank Fundamentals
Leverage	Total liabilities divided by liabilities and stockholders' equity, which is equal to total assets.	Compustat Bank Fundamentals
Bank Tier-1 Capital Ratio	The ratio of tier-1 capital to total risk-weighted assets, a key measure of bank capitalisation.	Compustat Bank Fundamentals
Total Deposits/Total Assets	The total deposits divided by total assets of the bank.	Compustat Bank Fundamentals
Bank Provisions (Loan Losses)/Assets	Provisions for losses on loans divided by total assets.	Compustat Bank Fundamentals
Common Ordinary Equity/Total Assets	Common ordinary equity divided by total assets of the bank.	Compustat Bank Fundamentals
E. Fixed Effects		
Bank	The unique ID for each bank.	Compustat Bank Fundamentals
Year	The loan initiation year.	Compustat Bank Fundamentals
CEO	The unique ID each bank CEO	Execucomp
CEO Country of Origin	A dummy variable for each CEO country of origin.	Ancestry.com, Hofstede et al. (2010)

Table 2: Summary Statistics

Variable	N	Mean	Standard Deviation	P25	P50	P75
A. Risk Measures						
Total Risk (%)	1,586	13.10	23.21	4.45	7.07	12.16
Tail Risk (%)	1,586	3.40	1.91	2.28	2.89	3.83
Systematic Risk (%)	1,586	4.62	8.23	1.07	2.05	4.27
Unsystematic Risk (%)	1,586	8.49	16.34	2.98	4.53	7.93
B. Cultural Measures						
Masculinity (MAS)	1,586	61.07	13.47	66.00	66.00	66.00
Power Distance (PDI)	1,586	38.94	13.39	35.00	35.00	35.00
Individualism (INV)	1,586	76.07	17.00	67.00	89.00	89.00
Uncertainty Avoidance (UAI)	1,586	48.64	19.43	35.00	35.00	65.00
C. CEO Compensation Measures						
Vega ($000s)	1,586	97.05	175.82	11.53	31.84	97.43
Delta ($000s)	1,586	481.31	1,805.34	57.42	152.21	383.21
Bonus ($000s)	1,586	805.63	1,056.73	244.43	440.77	892.88
Salary ($000s)	1,586	572.14	244.68	404.41	549.79	693.11
D. Bank Financial Characteristics						
Bank Size (in millions of $)	1,586	49,162.68	150,760.10	4,629.12	9,509.13	32,069.77
Return on Assets (ROA)	1,586	0.01	0.01	0.01	0.01	0.01
Leverage	1,586	0.90	0.03	0.89	0.91	0.92
Bank Tier-1 Capital Ratio	1,586	10.88	3.17	8.75	10.57	12.40
Total Deposits/Total Assets	1,586	0.71	0.11	0.65	0.72	0.79
Bank Provisions (Loan Losses)/Assets	1,586	0.00	0.01	0.00	0.00	0.00
Common Ordinary Equity/Total Assets	1,586	0.09	0.03	0.08	0.09	0.11

Table 2 presents the summary statistics of 1,586 bank-year observations over the 1992-2017 period. We provide key variables mean, standard deviation, 25th percentile (P25), median (P50) and 75th percentile (P75). All variables are winsorized at the 1st and 99th percentiles, with the exception of culture. We deflate compensation and bank financial variables to 1992 U.S. dollars to account for the effects of inflation. Compensation variables are stated in thousands of U.S. dollars, cultural measures on a 1-100 scale, risk measures as a percentage and bank financial characteristics in ratio form. Total assets are shown in millions of U.S. dollars. Variable definitions are provided in Table 1.

Table 3: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	RISK	1.00																		
2	TAIL	0.92	1.00																	
3	SYST	0.90	0.90	1.00																
4	UNSYST	0.97	0.85	0.78	1.00															
5	MAS	0.03	0.02	0.04	0.03	1.00														
6	PDI	0.02	0.01	0.01	0.02	-0.22	1.00													
7	INV	0.00	0.00	0.02	0.00	0.34	-0.56	1.00												
8	UAI	0.01	0.01	0.02	0.01	-0.34	0.50	-0.66	1.00											
9	VEGA	-0.07	-0.08	0.00	-0.09	0.01	0.04	-0.07	0.11	1.00										
10	DELTA	-0.01	0.01	-0.01	-0.01	-0.06	-0.11	-0.09	0.12	0.28	1.00									
11	BONUS	0.01	-0.01	0.08	-0.03	-0.04	0.02	-0.06	0.04	0.69	0.28	1.00								
12	SALARY	0.00	-0.01	0.05	-0.03	-0.08	-0.04	-0.05	0.08	0.49	0.43	0.52	1.00							
13	SIZE	-0.01	-0.02	0.05	-0.04	0.02	0.06	-0.09	0.12	0.57	0.14	0.60	0.37	1.00						
14	ROA	-0.66	-0.58	-0.55	-0.66	-0.04	-0.04	-0.06	0.03	0.15	0.22	0.05	0.12	0.00	1.00					
15	LEV	0.04	0.04	-0.04	0.08	0.02	-0.04	0.04	-0.08	0.06	-0.03	0.09	0.03	0.06	-0.09	1.00				
16	CAPT1	0.01	0.03	0.06	-0.01	0.03	0.01	0.01	-0.05	-0.14	0.01	-0.12	-0.12	-0.08	0.09	-0.55	1.00			
17	DIVER	-0.05	-0.06	-0.06	-0.04	-0.07	-0.01	0.01	-0.09	-0.33	-0.15	-0.38	-0.28	-0.30	0.04	-0.14	0.25	1.00		
18	PROV	0.76	0.68	0.64	0.76	-0.01	0.01	-0.01	0.05	0.04	0.11	0.04	0.12	0.05	-0.63	0.03	-0.03	-0.03	1.00	
19	EQAS	-0.13	-0.13	-0.05	-0.16	-0.01	0.02	-0.03	0.06	-0.06	0.04	-0.11	-0.05	-0.08	0.15	-0.96	0.53	0.14	-0.12	1.00

This table reports Pearson correlations coefficients for the main variables used in our baseline regressions. This allows us to see which pairs have the highest correlation. The abbreviations are as follows: Total Risk (RISK), Tail Risk (TAIL), Systematic Risk (SYST), Unsystematic Risk (UNSYS), Masculinity (MAS), Power Distance Index (PDI), Individualism (INV), Uncertainty Avoidance Index (UAI), Vega (VEGA), Delta (DELTA), Bonus (BONUS), Salary (SALARY), Bank Size (SIZE), Return on Assets (ROA), Leverage (LEV), Capital Tier-1 Ratio (CAPT1), Total Deposits/Total Assets (DIVER), Provisions (Loan Losses)/Total Assets (PROV), and Common Ordinary Equity/Total Assets (EQAS). Table 1 includes full details on the definitions the above variables. However, caution must be taken to avoid over interpreting the results, as these are simple pair-wise correlations that do not control for the impact of bank, year, and CEO characteristics. We used to the multivariate analysis where we examine the determinants of total risk, and the association between culture and risk-taking compensation incentives after controlling for key financial characteristics.

Table 4: Baseline Estimations

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk	(5) Total Risk
Vega	-0.0621***	0.00274	-0.0216	0.000291	-0.000984
	(0.0194)	(0.0170)	(0.0289)	(0.0209)	(0.0121)
Vega*MAS	0.000980***				
	(0.000354)				
MAS	-0.00312*				
	(0.00184)				
Vega*PDI		-0.000145			
		(0.000376)			
PDI		-0.00285			
		(0.00218)			
Vega*INV			0.000262		
			(0.000426)		
INV			6.97e-05		
			(0.00199)		
Vega*UAI				-5.74e-05	
				(0.000325)	
UAI				-0.00102	
				(0.00168)	
Delta	-0.0748***	-0.0720***	-0.0725***	-0.0714***	-0.0766***
	(0.0191)	(0.0196)	(0.0193)	(0.0198)	(0.0197)
Bonus	0.00670	0.000229	-7.99e-05	-0.00241	-0.00368
	(0.0211)	(0.0234)	(0.0225)	(0.0231)	(0.0240)
Salary	0.0630	0.0529	0.0627	0.0633	0.0782
	(0.0691)	(0.0707)	(0.0705)	(0.0704)	(0.0706)
Bank Size	0.0527	0.0584	0.0583	0.0623	0.0547
	(0.0646)	(0.0659)	(0.0653)	(0.0652)	(0.0635)
Bank ROA	-7.869**	-7.528**	-7.517**	-7.435**	-7.531**
	(3.229)	(3.125)	(3.179)	(3.175)	(3.188)
Leverage	-3.007	-2.713	-2.752	-2.749	-2.647
	(2.057)	(2.013)	(2.031)	(2.016)	(2.010)
Bank Tier 1 Capital Ratio	0.0140	0.0139	0.0140	0.0138	0.0139
	(0.00942)	(0.00954)	(0.00952)	(0.00969)	(0.00948)
Total Deposits/Total Assets	0.0886	0.0958	0.0717	0.0871	0.0807
	(0.266)	(0.267)	(0.268)	(0.267)	(0.263)
Bank Provisions (Loan Losses)/Assets	21.16***	21.59***	21.22***	21.42***	21.19***
	(5.455)	(5.417)	(5.410)	(5.463)	(5.399)
Common Ordinary Equity/Total Assets	-4.823***	-4.658***	-4.642***	-4.650***	-4.561***
	(1.704)	(1.668)	(1.692)	(1.676)	(1.662)
Constant	0.132	-0.201	-0.326	-0.313	-0.454
	(2.291)	(2.238)	(2.255)	(2.250)	(2.241)
Observations	1,425	1,425	1,425	1,425	1,429
R-squared	0.895	0.895	0.895	0.895	0.895
Bank FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-5 include bank, and year fixed effects. In model 5 we show the association between vega and total risk, without interactions to highlight the direct negative effect on total risk. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 5: CEO Fixed Effects

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
Vega	-0.0543***	-0.000333	-0.00923	-0.00248
	(0.0177)	(0.0183)	(0.0253)	(0.0183)
Vega*MAS	0.000675**			
	(0.000321)			
Vega*PDI		-0.000361		
		(0.000373)		
Vega*INV			-6.67e-05	
			(0.000380)	
Vega*UAI				-0.000233
				(0.000247)
Delta	-0.0845***	-0.0816***	-0.0823***	-0.0818***
	(0.0272)	(0.0269)	(0.0274)	(0.0269)
Bonus	0.00108	0.000433	-0.000440	-0.000253
	(0.0227)	(0.0227)	(0.0227)	(0.0226)
Salary	-0.00931	-0.00561	-0.00227	-0.00442
	(0.0721)	(0.0718)	(0.0717)	(0.0713)
Bank Size	0.0943	0.0921	0.0920	0.0942
	(0.0719)	(0.0718)	(0.0711)	(0.0715)
Bank ROA	-4.381	-4.303	-4.343	-4.243
	(3.113)	(3.134)	(3.158)	(3.152)
Leverage	-2.429	-2.486	-2.538	-2.452
	(2.482)	(2.487)	(2.494)	(2.491)
Bank Tier 1 Capital Ratio	0.0148	0.0146	0.0146	0.0148
	(0.00940)	(0.00947)	(0.00946)	(0.00945)
Total Deposits/Total Assets	0.387	0.367	0.371	0.375
	(0.286)	(0.286)	(0.287)	(0.286)
Bank Provisions (Loan Losses)/Assets	16.55***	16.56***	16.44***	16.62***
	(5.482)	(5.524)	(5.567)	(5.532)
Common Ordinary Equity/Total Assets	-5.416**	-5.465**	-5.469**	-5.443**
	(2.448)	(2.452)	(2.447)	(2.459)
Constant	-0.584	-0.520	-0.486	-0.585
	(2.729)	(2.738)	(2.741)	(2.736)
Observations	1,374	1,374	1,374	1,374
R-squared	0.913	0.913	0.913	0.913
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-4 include bank, year, and CEO fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 6: Endogeneity Concerns

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
	Panel A: CEO Country of Origin FE			
Vega	-0.0468**	-0.00194	-0.00903	-0.00917
	(0.0190)	(0.0171)	(0.0264)	(0.0183)
Vega*MAS	0.000701**			
	(0.000332)			
Vega*PDI		-4.14e-05		
		(0.000389)		
Vega*INV			7.31e-05	
			(0.000375)	
Vega*UAI				0.000106
				(0.000269)
Constant	-0.125	-0.246	-0.252	-0.258
	(2.263)	(2.251)	(2.257)	(2.246)
Observations	1,423	1,423	1,423	1,423
R-squared	0.898	0.898	0.898	0.898
Control variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
CEO Country of Origin FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank
	Panel B: Controlling for CEO Religion			
Vega	-0.0625***	0.00198	-0.0202	-0.00262
	(0.0188)	(0.0167)	(0.0278)	(0.0208)
Vega*MAS	0.000997***			
	(0.000352)			
MAS	-0.00301			
	(0.00187)			
Vega*PDI		-0.000115		
		(0.000369)		
PDI		-0.00281		
		(0.00217)		
Vega*INV			0.000250	
			(0.000412)	
INV			0.000274	
			(0.00185)	
Vega*UAI				4.44e-06
				(0.000327)
UAI				-0.00141
				(0.00168)
CEO Religion	0.0451	0.0331	0.0451	0.0490
	(0.0433)	(0.0443)	(0.0419)	(0.0429)
Constant	0.00493	-0.305	-0.486	-0.461
	(2.309)	(2.257)	(2.267)	(2.267)
Observations	1,425	1,425	1,425	1,425
R-squared	0.896	0.896	0.895	0.895
Control variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
CEO Country of Origin FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-4 of Panel A include bank, year, and CEO country of origin fixed effects. In Panel B, we control for CEO Religion i.e., Protestant, Orthodox, etc. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 7: Matched Sample Estimations Based on Propensity Scores

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
		Panel A: Bank & Year FE		
Vega	-0.0663	-0.00988	-0.0416	-0.00272
	(0.0609)	(0.0600)	(0.0464)	(0.0262)
Vega*MAS	0.00111			
	(0.000928)			
MAS	-0.00339			
	(0.00411)			
Vega*PDI		0.000845		
		(0.00198)		
PDI		-0.00993		
		(0.00991)		
Vega*INV			0.000485	
			(0.000659)	
INV			0.00125	
			(0.00252)	
Vega*UAI				-6.63e-05
				(0.000376)
UAI				-0.000466
				(0.00202)
Constant	-0.763	-5.167	-3.526	-1.259
	(3.353)	(3.819)	(2.824)	(3.051)
Observations	506	280	944	851
R-squared	0.917	0.913	0.896	0.902
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.109*	0.0141	-0.0419	0.0137
	(0.0634)	(0.0266)	(0.0317)	(0.0205)
Vega*MAS	0.00222**			
	(0.000999)			
Vega*PDI		-0.000335		
		(0.000800)		
Vega*INV			0.000346	
			(0.000424)	
Vega*UAI				-0.000274
				(0.000331)
Constant	-1.514	-6.395	-1.261	1.290
	(3.271)	(4.374)	(3.474)	(3.903)
Observations	481	265	905	809
R-squared	0.929	0.919	0.919	0.918
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

In the above Table, we control for omitted variable bias concerns. We control for the potential selection bias between CEOs and banks, as this may not be random. For example, CEOs with specific cultural characteristics may gravitate towards banks where risk incentives are high, or banks that are willing to take more risks, may higher CEOs with cultural heritage characteristics that have a higher propensity to take risk. In Panel A, we include bank, and year fixed effects. In Panel B, we include bank, year, and CEO fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 8a: Tail Risk

	(1) Tail Risk	(2) Tail Risk	(3) Tail Risk	(4) Tail Risk
		Panel A: Bank & Year FE		
Vega	-0.0363***	-0.000448	-0.00860	0.000445
	(0.0139)	(0.0103)	(0.0177)	(0.0106)
Vega*MAS	0.000633**			
	(0.000255)			
MAS	-0.00203			
	(0.00128)			
Vega*PDI		5.83e-05		
		(0.000270)		
PDI		-0.00201		
		(0.00144)		
Vega*INV			0.000146	
			(0.000239)	
INV			0.000712	
			(0.00110)	
Vega*UAI				2.69e-05
				(0.000201)
UAI				-0.00101
				(0.000983)
Constant	-2.107*	-2.374**	-2.519**	-2.408**
	(1.161)	(1.123)	(1.143)	(1.139)
Observations	1,425	1,425	1,425	1,425
R-squared	0.889	0.889	0.888	0.888
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.0358***	0.00180	-0.00776	0.00297
	(0.00852)	(0.0102)	(0.0149)	(0.0102)
Vega*MAS	0.000528***			
	(0.000158)			
Vega*PDI		-0.000160		
		(0.000201)		
Vega*INV			4.98e-05	
			(0.000214)	
Vega*UAI				-0.000146
				(0.000142)
Constant	-2.115	-2.057	-2.056	-2.102
	(1.305)	(1.316)	(1.320)	(1.315)
Observations	1,374	1,374	1,374	1,374
R-squared	0.907	0.906	0.906	0.906
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the bank tail risk (Tail Risk) computed by taking the average return of each banks' equity over the 10% worst return days for a given year. As this is a negative figure, we multiply results by (-1) hence, higher values signify higher risk. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-4 of Panel A include bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 8b: Systematic Risk

	(1) Systematic Risk	(2) Systematic Risk	(3) Systematic Risk	(4) Systematic Risk
		Panel A: Bank & Year FE		
Vega	-0.122***	0.00616	-0.0652	0.000429
	(0.0385)	(0.0308)	(0.0458)	(0.0373)
Vega*MAS	0.00184***			
	(0.000682)			
MAS	-0.00561			
	(0.00423)			
Vega*PDI		-0.000399		
		(0.000689)		
PDI		-0.000879		
		(0.00345)		
Vega*INV			0.000740	
			(0.000666)	
INV			0.000840	
			(0.00432)	
Vega*UAI				-0.000219
				(0.000585)
UAI				-0.00205
				(0.00379)
Constant	4.377	3.689	3.428	3.582
	(3.687)	(3.636)	(3.917)	(3.622)
Observations	1,425	1,425	1,425	1,425
R-squared	0.819	0.818	0.818	0.818
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.0828***	-0.0152	-0.0877**	0.00907
	(0.0302)	(0.0356)	(0.0400)	(0.0324)
Vega*MAS	0.000960*			
	(0.000549)			
Vega*PDI		-0.000268		
		(0.000683)		
Vega*INV			0.000879	
			(0.000622)	
Vega*UAI				-0.000699
				(0.000430)
Constant	7.837	7.943	7.804	7.696
	(5.596)	(5.594)	(5.521)	(5.563)
Observations	1,374	1,374	1,374	1,374
R-squared	0.840	0.840	0.840	0.840
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the systematic risk (Systematic Risk) computed by using the CRSP value-weighted returns as our proxy for the returns on the market portfolio. The market betas are calculated by regressing bank excess returns on market excess returns. The systematic risk is then captured by the annualised variance of the product of bank beta and the market daily returns. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-4 of Panel A include bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 8c: Unsystematic Risk

	(1) Unsystematic Risk	(2) Unsystematic Risk	(3) Unsystematic Risk	(4) Unsystematic Risk
		Panel A: Bank & Year FE		
Vega	-0.0547**	-0.000533	-0.0150	0.00498
	(0.0258)	(0.0208)	(0.0336)	(0.0248)
Vega*MAS	0.000870*			
	(0.000447)			
MAS	-0.00339			
	(0.00213)			
Vega*PDI		-4.64e-05		
		(0.000447)		
PDI		-0.00292		
		(0.00235)		
Vega*INV			0.000189	
			(0.000491)	
INV			-0.00116	
			(0.00230)	
Vega*UAI				-0.000119
				(0.000387)
UAI				7.61e-05
				(0.00187)
Constant	0.208	-0.146	-0.0318	-0.217
	(2.672)	(2.614)	(2.655)	(2.627)
Observations	1,425	1,425	1,425	1,425
R-squared	0.867	0.867	0.866	0.866
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.0402*	-0.00365	0.00382	-0.00496
	(0.0221)	(0.0222)	(0.0268)	(0.0203)
Vega*MAS	0.000420			
	(0.000390)			
Vega*PDI		-0.000303		
		(0.000466)		
Vega*INV			-0.000267	
			(0.000404)	
Vega*UAI				-0.000206
				(0.000272)
Constant	-0.443	-0.408	-0.342	-0.467
	(3.353)	(3.359)	(3.359)	(3.357)
Observations	1,374	1,374	1,374	1,374
R-squared	0.889	0.889	0.889	0.889
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the unsystematic risk (Unsystematic Risk) computed by using the CRSP value-weighted returns as our proxy for the returns on the market portfolio. The market betas are calculated by regressing bank excess returns on market excess returns. The unsystematic risk is then calculated as the annualised variance of the residuals from the regression. The key variables of interest in each model relate to the interaction effect of a cultural dimension (MAS, PDI, INV, and UAI) to our risk-taking compensation incentive, vega. We calculate vega as the change in the value of the CEO's equity-based compensation for a 0.01 change in stock price volatility. Regressions 1-4 of Panel A include bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 9: Controlling for all Dimensions & Horserace Model

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk	(5) Total Risk	(6) Total Risk
Vega	-0.0518**	0.00360	-0.0190	-0.00353	-0.00539	-0.0164
	(0.0213)	(0.0182)	(0.0280)	(0.0214)	(0.0105)	(0.0114)
Vega*MAS	0.000792**					
	(0.000378)					
Vega*PDI		-0.000170				
		(0.000405)				
Vega*INV			0.000213			
			(0.000410)			
Vega*UAI				3.37e-06		
				(0.000334)		
MAS	-0.00345*	-0.00103	-0.000928	-0.000908		
	(0.00200)	(0.00143)	(0.00141)	(0.00141)		
PDI	-0.00322*	-0.00317	-0.00371**	-0.00374**		
	(0.00184)	(0.00244)	(0.00173)	(0.00176)		
INV	-0.000795	-0.000907	-0.00162	-0.00100		
	(0.00197)	(0.00197)	(0.00242)	(0.00192)		
UAI	-0.000452	-0.000432	-0.000428	-0.000508		
	(0.00174)	(0.00177)	(0.00170)	(0.00207)		
MAS Residuals					-0.00371*	
					(0.00205)	
PDI Residuals					-0.00316	
					(0.00330)	
INV Residuals					-2.18e-06	
					(0.00419)	
UAI Residuals					-0.00148	
					(0.00257)	
Vega*MAS Residuals					0.000970**	0.000675*
					(0.000420)	(0.000373)
Vega*PDI Residuals					-0.000409	-3.24e-05
					(0.000566)	(0.000696)
Vega*INV Residuals					0.000462	-0.000404
					(0.000830)	(0.000832)
Vega*UAI Residuals					-2.77e-05	-0.000264
					(0.000510)	(0.000460)
Delta	-0.0723***	-0.0722***	-0.0716***	-0.0724***	-0.0744***	-0.0819***
	(0.0194)	(0.0197)	(0.0195)	(0.0196)	(0.0194)	(0.0272)
Bonus	0.00660	0.000131	0.000974	-0.00135	0.00607	0.000219
	(0.0218)	(0.0236)	(0.0226)	(0.0236)	(0.0221)	(0.0227)
Salary	0.0531	0.0529	0.0533	0.0544	0.0540	-0.00671
	(0.0695)	(0.0704)	(0.0706)	(0.0704)	(0.0691)	(0.0716)
Bank Size	0.0539	0.0594	0.0585	0.0609	0.0523	0.0963
	(0.0653)	(0.0657)	(0.0655)	(0.0654)	(0.0657)	(0.0704)
Bank ROA	-7.789**	-7.552**	-7.584**	-7.552**	-7.725**	-4.404
	(3.216)	(3.176)	(3.173)	(3.166)	(3.206)	(3.154)
Leverage	-2.934	-2.793	-2.811	-2.747	-2.935	-2.453
	(2.047)	(2.026)	(2.023)	(2.007)	(2.045)	(2.477)
Bank Tier 1 Capital Ratio	0.0140	0.0140	0.0140	0.0141	0.0137	0.0147
	(0.00956)	(0.00962)	(0.00964)	(0.00969)	(0.00960)	(0.00942)
Total Deposits/Total Assets	0.0960	0.0878	0.0900	0.0953	0.0923	0.408
	(0.279)	(0.282)	(0.281)	(0.280)	(0.281)	(0.284)
Bank Provisions (Loan Losses)/Assets	21.71***	21.75***	21.70***	21.72***	21.75***	16.44***
	(5.553)	(5.527)	(5.520)	(5.536)	(5.555)	(5.532)
Common Ordinary Equity/Total Assets	-4.825***	-4.718***	-4.734***	-4.684***	-4.788***	-5.463**
	(1.710)	(1.690)	(1.700)	(1.683)	(1.702)	(2.450)
Constant	0.329	0.0399	0.123	0.00232	-0.0596	-0.602
	(2.303)	(2.278)	(2.286)	(2.265)	(2.269)	(2.708)
Observations	1,425	1,425	1,425	1,425	1,425	1,374
R-squared	0.896	0.896	0.896	0.896	0.896	0.913
Bank FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1). Models 1-4 controls for all cultural heritage dimensions of bank CEOs, within the same specification. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. Models 5 and 6 present the results of the horserace regressions that comprises of the interactions of all cultural heritage attributes of bank CEOs with our risk-taking incentive measure, vega. In order to reduce the collinearity issues common in such tests, we replace the cultural heritage values with the residuals from regressions that use as dependent variable, a cultural heritage characteristic and as explanatory variables the remaining cultural heritage characteristics. Regressions 1-5 include bank, and year fixed effects. Regression model 6 includes bank, year, and CEO fixed effects. We do not include a model where with CEO fixed effects whilst controlling for all cultural heritage dimensions of bank CEO as the individual effects would be wiped out and produce identical result to that of Table 5. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 10: Alternative Measures of Culture

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
		Panel A: Bank & Year FE		
Vega	-0.0703	-0.0413	-0.208	-0.0467
	(0.0707)	(0.100)	(0.198)	(0.0581)
Vega*Assertiveness	0.0180			
	(0.0186)			
Assertiveness	-0.103			
	(0.0985)			
Vega*Power Distance		0.0155		
		(0.0377)		
Power Distance		-0.255		
		(0.195)		
Vega*Collectivism			0.0365	
			(0.0352)	
Collectivism			-0.212	
			(0.198)	
Vega*Uncertainty Avoidance				0.0104
				(0.0143)
Uncertainty Avoidance				-0.168**
				(0.0839)
Constant	-0.535	0.120	0.215	-0.0358
	(2.217)	(2.266)	(2.370)	(2.197)
Observations	1,377	1,377	1,377	1,377
R-squared	0.895	0.895	0.895	0.896
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.132**	0.00656	-0.303**	-0.0566
	(0.0628)	(0.0775)	(0.139)	(0.0483)
Vega*Assertiveness	0.0315*			
	(0.0161)			
Vega*Power Distance		-0.00740		
		(0.0306)		
Vega*Collectivism			0.0518**	
			(0.0244)	
Vega*Uncertainty Avoidance				0.0106
				(0.0112)
Constant	-1.215	-0.873	-1.168	-1.013
	(2.656)	(2.689)	(2.682)	(2.684)
Observations	1,322	1,322	1,322	1,322
R-squared	0.914	0.913	0.913	0.913
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1). The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. We replace the four main Hofstede dimensions with those that are analogous in GLOBE framework. The alternative measures for masculinity, power distance, individualism, and uncertainty avoidance are assertiveness, power distance, collectivism, and uncertainty avoidance, respectively. Regressions 1-4 of Panel A include bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 11a: Alternative Clustering of Standard Errors (CEO-level)

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
		Panel A: Bank & Year FE		
Vega	-0.0621***	0.00274	-0.0216	0.000291
	(0.0187)	(0.0181)	(0.0268)	(0.0196)
Vega*MAS	0.000980***			
	(0.000336)			
MAS	-0.00312*			
	(0.00169)			
Vega*PDI		-0.000145		
		(0.000407)		
PDI		-0.00285		
		(0.00196)		
Vega*INV			0.000262	
			(0.000389)	
INV			6.97e-05	
			(0.00183)	
Vega*UAI				-5.74e-05
				(0.000309)
UAI				-0.00102
				(0.00161)
Constant	0.132	-0.201	-0.326	-0.313
	(2.258)	(2.241)	(2.249)	(2.249)
Observations	1,425	1,425	1,425	1,425
R-squared	0.895	0.895	0.895	0.895
Control Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	CEO	CEO	CEO	CEO
		Panel B: Bank, Year & CEO FE		
Vega	-0.0543***	-0.000333	-0.00923	-0.00248
	(0.0196)	(0.0229)	(0.0312)	(0.0196)
Vega*MAS	0.000675*			
	(0.000348)			
Vega*PDI		-0.000361		
		(0.000521)		
Vega*INV			-6.67e-05	
			(0.000461)	
Vega*UAI				-0.000233
				(0.000277)
Constant	-0.584	-0.520	-0.486	-0.585
	(2.894)	(2.904)	(2.909)	(2.907)
Observations	1,374	1,374	1,374	1,374
R-squared	0.913	0.913	0.913	0.913
Control Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	CEO	CEO	CEO	CEO

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our risk-taking compensation incentive, vega. The regressions in Panel A use bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. We re-estimate our baseline model using CEO-level clustering. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 11b: Alternative Clustering of Standard Errors (CEO Origin-level)

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
		Panel A: Bank & Year FE		
Vega	-0.0621**	0.00274	-0.0216	0.000291
	(0.0238)	(0.0197)	(0.0332)	(0.0233)
Vega*MAS	0.000980**			
	(0.000413)			
MAS	-0.00312			
	(0.00189)			
Vega*PDI		-0.000145		
		(0.000541)		
PDI		-0.00285		
		(0.00209)		
Vega*INV			0.000262	
			(0.000420)	
INV			6.97e-05	
			(0.00157)	
Vega*UAI				-5.74e-05
				(0.000498)
UAI				-0.00102
				(0.00164)
Constant	0.132	-0.201	-0.326	-0.313
	(1.507)	(1.402)	(1.363)	(1.410)
Observations	1,425	1,425	1,425	1,425
R-squared	0.895	0.895	0.895	0.895
Control Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	CEO Origin	CEO Origin	CEO Origin	CEO Origin
		Panel B: Bank, Year & CEO FE		
Vega	-0.0543**	-0.000333	-0.00923	-0.00248
	(0.0209)	(0.0259)	(0.0362)	(0.0217)
Vega*MAS	0.000675			
	(0.000400)			
Vega*PDI		-0.000361		
		(0.000559)		
Vega*INV			-6.67e-05	
			(0.000493)	
Vega*UAI				-0.000233
				(0.000327)
Constant	-0.584	-0.520	-0.486	-0.585
	(1.351)	(1.366)	(1.383)	(1.377)
Observations	1,374	1,374	1,374	1,374
R-squared	0.913	0.913	0.913	0.913
Control Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	CEO Origin	CEO Origin	CEO Origin	CEO Origin

This table presents the results of the multivariate linear regression model shown in Equation (1) of the main text. The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our risk-taking compensation incentive, vega. The regressions in Panel A use bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. We re-estimate our baseline model using the CEOs country of origin as our clustering level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 12: CEO Control

	(1) Total Risk	(2) Total Risk	(3) Total Risk	(4) Total Risk
		Panel A: Bank & Year FE		
Vega	-0.0621***	0.00291	-0.0210	0.000102
	(0.0193)	(0.0174)	(0.0289)	(0.0211)
Vega*MAS	0.000982***			
	(0.000352)			
MAS	-0.00323*			
	(0.00186)			
Vega*PDI		-0.000145		
		(0.000388)		
PDI		-0.00282		
		(0.00223)		
Vega*INV			0.000256	
			(0.000427)	
INV			8.79e-05	
			(0.00206)	
Vega*UAI				-5.11e-05
				(0.000327)
UAI				-0.00106
				(0.00172)
CEO Tenure	-0.00481	0.000598	-0.00364	-0.000650
	(0.0706)	(0.0718)	(0.0716)	(0.0719)
Constant	0.130	-0.208	-0.339	-0.321
	(2.302)	(2.253)	(2.263)	(2.262)
Observations	1,416	1,416	1,416	1,416
R-squared	0.895	0.895	0.895	0.895
Controls Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Clustering	Bank	Bank	Bank	Bank
		Panel B: Bank, Year & CEO FE		
Vega	-0.0520***	-0.00226	-0.00668	-0.00320
	(0.0179)	(0.0185)	(0.0258)	(0.0184)
Vega*MAS	0.000635*			
	(0.000329)			
Vega*PDI		-0.000312		
		(0.000371)		
Vega*INV			-0.000104	
			(0.000389)	
Vega*UAI				-0.000220
				(0.000252)
CEO Tenure	-0.0445	-0.0479	-0.0530	-0.0530
	(0.0738)	(0.0732)	(0.0741)	(0.0730)
Constant	-0.554	-0.488	-0.446	-0.549
	(2.716)	(2.724)	(2.726)	(2.720)
Observations	1,365	1,365	1,365	1,365
R-squared	0.913	0.913	0.913	0.913
Control variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (1). The dependent variable is represented by the total bank risk (Total Risk) defined as the annualised variance of daily stock returns for each fiscal year. Following prior literature, we use tenure as a proxy for CEO control. In both Panel A and B, we include a dummy variable which equals 1 where banks whose CEOs have a tenure exceeding 5 years (high control) and 0 otherwise (low control). Regressions 1-4 of Panel A include bank, and year fixed effects. Panel B includes bank, year, and CEO fixed effects. Whilst the CEO fixed effects in Panel B should account for the variations in tenure, we include a CEO tenure control to further mitigate potential endogeneity concerns. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Chapter 3 What drives banks to value lending relationships? The role of the Chief Executive's cultural heritage

What drives banks to value lending relationships? The role of the Chief Executive's cultural heritage

Abstract

Does bank CEOs' cultural heritage shape the nexus between lending relationships and the cost of bank loans? We show that banks, led by CEOs that trace their origin to more individualistic and masculine societies, are less inclined to share with their borrowers the savings accruing from strong lending relationships. In contrast, banks led by CEOs that originate from societies where uncertainty avoidance and power distance are higher, exhibit a stronger propensity to reward their relationship borrowers with lower loan prices. These findings are consistent with the view that cultural attributes affect the degree to which business relationships are valued.

JEL classification: G21, M14, Z10

Keywords: lending relationships, cost of bank loans, CEOs, cultural heritage

3.1 Introduction

The primary function of financial intermediaries is to facilitate the channelling of funds from those in surplus (lenders) to those in deficit (borrows). These institutions play a critical role for firm growth including capital expenditures, research and development, marketing, and expansion opportunities such as mergers and acquisitions. Hence, these intermediaries can stimulate economic growth through funding firm activities that lead to greater innovation, employment, liquidity, and overall fluidity of funds moving within an economy. Yet, for this system to work efficiently it is dependent on the ability generate valuable information on borrower credit worthiness and being able to build strong lender-borrower relationships. Relationship-lending occurs when a firm has close ties to a financial institution (lender). This process allows financial institutions, namely banks, to gather privileged confidential information in asymmetric information conditions. This data is gathered through the acquisition of "hard" and "soft" information. Hard information includes quantifiable data that is used in credit-scoring models to determine a level of risk, while soft data is based on an ongoing rapport with the firm and cannot be reliably transferred from one lender to another (Elyasiani and Goldberg, 2004).

These relationships play an essential role in reducing information asymmetries between banks and borrowers. Through repeated interactions with the same borrowers, banks collect reusable private and proprietary information, which allows the latter to improve their assessment of the former's creditworthiness (Rajan, 1992). As lending relationships become stronger, banks enjoy savings in terms of due diligence and monitoring costs. Many theoretical and empirical studies show that banks are willing to share these savings with their relationship borrowers through lower loan prices and less restrictive loan contracting terms (Boot and Thakor, 1994; Petersen and Rajan, 1994; Berger and Udell, 1995; Boot, 2000; Bharath et al., 2011; Prilmeier, 2017). The opposite view is that lending relationships increase the informational advantage of relationship banks compared to outside lenders. This "hold-up" problem enables banks to extract rents from their relationship borrowers in the form of higher loan prices (Sharpe, 1990; Rajan, 1992; Degryse and Ongena, 2005; Ioannidou and Ongena, 2010; Schenone, 2010; Hasan et al., 2019). However, despite the established methods for capturing the degree of these relationships, the effects on bank loans remains an ongoing debate because of the opposing theoretical predictions and mixed empirical findings in the extant literature (Kysucky and Norden, 2016).

Several recent studies focus on how the borrowing firms' characteristics or the economic cycle influences the association between lending relationships and the cost of bank loans (Sette and Gobbi, 2015; Bolton et al., 2016; López-Espinosa et al., 2017; Beatriz et al., 2018; Beck et al., 2018; Hasan et al., 2019; Schäfer, 2019). However, research on banks' characteristics that could affect their propensity to share the benefits of relationship-lending with borrowers is scarce. In this study, we take a different approach from the extant studies and posit that culture could influence banks' willingness to pass, in the form of lower loan prices, the savings stemming from strong lending relationships to borrowers. The purpose of this paper is to provide some answers to the following question: "Does banks' culture condition the effect of lending relationships on the cost of bank loans?".

The Upper Echelon theory explains that organisational outcomes are in part predicted by characteristics of the top-level managerial team and where the experiences, values, and personalities of executives influence their interpretations of the situations faced and in turn, influence their choices made (Hambrick and Mason, 1984; Hambrick, 2007). This is particularly relevant to our study as bank CEO characteristics are greatly shaped by inherited cultural values and practices, absorbed during their childhood. This is continued into their adult life and impacts decision-making. For example, whether they exploit relationship-lending or reward it. This ultimately forms the loan policy of the bank. Hofstede (1984, p.82) defines culture as "the collective programming of the mind which distinguishes the members of one group or society from those of another." Culture serves as an informal institutional mechanism that shapes individuals' values and preferences and calibrates their behaviour in society and economic transactions (North, 1990; Licht et al., 2005; Tabellini, 2010). In the context of our study, differences in the national culture offer a source of significant variation on the value that individuals and organizations place on relationships in the societal and business contexts (Zaheer and Zaheer, 2006). Hence, national culture could influence the degree to which banks value lending relationships and their inclination to share with borrowers the benefits stemming from such relationships. The Hofstede (2001) cultural dimensions (individualism versus collectivism, uncertainty avoidance, masculinity versus femininity, and power distance) provide ample theoretical basis to this conjecture.

The individualism dimension captures the extent to which a society's members value personal independence and focus solely on personal gains versus being integrated into strong, cohesive groups, forming common goals, and striving for collective benefits (Triandis, 1994; Hofstede, 2001; Li et al., 2013). Members of a collectivist society also display less society-wide trust and resort to the formation of strong relationships to overcome transaction costs (Tabellini, 2010). In contrast, high individualism associates more with arm's length market transactions and formal contracting mechanisms (Li and Zahra, 2012; Boubakri and Saffar, 2016; Cline and Williamson, 2017). Based on this, we formulate our first hypothesis (H1), that banks in which an individualist culture dominates, place less value on strong lending relationships. Therefore, they are less willing to share the benefits of relationship lending with their borrowers by reducing loan prices.

The uncertainty avoidance dimension measures the degree to which a society's members feel uncomfortable and anxious in ambiguous and uncertain situations (Hofstede, 2001; Hofstede, 2010). Individuals in uncertainty-avoidant societies appreciate predictability in economic transactions (Fidrmuc and Jacob, 2010; Zheng et al., 2012; Li et al., 2013) and strive to facilitate such predictability by cooperating and forming strong relationships with the other parties (Hofstede, 2001). Strong lending relationships by reducing information asymmetry render borrowers' behaviour more predictable. Consequently, banks with an uncertainty avoidant culture are more likely to value strong lending relationships and to display a higher propensity to share the benefits from such relationships with borrowers through lower loan prices (hypothesis H2).

The masculinity dimension relates to the degree to which values stereotypically associated with the male gender (e.g., material success and achievement) are preferred over female values (e.g., nurturing relationships, cooperation, and caring for the vulnerable). Members of masculine societies place low importance on developing strong relationships and focus more on material success. Consequently, individuals in masculine societies are more opportunistic and show little concern about the impact of their opportunistic actions on the other parties (Hofstede, 1984; Doney et al., 1998; Jing and Graham, 2008; Zheng et al., 2013). Thus, in our third hypothesis (hypothesis H3), we predict that banks with a more masculine culture value lending relationships less and are less likely to reward their relationship borrowers with lower loan prices.

The power distance dimension reflects the extent to which a society's members accept an unequal distribution of power. Members of high power-distance societies value hierarchical organisational forms that prompt a preference for conformity and unquestioning loyalty over independence (Hofstede, 1984; Berger et al., 2021). Consequently, power distant societies exhibit a low tolerance for behavioural deviations and value predictable relationships (Hofstede, 1984; Doney et al., 1998). Strong lending relationships represent loyalty and facilitate, through lower information asymmetry, the predictability of borrowers' behaviour. Therefore, in our fourth and final hypothesis (H4), we predict that banks with a more power distant culture would display a greater appreciation of lending relationships and a higher propensity to reduce the price of loans for relationship borrowers.

We focus on the CEO of the lead bank as existing literature provides strong supporting evidence regarding their critical role and are generally considered the most senior individuals within the bank (Tsui et al., 2006; Berson et al., 2008; Sheikh, 2018). The CEOs' preferences pervade the corporations they lead, influence corporate decision-making and practices, and ultimately drive corporate outcomes (Bertrand and Schoar, 2003; Chatterjee and Hambrick, 2007; Biggerstaff et al., 2015). Similarly, in the banking industry, bank CEOs' characteristics and preferences shape lending policies (Ho et al., 2016). In the syndicated loans setting particularly, the influence of bank CEOs on loan pricing and contract design is significant. Hagendorff et al. (2019) provide survey evidence that bank CEOs in the U.S. determine the lending parameters that loan officers use when setting the price and other contract terms of syndicated loans. Furthermore, their survey reveals that bank CEOs are in regular communication with the loan officers to ensure that the latter follow the loan pricing guidelines that bank CEOs have set.[15] Hence, we focus specifically on these individuals and their embedded preferences. The inherited values of bank CEOs infiltrate and filter down to shape a firm's economic decision making such as relationship-lending and loan policies.

Moreover, studies that attempt to isolate national culture's effects on financial contracts in a cross-country framework face a significant challenge. National culture correlates with several country-level factors that could exert an independent effect on financial contracts (Aghion et al., 2010). For example, national culture affects the legal system and the contract enforcement mechanisms in a country (Licht et al., 2005; Cline and Williamson, 2017), both of which play an important independent role in bank lending. To alleviate concerns regarding such confounding factors, we follow previous studies (Nguyen et al., 2018; Hagendorff et al., 2019) that examine the bank policy and loan contract implications of the variation in the national cultural heritage of bank CEOs in a single country context. The multicultural nature of the U.S. provides a reliable testing ground for our research and due to its long immigration history. In addition, we are better able to capture the spill-over effects of culture due to the homogeneity in regulatory framework and financial market. This is particularly notable for the purpose of our study as we exploit the cultural diversity in the United States. Cultural heritage variations prompt differences in values and preferences on a national scale. These values are imported with immigration to the host country and display strong intergenerational persistence (Guiso et al., 2006; Giannetti and Yafeh, 2012; DeBacker et al., 2015; Pan et al., 2020). Hence, heterogeneity in the cultural heritage characteristics of U.S. banks' CEOs could influence banks' willingness to share the benefits of relationship lending with their borrowers.

[15] More than 90% of the 92 loan officers in the Hagendorff et al. (2019) survey agree that CEOs shape the overall lending policy. Loan officers, that form the syndication team, adhere to the lending policy parameters that bank CEOs have set.

To carry out our empirical analysis, we compile a largely hand-collected dataset on the CEOs' cultural heritage of 53 banks active as lead lenders for syndicated loans to around 2,400 borrowing firms in the U.S. over the 1992-2017 period. First, we draw the surname of bank CEOs from the Execucomp database. Then, similarly to prior U.S. based studies (Hegde and Tumlinson, 2014; Liu, 2016; Nguyen et al., 2018; Giannetti and Zhao, 2019; Chen et al., 2020), we use the origin of the bank CEOs' surnames to infer ethnicity. We identify the ethnic origin of the CEOs' surnames using various data sources such as the website ancestry.com, the 1940 U.S. census, the immigration records, and the commercial database of Origins Info Ltd. The latter provides data on the origin of names and surnames for ethnically targeted marketing campaigns. In this way, we trace the origin of bank CEOs to 14 countries. Consequently, we associate the ethnic origin of CEOs' surnames with the four national cultural heritage dimensions of Hofstede.

We then merge the bank CEOs' cultural heritage dataset with data on syndicated loans that we source from Dealscan, data on the characteristics of the borrowing firms from Compustat and – once we identify the lead bank in each syndicate loan – we also source data from Compustat Bank Fundamentals on the characteristics of the lead banks. We are careful to take account of bank mergers and acquisitions occurring during the period of our sample. It is rational to assume that post-M&A, the acquiring bank inherits the acquired bank's information on borrowing firms and, therefore, the lending relationship with these firms (Schenone, 2010; Prilmeier, 2017). In our tests, we use three relationship lending variables. Our primary measure is a relationship intensity indicator, which is the ratio of the dollar ($) value of the loans a bank has granted to a specific borrower in the last five years before a loan's inception to the dollar ($) value of all the loans that this borrower has obtained in the same period. The other two measures comprise a relationship intensity measure based on the number of loans and a lending relationship dummy.

The empirical findings of our baseline models support our hypotheses. Using models with interaction terms, we find that the association of lending relationship intensity with the cost of bank loans, as measured by the all-in-spread-drawn (AISD) above LIBOR, is conditioned by the cultural heritage characteristics of bank CEOs. We show that the interactions between lending relationship intensity and bank CEO cultural heritage in terms of individualism and masculinity display a positive relationship with loan spreads (hypotheses H1 and H3, respectively). In contrast the interactions between relationship intensity and bank CEO cultural heritage in terms of uncertainty and power distance are negative and significant (hypotheses H2 and H4, respectively). These findings show that the loan pricing implications of lending relationships are consistent with the conjecture that certain CEOs' cultural heritage traits prompt an appreciation of relationships. These results are also economically significant. As an example, we use the case of individualism (hypothesis H1) and the difference (similar to one standard deviation) in this cultural heritage attribute between a bank led by a CEO of Greek heritage (individualism=35) and a bank led by a CEO of Polish origin (individualism=60). A one standard deviation increase in relationship intensity (0.42) implies a decrease of around 4.85 basis points (or $577,000) in interest costs for an average loan issued by a bank led by a Greek heritage CEO. In the case of the bank led by a CEO of a Polish heritage the corresponding decrease in the interest costs is 1.81 basis points (or $202,000).[16]

Our data is a multi-level cross-section which allows us to control for bank, firm, and loan characteristics. In addition, we include several fixed effects in our baseline including firm, bank, year, month, S&P quality rating, rated (bank-dependence), and loan type thus mitigating concerns regarding omitted variables stemming from other lending characteristics that could influence the cost of borrowing. However, we perform further tests to address methodological concerns. An important omitted variables concern is that bank CEOs' cultural heritage could be associated with other characteristics of the societies in which CEOs trace their origin (e.g., religion). We use an instrumental variable analysis to tackle this issue. We are careful in selecting instruments for the cultural heritage traits that satisfy both the inclusion and exclusion restrictions. Furthermore, we use models that comprise CEO fixed effects. Tests that use CEO fixed effects are useful in the context of this study. Such fixed effects account for the time-invariant characteristics of bank CEOs such as gender, religion, and the generation of immigration that each bank CEO belongs (e.g., first-generation immigrant versus later generations). To address further omitted variable concerns, we use specific types of fixed effects models. To control for all time-variant CEO characteristics (e.g., compensation schemes, age, overconfidence), we employ models with bank CEO*year fixed effects. To account for time-variant omitted variables at the bank level (e.g., each bank's corporate governance structure), we estimate models that comprise bank*year fixed effects. Next, we perform estimations using matched samples from propensity score matching to address three potential selection bias issues. The first is that the decision to form lending relationships is determined to an extent by the borrowing firm and could be influenced by certain borrowing firm characteristics such as size (Bharath et al., 2011). The second relates to the possibility that CEOs with certain cultural heritage traits could be more likely to form lending relationships with firms that exhibit specific characteristics. For example, some studies show that individualism prompts increased risk-taking (Chui et al., 2010; Li et al., 2013; Mourouzidou-Damtsa et al., 2019). Hence, banks led by more individualistic CEOs could be more likely to form a lending relationship with lower quality

[16] The average size of a loan is $335m and average duration is 3.62 years.

firms. The third selection issue relates to the possibility that banks might select a CEO with a specific cultural heritage trait to implement a bank policy conducive to lending relationships. We perform several additional robustness tests: we estimate models that employ alternative lending relationships, and cultural heritage measures; we perform tests in which we use alternative ways of clustering the standard errors; and we use specifications that comprise fixed effects for the CEOs’ ancestral country of origin. We also re-estimate each model to include all the cultural dimensions.

Our key contribution is to show that banks' inclination to share the benefits of lending relationships, through lower loan prices, with their relationship borrowers is conditioned by the bank CEOs' cultural heritage traits. Our findings show that such inclination follows a pattern that is consistent with the degree to which bank CEOs' cultural heritage is appreciative of relationships. Therefore, our study contributes to the growing stream of the literature that investigates the factors that influence banks' decision to share the benefits of lending relationships with their borrowers (Sette and Gobbi, 2015; Bolton et al., 2016; López-Espinosa et al., 2017; Beatriz et al., 2018; Beck et al., 2018; Hasan et al., 2019; Schäfer, 2019). These studies focus on borrowers' characteristics and the economic cycle. Surprisingly, the empirical literature on the conditioning effects of banks' characteristics on the association between lending relationships and loan pricing is still scarce. Our study highlights the importance of considering lenders' culture when investigating the effects of lending relationships on the cost of bank loans.

This study also contributes to the emerging literature that examines the effect of culture and CEO heritage on the economic outcomes of corporations (Pan et al., 2015; Mourouzidou-Damtsa et al., 2019; Bedendo et al., 2020), and more specifically to the stream of this literature that focuses on the banking sector (Giannetti and Yafeh, 2012; Nguyen et al., 2018; Álvarez-Botas and González, 2021). To our knowledge, this study is one of the first studies that examine the effect of bank CEO cultural heritage on the cost of bank loans. Another recent study shows that bank CEO cultural heritage in terms of trust exerts a significant direct effect on loan prices (Hagendorff et al., 2019). Our study shows that the effect of bank CEO cultural heritage on the cost of bank loans is also important in terms of the extent to which banks value lending relationships, which is an important feature of financial intermediation.

Finally, our paper contributes to the literature that investigates the effects of bank CEO characteristics on bank lending policies. Several studies show that CEO characteristics matter for bank risk and performance (Fahlenbrach and Stulz, 2011; Hagendorff and Vallascas, 2011; King et al., 2016; Huang et al., 2018). However, studies that focus on the effects of bank CEO attributes on lending policies using granular loan-level data are comparatively scarce. Some recent studies investigate how bank CEO attributes impact lending behaviour and loan pricing (Ho et al., 2018; Lim and Nguyen, 2020). Our study also fits within this emerging stream of the literature.

The rest of the paper is organised as follows. Section 3.2 develops four hypotheses. Section 3.3 describes the data and methodology. Section 3.4 provides the main empirical findings. Section 3.5 reports the results of the main robustness tests. In addition, we provide a summary of further robustness checks and analysis in section 3.6. Finally, section 3.7 concludes.

3.2 Hypothesis Development

We posit that the cultural heritage of bank CEOs shape the nexus between lending relationships and the cost of bank loans. We use the four main cultural dimensions in the Hofstede (2001) framework to explore how the association between lending relationships and bank costs change according to each dimension. This approach captures the following 4 dimensions: Masculinity versus Femininity (MAS), Power Distance Index (PDI), Individualism versus Collectivism (INV), and Uncertainty Avoidance Index (UAI). Next, we break down each dimension that drives these underlying cultural preferences that make CEOs more likely to exhibit a stronger propensity to reward their relationship borrowers or less inclined to share with their borrowers the savings accruing from strong lending relationships.

Bank CEO Individualism and Lending Relationships

The individualism (INV) cultural dimension describes the extent of the individualistic versus the collectivist nature that prevails in a given society and, as such, reflected in societal interactions (Hofstede, 1984). Individualistic cultures emphasize self-interest, individual freedom, and autonomy. In an individualistic society, individuals only look after themselves and their immediate family (Hofstede, 2001). Hence, individuals originating from such societies value independence from group affiliations (Triandis, 1994). Employed persons in an individualistic culture are expected to act according to their own interests, and where work is organised in such a way that the employer's and individuals interest coincide (Hofstede, 2010). In contrast, those from more collectivist cultures highly value being integrated into strong cohesive in-groups, bounded together by informal relationships, in which protection is exchanged for allegiance (Hofstede, 2001; Li et al., 2013). Thus, individuals originating from collectivist societies place a high value on relationships (Triandis, 1994).

Based upon the intrinsic nature of those from each type of society, we expect that banks led by CEOs from more individualistic societies, in which concerns for pure self-interest are prevalent, are more likely to exploit the inside information they have acquired on borrowers, for their self, and employers' financial benefit by charging higher loan spreads. On the contrary, we believe that banks led by CEOs from more collectivist societies are more likely to embrace and appreciate strong bank-borrower relationships that could promote a mutually beneficial rapport between the two parties. CEOs from collectivist cultures may value the relationship with the borrower and use their unique insider knowledge to offer more competitive loan pricing, which even further strengthens the relationship.

The "individualism-collectivism" spectrum also influences preferences regarding the mechanisms that mitigate transaction costs and information asymmetry. Tabellini (2010) shows those in a collectivist society display less societal-wide trust, as a result increasing transaction cost. In such a society, individuals tend to rely on nurturing relationships to reduce transaction costs and contract enforcement (Fukuyama, 1995; Perkins, 2000). These relationships are based on frequent interpersonal contact that acts as an incubator of trust between two parties, and promote collective goals (Earley, 1989; Triandis, 1994). On the other hand, individuals from more individualistic societies exhibit a preference for arm's length market transactions where formal contractual rules are used to mitigate transaction costs (Steensma et al., 2000; Li and Zahra, 2012; Boubakri and Saffar, 2016; Cline and Williamson, 2017). These formalities also act as a barrier to informal relationship development i.e., maintain professionalism. Similarly, the pricing of loan contracts in individualistic societies is more likely to be based on arm's length market forces compatible with transactional-based lending (Zheng et al., 2013).

Following the above discussion, we expect banks led by CEOs originating from more collectivist societies to place a higher value on lending relationships, which are based on the repeated interactions of banks with borrowers and the generation of inside information on borrowers, to reduce transaction costs and information asymmetry issues (Bharath et al., 2011). On the contrary, banks led by CEOs originating from more individualistic societies may not give emphasis to the benefits of lending relationships due to the positive association of individualism with arm's length market transactions (i.e., transactional-based lending), and the potential to increase one's own wealth, as well as their employers.

Hence, we formulate the first hypothesis (H1) as follows:

H1: The negative (positive) effect of lending relationships on the cost of bank loans would be moderated (enhanced) for banks led by CEOs that trace their origin to more individualistic societies.

Bank CEO Uncertainty Avoidance and Lending Relationships

Uncertainty avoidance (UAI) indicates the degree to which a society's members feel uncomfortable and exhibit anxiety in the face of uncertainty and ambiguity (Hofstede, 2001; Hofstede, 2010). Managers originating from high uncertainty avoidance societies tend to be more conservative, strive to reduce their exposure to future uncertainty, and display a preference for predictable returns (Fidrmuc and Jacob, 2010; Zheng et al., 2012; Li et al., 2013). Those from high uncertainty avoidant societies have a low tolerance for unstructured and unpredictable circumstances, which determines the extent that uncertainty is lessened and the type of mechanisms developed alleviate this anxiety (Singh, 1990). “Extreme ambiguity creates intolerable anxiety. Every human society has developed ways to alleviate this anxiety.” (Hofstede, 2010, pp. 201-202). Contrastingly, those from low uncertainty avoidant societies have less anxiety and find deviance from the norm is more palatable. Individuals originating from high uncertainty avoidance societies also avoid conflict and competition (Hofstede, 2001; Berger et al., 2021). Thus, they display a preference for cooperation as a device that could facilitate the predictability of the other party's behaviour (Hofstede, 2001). These characteristics of individuals in uncertainty avoidant societies manifest themselves also in the banking sector. One of the ways uncertainty avoidant CEOs can alleviate their anxiety is by reducing information asymmetries via relationship-lending. Kwok and Tadesse (2006) show that uncertainty avoidant cultures are associated with banking systems where informal rules such as the relationships between lenders and borrowers play a significant role. Therefore, strong lending relationships fit with the preference for permanent and stable relationships that individuals from high uncertainty avoidance societies display (Emrich et al., 2004)

Based on the above discussion, we posit that banks led by CEOs originating from high uncertainty avoidant societies will strive to maintain a high level of certainty in their lending operations. Thus, they are likely to highly value strong relationships with borrowers to retain their business and secure future income. Strong lender-borrower relationships reduce information asymmetry and render borrowers' loan repayment more certain and predictable. Lending relationships also shield banks from the uncertainty inducing effort to compete continuously with other banks for loans to new borrowers. Hence, banks led by CEOs originating from high uncertainty avoidance societies are more likely to reward, through lower loan prices, the information asymmetry reducing properties of strong relationships with the borrowers.

Therefore, we state our second hypothesis (H2) as follows:

H2: The negative (positive) effect of lending relationships on the cost of bank loans would be enhanced (moderated) for banks led by CEOs that trace their origin to more uncertainty avoidant societies.

Bank CEO Masculinity and Lending Relationships

The masculinity-femininity cultural dimension captures the two opposite ends of the spectrum in a society with respect to their associated stereotypical connotations. Societies that are closer to the masculinity (MAS) side of the cultural spectrum exhibit characteristics such as assertiveness such as material success and achievements, competitiveness, and little sympathy for the vulnerable (Hofstede, 2001). Hence, individuals that originate from more masculine societies value independent thought and action while they do not shy away from conflicts with other parties (Doney et al., 1998).

On the contrary, cultures closer to the femininity side of this cultural spectrum exhibit stronger relationship orientation and place importance on values such as cooperation, societal interactions, and caring for the weaker members (Hofstede, 2001; Arnold et al., 2007). These characteristics may manifest themselves in the interaction's lenders have with borrowers. A weak focus on relationships and a stronger emphasis on material success suggest that individuals originating from more masculine societies exhibit more aggressive and opportunistic behaviour with little regard for how such behaviour would affect other parties (Hofstede, 1984; Doney et al., 1998; Jing and Graham, 2008; Zheng et al., 2012). Consequently, members of more masculine societies value relationships less than members of feminine societies.

We believe this may be reflected in the lender-borrower relationship i.e., lenders originating from feminine cultures providing more favourable loan pricing compared to lenders originating from masculine cultures. Therefore, higher profits achieved through rent extraction and exploiting their advantageous position would align with the cultural partialities of a CEO from a highly masculine culture. Based on the above discussion, we conjecture that banks led by CEOs that originate from more masculine societies are more likely to exploit financially, through higher loan prices, the private information on borrowers that they have accumulated through their past interactions with them. Hence, our third hypothesis (H3) is as follows:

H3: The negative (positive) effect of lending relationships on the cost of bank loans would be moderated (enhanced) for banks led by CEOs that trace their origin to more masculine societies.

The Power distance (PDI) cultural dimension indicates the extent to which societies accept inequalities stemming from power, wealth, and, most notably, status. Individuals that originate from high power distance societies accept a hierarchical order within their community where privilege and status symbols are considered the norm (Hofstede, 2001; Hofstede, 2010). Furthermore, individuals in high power distance societies are more like to value conformity and loyalty over independence (Hofstede, 1984; Berger et al., 2021). The predominance of authoritarian norms, conformity, and loyalty in these societies prompt low tolerance of deviations in behaviour and, as a result, high regard for predictable relationships (Doney et al., 1998).

This status and inequality are reinforced by a high level of dependency of the borrower on the lender through intense relationships, by banks led by such CEOs. Therefore, this type of CEOs decision-making will likely be geared towards the perseveration of this position and make decisions not based on merit; but on the basis of making borrowers happy in exchange for their loyalty. To achieve this, they may try to entice and keep borrowers loyal by offering them competitive loan prices and keeping them dependent on the lenders funding. Hence, rewarding repeated lending by offering lower loan spreads. Furthermore, banks led by CEOs originating from high power distance societies might appreciate the higher predictability of borrowers' behaviour that stems from strong lender-borrower relationships. Therefore, banks led by CEOs originating from higher power distance societies might try to entice and keep borrowers with strong relationships loyal by offering them lower loan prices and keeping them dependent on their funding.

Thus, we state the fourth hypothesis (H4) as follows:

H4: The negative (positive) effect of lending relationships on the cost of bank loans would be enhanced (moderated) for banks led by CEOs that trace their origin to societies with more power distance.

3.3 Data and Methods

3.3.1 Sample

We source data on US syndicated loans from the DealScan database maintained by the Loan Pricing Corporation (LPC) for the 1992-2017 period. In line with previous research on lending relationships (Schenone, 2010; Bharath et al., 2011; Prilmeier, 2017), we focus on the syndicated lending market which allows us to identify past lending interactions between borrowing firms and lead lenders. The sample starts in 1992 as this is the first year that we have data available on bank CEOs from the Execucomp database to match them with loan data. Dealscan provides comprehensive information on loan characteristics such as price, amount, maturity, covenant and collateral presence, and other features. Our sample often includes multiple loan facilities to the same borrowing firms in the same year. Following previous studies such as Hasan et al. (2014), we treat each of these loan facilities as unique observations. Even when loan facilities are part of the same loan package deal, they may carry different loan elements such as the type, maturity, and size of the loan. Following the extant literature, we exclude loans to financial companies (SIC between 6000-6999) and utility firms (SIC 4900-4949). These industries are subject to stricter regulatory requirements, and the conditions of granting loans to firms belonging to these industries differ from the rest of the firms. We match loan data with the borrowing firm's characteristic that we plan to use as control variables in our estimations through the DealScan-Compustat link developed by (Chava and Roberts, 2008). This matching table allows us to use the DealScan database's information, such as borrowing firms' names and unique identifiers, to match them to borrowers' financial characteristics from the Compustat database. The updated link contains matches until the end of 2017.

As we are interested in lender-borrower relationships, our next step involves identifying each syndicated loan's lead bank. The lead bank plays the most crucial role in a syndicated loan. It determines the loan price and the other loan terms (e.g., size and maturity), is the primary point of contact for the borrower and acts as an intermediary between the borrower, and the rest of the participant lenders in the syndicate (Ivashina, 2009; Prilmeier, 2017). Lead banks also perform most screening and monitoring activities regarding the borrowing firm, such as acquiring and analysing information on borrowers and making on-site visits (Gustafson et al., 2021). Therefore, we consider that a bank establishes a relationship with a borrowing firm if it acts as the loan's lead bank (Chakraborty et al., 2018). Hence, identifying the lead bank is the building block of classifying a lending relationship to carry out the empirical analysis. To perform this identification, we follow established procedures from the extant literature. If the lead bank is clearly identified or where the loan facilities contain only one lender, we classify them as the lead banks (Sufi, 2007). In other cases, where there is no explicit information, to identify each syndicated loan's lead bank, we follow banks' ranking hierarchy in a syndicated loan developed by Chakraborty et al. (2018).[17]

[17] We follow Sufi (2007), and the ranking hierarchy provided by Chakraborty et al. (2018) in order to identify the lead bank of each loan. In the majority of our sample, we are able to identify the lead arranger when the lender is denoted as “Admin Agent” as opposed to “Participant” within the DealScan data as in Sufi (2007). This method

Next, we merge the loan data from DealScan with lead bank characteristics from Compustat Bank Fundamentals. To this end, we follow the methodology provided by Schwert (2018) and use the lender link table.[18] This table contains DealScan lender names matched to the Compustat Bank Fundamentals identities (GVKEYs) and bank merger and acquisition (M&A) details. This linking table only provides information up to 2012. Hence, we verify the existing table and update its bank M&A information by identifying additional bank M&A activity using data from the FED, media articles, and news events. Several bank mergers and acquisitions occur during our sample period.[19] It is rational to assume that post-M&A, the acquiring bank inherits the acquired bank's information on borrowing firms and, therefore, the lending relationship with these firms (Schenone, 2010; Prilmeier, 2017).

The above procedures together with the data on relationship lending variables, the information on the cultural heritage of lead bank CEOs (as described in the following subsections), and the control variables we use at the lead bank and borrowing firm levels results in a sample of around 16,000 loans to around 2,400 firms that are granted by 53 lead banks led by 103 CEOs. Table 1 provides the definitions of the variables that we use in the regression analysis.

3.3.2 Bank CEOs Origin and Cultural Heritage

A critical point of our study is to determine the lenders' CEO origin. To this end, we use the origin of the surname approach as in other U.S. studies (Hegde and Tumlinson, 2014; Liu, 2016; Nguyen et al., 2018; Giannetti and Zhao, 2019; Chen et al., 2020). As a first step, we use the Execucomp database that provides the names and surnames of all lenders' CEOs. We further search all lenders' CEO names and surnames manually and make corrections if we find any spelling errors. To finalise the list of original names and surnames, we use various sources, including state digital archives of marriage certificates, new articles, curriculum vitae, and biographies. In this way, we manage to overcome issues surrounding changes of family surnames and maiden names in cases of married female CEOs.

Next, we trace the origin of the bank CEOs' surnames. We use three primary sources to identify the country of origin of the bank CEOs' surnames. First, we use the Forebears website

allows us to eliminate the possibility of classifying a participant bank in the syndicate as a lead bank when in fact plays a small role in the syndicated loan in terms of setting the loan price and other contract terms as well as the screening and monitoring of the borrowing firm. For the rest of the loans, we follow the ranking hierarchy process of Chakraborty et al. (2018), which in turn follows and is similar to the process that Bharath et al. (2011) use to identify a lead bank.

[18] This table is available on https://sites.google.com/site/mwschwert/.

[19] For example, First Chicago NBD Corp was acquired by Bank One in 1998. Bank One was subsequently acquired by JP Morgan in 2004, and thus both becoming subsidiaries of JP Morgan.

(Forebears, 2019), which gives an initial signal of the surname's country of origin. Next, we use the ancestry.com website and source the most common country of origin of each CEO surname from both the 1940 U.S. Federal Census and the immigration records of the New York, Passenger, and Crew Lists (comprising Castle Garden and Ellis Island) during the 1820-1957 period. Finally, following other studies (Hegde and Tumlinson, 2014), we use a commercial database provided by Origins Info Ltd.[20] This database offers name-based classification services for ethnically targeted marketing campaigns. We use it to verify and complete the tracing of the origin of the bank CEOs' surnames.

While these sources provide comprehensive information regarding the origin of surnames and, to no small extent, eliminate the possibility of discrepancies, we acknowledge that CEOs could have mixed ancestry. Consequently, it is harder to identify the origin. However, empirical evidence suggests that less than 15% of bank CEOs have mixed ancestry in the U.S. (Nguyen et al., 2018). In addition, Pagnini and Morgan (1990) note strong endogamy during the 20th century and highlight that cross-cultural weddings were less likely among. As the last step, we group smaller nationalities into larger ethnic groups that reflect contemporary country borders. This step is necessary to assign cultural heritage characteristics to each bank's CEO. We can identify the surname origin of 103 CEOs of 53 banks during our sample period with this process. Our sample includes CEOs whose surnames originate from 14 countries.[21] After tracing the origin of the bank CEOs' surnames, we assign them cultural heritage characteristics. We use the following four cultural dimensions as developed by Hofstede (1984): individualism (INV), uncertainty avoidance (UAI), masculinity (MAS), and power distance (PDI). These four dimensions have a 0-100 scale.

3.3.3 Measures of Lending-Relationships

We use a relationship intensity variable to measure the lending relationship's strength between a lead bank and a borrowing firm. This lending relationship measure captures if a specific lead bank has a previous lending relationship with a given borrowing firm and how dependent this borrowing firm is on that lead bank (Schenone, 2010). Based on this premise, we calculate the relationship intensity for bank lending to borrowing firm as follows:

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[20] This census is no longer subject to the "72-Year Rule" of US confidentiality regulations.

[21] The countries of origin of the CEO surnames are France, Germany, Greece, Hungary, Ireland, Israel, Italy, Netherlands, Poland, Serbia, Sweden, the United Kingdom, Canada, and the United States. We assign the United States as country of origin in a few cases when a surname is absent from the immigration records and the Origins Info Ltd database (commercial vendor) came back with a US origin. Our results are unchanged when these cases are excluded.

$$RIA = \frac{Loan\ Amount\ by\ lead\ bank\ i\ to\ borrower\ m\ in\ the\ last\ 5\ years\ (\$)}{Total\ amount\ of\ loans\ to\ \ borrower\ m\ by\ all\ lead\ banks\ in\ the\ last\ 5\ years\ (\$)} \qquad (1)$$

The above measure of relationship intensity (RIA) is the ratio of the $ value of the loans a lead bank has granted to a specific borrowing firm just before the inception of a new loan to this firm divided by the $ value of the total of the loans a borrowing firm has taken from all banks. Hence, this measure of lending relationship intensity can range from 0-1 with higher values denoting a stronger lending relationship of a lead bank with a borrowing firm and more dependency on borrowing from this lead bank. Similar lending relationship intensity measures are widely used in the literature (Schenone, 2010; Bharath et al., 2011; Yildirim, 2020; Delis et al., 2021). Note that to have an accurate measure of relationship intensity when we construct the denominator of equation (1), we use all the loans a borrowing firm has taken in the past five years, including those not in the final sample due to missing information. In robustness tests, we use two additional measures of lending relationships. The first is an alternative measure of lending relationship intensity (RIN) that is based on the number of loans instead of the dollar value of loans:

$$RIN = \frac{Number\ of\ loans\ by\ lead\ bank\ i\ to\ borrower\ m\ in\ last\ 5\ years}{Total\ number\ of\ loans\ to\ borrower\ m\ by\ all\ lead\ banks\ \ in\ last\ 5\ years} \qquad (2)$$

The second is a more straightforward lending relationship measure. We use a dummy variable (RELDUM) that takes the value of 1 if a firm has taken at least one loan from the same lead bank in the past five years. Otherwise, this relationship dummy takes the value of zero. Both of these additional measures of lending relationships have also been widely used in the literature.

3.4 Empirical Findings

3.4.1 Regression Specification

To test our hypotheses, we use the following multivariate linear regression equation:

$$Loan\ Spread_t = a + \ \beta_{1\ (Lending\ Relationship)t} + \beta_{2\ (Bank\ CEO\ Cultural\ Heritage)t} + \beta_{3\ (Lending\ Relationship\ t\ *\ Bank\ CEO\ Cultural\ Heritage\ t)} + Firm\ Controls_{t-1} + Bank\ Controls_{t-1} + CEO\ Controls_t + Loan\ Controls_t + Set\ of\ Fixed\ Effects + \ \varepsilon \qquad (3)$$

We use the loan spread as the dependent variable following other studies on the determinants of bank loans' cost. In particular, we use the "all-in-spread drawn" (AISD), which is the loan interest payment in basis points above LIBOR plus the annual fee for each loan that a firm obtains (Ertugrul et al., 2017; Hasan et al., 2017; Hagendorff et al., 2019; Delis et al., 2020). In equation (3), we are interested in the coefficient β_3 . This is the coefficient of the interaction term between the lending relationship variable and the four bank CEOs' cultural heritage characteristics of Hofstede. These cultural dimensions are individualism (INV), uncertainty avoidance (UAI), masculinity (MAS), and power distance (PDI).

To reduce the potential for omitted variable bias, we control for several characteristics of the borrowing firms. We use the natural logarithm of total assets as a size proxy. We also include ROA as an indicator of profitability. We capture firm liquidity by dividing total current assets by the total current liabilities and firm tangibility by the ratio of net property, plant, and equipment to total assets. We also use the ratio of long-term debt to total assets as a measure of leverage. Finally, we use Altman's Z-score as a risk measure, computed as 1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales/total assets (Chakraborty et al., 2018).

In terms of bank controls, we use the lead lenders' total assets' natural logarithm as a measure of size. To capture the lead bank's capitalisation, we include a key Basel III regulatory measure calculated as the ratio of tier-1 (core) capital to total risk-weighted assets. This is the core funding source relative to the level of risk-weighted assets used to determine a bank's capital adequacy. We also include provisions (for loans and asset losses) to total assets. The use of provisions to assets captures the quality of a bank's assets and serves as a proxy for bank risk. Lastly, we control for the geographic distance between the bank and the borrowing firm. Previous research finds that geographic proximity between lenders and borrowers reduces information asymmetries and has loan pricing implications (Hollander and Verriest, 2016). In terms of bank CEO controls, we use their compensation incentives about risk and performance as captured by Vega and Delta, respectively. We source data on the CEO incentives from Execucomp.

We use a wide range of loan-level control variables, which may influence loan spreads. We control for loan size (in $ value) as it is standard in the literature (Santos and Winton, 2008; Chakraborty et al., 2018; Schwert, 2018). Our second loan-level variable is loan maturity as measured in months. We account for the syndicate size by capturing the total number of lenders who participated in the loan (Schwert, 2018). We also use three dummy variables that indicate if a loan is secured by collateral, or the presence of loan covenants or is subject to performance pricing.

In our baseline model, we also use several fixed effects. These include fixed effects of the borrowing firm, the presence of credit rating (bank dependence), the S&P quality of rating, bank, loan type, month, and year. We note that borrowing firm fixed effects is a stringent control for all the time-invariant characteristics of each borrowing firm (including its state and industry).

We utilise fixed effects models as this provided an efficient way to remove omitted variable bias by measuring variations within banks, firms, and other groups across time. This is of particular importance for the purpose of our study due to the number of elements we analyse over the 25-year period. We follow related papers (Hagendorff et al., 2019) when designing our model specification. However, we note that whilst we use fixed effects in our regressions, this is not considered a true fixed effect model. This is because, as Delis et al. (2017) posit each loan profile is unique and with its own unique characteristics (i.e., spread, covenants, duration etc.) and is not repeated overtime. Hence, this is not considered a true panel, as the same loan is not repeated over time. In essence, each loan is treated as a unique observation.

The sample of loan facilities is essentially, a cross-section of loans across banks and firms. We include the data for variables according to the timing noted in equation 3. We use high dimensional fixed effects for the key actors (banks and firms). As a result, this yields large R-squared values. We note that that the time dimension is not an issue, as the loan deals are not repeated in time as each loan is treated as a unique observation (as previously stated). Like Delis et al. (2017), we do not use a true panel dataset for firms and banks, in the sense that loan facilities are not repeated. Therefore, the elements affecting bank lending is already captured by the loan-level controls and the bank- and firm-related fixed effects.

We are also aware that demand and supply factors may be influenced by the economic conditions of the market (state of the economy). Since our research is contained within a single country namely, the U.S., to account for all possible economic conditions we use year fixed effects (this wipes out all yearly economic shocks, that is common to all firms and banks). Supply conditions are also determined by bank characteristics i.e., risk-taking of the bank, for this reason we control for bank characteristics such as Capital Tier 1 ratio and also control for bank fixed effects in our baseline models. We also control for time-variant loan supply conditions using Bank*Year fixed effects in panel A of Table 6, which account for and saturate the model from any time-varying changes in lead bank (supply-side) behaviour (Deli et al., 2019). Furthermore, CEO cultural heritage could affect loan supply for example, banks that led by high uncertainty avoidant CEOS could shy away from firms they have no relationship with, for this reason we use CEO fixed effects that mitigates, to some extent this issue (as culture is time-invariant). However, we are still able to identify the interaction effect even though the individual cultural heritage variable is wiped out. Whereas its interaction with the variables of interest i.e., lending relationships, are time variant and therefore survive (are not wiped out). The demand factors relate mostly to borrower characteristics hence, we use several firm characteristics as controls and also, use firm fixed effects to account for firm unobserved characteristics. This is consistent with previous literature that controls for demand and supply conditions in the loan market (Hagendorff et al., 2019; Delis et al., 2016).

The U.S. has a competitive banking landscape, with borrowers having ample choice in potential lenders for example, we have 53 banks in our sample. However, the choice of banks may become narrower depending on loan supply conditions. For example, Mi and Han (2020) show that syndicated loan prices are positively associated with the concentration of lead arranger's markets. The competitive landscape of banks plays a significant role in this case. A firm (borrower) has greater bargaining power over banks (lenders) if bank competition is high (as other banks may try lure new customers through lower loan prices). Hence, competition can affect the pricing strategies of banks. Therefore, this is another important reason why we use year fixed effects as this can absorb the competitive conditions (concentration) in the banking sector. This is particularly useful in our analysis as our study is focused on a single country context (i.e., the United States) therefore, concentration only has yearly variation.

However, there are measures of bank market power that are estimated at the bank level such as the Lerner index (Elzinga and Mills, 2011). For this reason, we account for bank market power measures that vary by bank and year, by using bank*year fixed effects to eliminate these variations. This is because measure of bank market power is bank specific and change by year (i.e., Lerner index). In using such fixed effects, we are able to absorb the effect of these competitive/bank market power effects.

To mitigate simultaneity, we use lagged values of the bank and firm-level control variables, whereas the bank CEO controls remain at time (t) as CEOs are in constant communication with the lending team and thus, have contemporaneous information during at loan inception. Hagendorff et al. (2019) provide evidence to show that CEOs set the broad parameters on loans and highlight that regular communications with the syndication team contribute to ensure that the lending parameters set by the CEO are followed closely. We also cluster the standard errors at the bank level because each bank gives multiple loans. However, in our robustness tests, we use alternatives ways of clustering the standard errors. We winsorize all the continuous variables at the 1st and 99th percentiles.

In Tables 2 and 3, one can find the summary statistics and the correlation matrix, respectively. The summary statistics are similar to other studies that use the same lending setting. It is useful to mention that for Hofstede's cultural heritage variables, the summary statistics are similar to those in the studies of (Nguyen et al., 2018; Hagendorff et al., 2019).

3.4.2 Baseline Results

We employ the baseline equation (3) to test the hypotheses that lenders' CEOs' cultural heritage attributes could condition the relationship between relationship intensity and the cost of bank loans (i.e., hypotheses 1-4). Results from these regressions are in Table 4. We first examine the direct association between relationship intensity (RIA) and loan spreads. In model 5 of Table 4, we find the individual effect of relationship-lending (RIA) has a negative relationship with the cost of bank loans as captured by loan spread, suggesting that stronger bank-firm relationships decrease the cost of lending to borrowers. We find this very much in line with prior literature that also finds lending relationships to decrease loan costs (i.e., Bharath et al., 2011). One of the main explanations for this result points to the reduction in information asymmetries between banks and borrows. Through repeated interactions with the same borrowers, banks collect reusable private and proprietary information, which allows the latter to improve their assessment of the former's creditworthiness (Rajan, 1992). As lending relationships become stronger, banks enjoy savings in terms of due diligence and monitoring costs. Many theoretical and empirical studies show that banks are willing to share these savings with their relationship borrowers through lower loan prices and less restrictive loan contracting terms (Boot and Thakor, 1994; Petersen and Rajan, 1994; Berger and Udell, 1995; Boot, 2000; Bharath et al., 2011; Prilmeier, 2017).

The interaction effects models provide findings that support our hypotheses (models 1-4 of Table 4). In model 1, we show that the interaction between individualism (INV) and relationship intensity (RIA) is positive and significant at the 1% level. In the same model, the individual effect of relationship intensity (RIA) on bank loans' cost is negative and significant. This finding provides supporting evidence to hypothesis H1. It indicates that banks led by CEOs that trace their origins to more individualist societies would be less appreciative of strong lending relationships and would attempt to exploit them financially. This result also means that banks led by CEOs originating from more collectivist societies are more willing to reward borrowers with strong lending relationships with lower interest costs. The findings regarding banks led by CEOs originating from more masculine cultures are similar to the ones of individualism and consistent with hypothesis H3. In model 3 of Table 4, we also show that the interaction between masculinity (MAS) and relationship intensity (RIA) is positive and significant at the 5% level. This finding is consistent with the notion that masculinity has an association with opportunistic behaviour.

In contrast, in model 2 of Table 4, we find that the interaction between uncertainty avoidance (UAI) and relationship intensity (RIA) is negative and significant at the 1% level. In the same model, the individual association between relationship intensity (RIA) and bank loans' cost is positive but not significantly different from zero. This result supports hypothesis H2. Banks led by CEOs with very low uncertainty avoidant heritage do not reward significantly strong lending relationships. However, banks led by CEOs with more uncertainty avoidant heritage place a higher value in relationships with the borrowers and are more willing to share with them the savings stemming from decreased information asymmetry. Similarly, in model 4 of Table 4, we find that the interaction between power distance (PDI) and relationship intensity (RIA) is negative and significant at the 1% level. In the same model, the individual effect of relationship intensity (RIA) is positive and significant at the 1% level. This finding provides evidence also in support of hypothesis H4.

3.4.2.1 Magnitude & Sign Direction

In the interaction models of Table 4, the individual effect of relationship-lending (RIA) is not interpreted in the same way as the effect of the coefficient in a model without interaction effects. In models with interaction effects, the coefficient is the average effect of relationship-lending on the cost of bank loans, when the variable interacted with (i.e., CEO culture) is zero. Hence, being very different to a regression model where no interaction exists. As our study includes many interactions with different cultural dimensions, these coefficients would change. Hence, such models are not as straightforward under the condition of the interacted variable.

In Table 4, the interpretation of the estimated coefficients can be quite difficult due to the nature of the cultural dimensions in an interaction model hence, the coefficients can vary in magnitude and sign direction. For this reason, in addition to the existing models in Table 4, in model 5, we also present results without interaction effects to show the average effect of lending relationships on the cost of bank loans in the absence of interactions.

This stems from two key factors; firstly, the influence of certain cultural dimensions is far greater. For example, we found individualism to have a much greater impact on loan spread compared to power distance, as expected. Secondly, we must be cautious interpreting the sign direction. For example, collectivistic CEOs are less likely to exploit a borrower and charge a lower interest rate on borrowers that are loyal to the bank and concentrates their borrowing portfolio on the bank compared to banks led by individualistic CEOs who would be less appreciative of strong lending relationships and exhibit a higher propensity to exploit their borrowers by charging higher interest rates.

3.4.2.2 Economic Effects

These results regarding our hypotheses are also economically significant. As an illustration, we use the case of individualism (hypothesis H1) and the difference in this cultural heritage trait between a bank led by a CEO of Greek heritage (individualism=35), a bank led by a CEO of Polish origin (individualism=60), and a bank led by a CEO with a Dutch ancestry (individualism=80). The differences in individualism between Greece and Poland (25) and between Poland and the Netherlands (20) are similar to one standard deviation increase in individualism (22.32). The results of model 1 of Table 4 imply that if individualism of the lead bank's CEO were zero (i.e., a totally collectivist bank CEO), then one standard deviation (0.42) increase in relationship intensity leads to a reduction in bank loans' cost by 9.09 basis points (-21.64*0.42), ceteris paribus. The average loan size in the sample is $335 million and the average loan maturity is 3.62 years (43.48 months). Hence, a 9.09 basis points reduction translates into around $1.102 million (335*3.62*0.000909) in loan interest savings for the average loan, ceteris paribus. However, the interaction term between relationship intensity (RIA) and individualism (IDV) implies that with each point of increase in the individualism of a bank's CEO (in the 0-100 scale) these savings decrease by around $15,000.[22]

Thus, borrowers' savings due to a one stand deviation increase in the relationship intensity with a bank led by a CEO with Greek heritage is around $577,000 (1.102 – (35*0.015)), ceteris paribus. These savings drop to around $202,000 (1.102 – (60*(0.015)) for a standard deviation increase in relationship intensity with a bank led by a CEO of Polish heritage, ceteris paribus. For a bank led by a CEO of Dutch ancestry, a one standard deviation increase in relationship intensity implies that borrowers would even incur negative savings (i.e., additional interest costs). These would be around $100,000 (1.102 – (80*0.015)), ceteris paribus. Such differences in the borrower's loan interest costs are economically meaningful. By way of comparison, Lin et al. (2018) show that a one standard deviation increase in private benefits of control increases the average loan costs in their sample by around $178,600. We find similarly significant economic effects for the other three dimensions of bank CEOs' cultural heritage (uncertainty avoidance, masculinity, and power distance).[23]

[22] One point of increase in the individualism of the bank CEOs increases the coefficient of relationship intensity to -21.351 (-21.64 + 0.289). Thus, the decrease in basis points due to a one standard deviation increase in relationship intensity falls to 8.967 (-21.351 * 0.42). Hence, interest savings in this case are $1.087 million (335*3.62*0.0008967). This represents approximately a $15,000 decrease in interest savings with each point of increase in individualism.

[23] In the case, of uncertainty avoidance, the coefficient of the model 7 of Table 4 shows that a one standard deviation (0.42) increase in relationship intensity leads to a 4.305 (10.25*0.42) basis points increase in loan interest costs when uncertainty avoidance is zero. This translates into around $522,067 ($335m*3.62 years*0.000431) additional interest costs for the average loan. However, the coefficient of the interaction term between uncertainty

3.5 Main Robustness Tests

3.5.1 Instrumental Variable Estimations

Bank CEOs' cultural heritage could be associated with other features of the societies in which bank CEOs trace their origin. Such characteristics could include religion or any other traits that correlate with the bank CEOs' cultural heritage. As a consequence, our estimations might be biased. For example, previous research finds that CEO religion has significant implications for bank behaviour (Adhikari and Agrawal, 2016). To lessen such concerns, we opt for instrumental variable analysis. Therefore, we identify instruments for the four cultural heritage traits.

Concerning individualism (INV), a potential instrument is the historical prevalence of pathogens in a country. This instrument relies on studies investigating the influence of geography on cultural development (Fincher et al., 2008). Societies at higher risk for infectious diseases display more collectivism (i.e., less individualism) because it serves as a mitigation mechanism of exposure to new pathogens (Nash and Patel, 2019). Fincher et al. (2008) show a negative association between the historical pathogen prevalence in a country and individualism (i.e., the inclusion restriction). On the other hand, it is not very likely that the historical pathogen prevalence in the country of origin of a bank's CEO could directly affect the cost of bank loans (i.e., the exclusion restriction). Therefore, as an instrument of individualism, we use a variable (Pathogen) that measures a country's historical prevalence of pathogens detrimental to human health (Fincher et al., 2008).

Nash and Patel (2019) show that many studies use religion-based instruments for uncertainty avoidance (UAI). However, we avoid such instruments because bank CEOs' religious traits could directly affect bank policies. Instead, we propose as an instrument of uncertainty avoidance the innovation performance in the country of ancestral origin. Individuals from low uncertainty avoidant cultures prefer tasks with uncertain outcomes that require problem-solving. Besides, innovators in these societies feel independent of rules (Hofstede, 2001) and

avoidance (UA) and relationship intensity (RIA) denotes that each point of increase in the uncertainty avoidance index of a bank CEO is associated with a $21,712 decrease in these additional loan interest costs. Similarly, in the case of masculinity (model 8 of Table 4) the corresponding figure is -16.18 basis points (or $1,963,000) in interest savings for the average loan in the case of a one standard deviation of increase in relationship intensity when masculinity is zero. The interaction between masculinity (MAS) and relationship intensity (RIA) implies that each point of increase in the masculinity index of a bank CEO leads to a $31,143 decrease in these interest savings. For power distance, (model 9 of Table 4) the corresponding figure is 6.531 basis points (or $792,014) in additional interest costs for the average loan in the case of a one standard deviation of increase in relationship intensity when power distance is zero. The interaction between power distance (PDI) and relationship intensity (RIA) suggests that each point of increase in the power distance index of a bank CEO results in a $20,220 decrease in these additional interest costs.

are therefore more likely to embrace the freedom associated with creativity at work. Hence, innovation associates with the willingness to place oneself in an undefined creative space. Such willingness is in contrast with highly uncertainty avoidant cultures. Shane (1993) provides evidence that uncertainty avoidance has a negative and significant association with national innovation rates. Therefore, we use innovation (EIU) as an instrument for uncertainty avoidance and expect it to negatively associate with uncertainty avoidance (i.e., the inclusion restriction). However, it is not likely the national rate of innovation in the ancestral country of origin of bank CEOs could directly affect loan spreads (i.e., the exclusion restriction). We source data on national innovation performance from the Economist Intelligence Unit (EIU).

Regarding masculinity (MAS), existing studies show that it associates with a country's climate (Hofstede, 2001; Tang and Koveos, 2008), whereby warmer climate contribute to the formation of masculine cultures. The relationship between warmer climates and masculinity relies on the parental investment theory (Van de Vliert et al., 1999; Den Hartog, 2004), positing that more extreme weather conditions render greater male involvement more necessary for family survival. This disproportionate involvement of males in the family protection in warmer climates associates with a society's higher position on Hofstede's masculinity index (Nash and Patel, 2019). Therefore, we expect a higher temperature to correlate positively and significantly with masculinity (i.e., the inclusion restriction). On the other hand, it is not likely that the temperature in the ancestral country of origin of a bank CEO could directly affect bank loans' prices (i.e., the exclusion restriction). Hence, we use the average temperature in the ancestral country of origin of bank CEOs in the last thirty years as an instrument for masculinity. We source data on the average temperature of countries from Nash and Patel (2019). Our instrument (HIGHTEMP) is a dummy that takes the value of 1 when the ancestral country of origin of bank CEOs has a higher average temperature than the sample median and zero otherwise.

To instrument power distance (PDI), we use a country-level measure of distance to the equator captured by latitude. Previous studies show that power distance displays a negative and significant correlation with distance from the equator (Hofstede, 1984; Shackleton and Ali, 1990). The inverse relationship between power distance and latitude implies that differences in power distance are deep-rooted in countries closer to the equator (Hofstede, 2001). Thus, the distance from the equator as an instrument for power distance can satisfy the inclusion restriction. However, it is unclear how the distance from the equator of the ancestral country of origin of bank CEOs could directly influence bank loan spread (i.e., the exclusion restriction). To construct this instrument (LAT), we source the latitude of a country's capital from google maps.

In our two-stage least squares instrument variable estimations (2SLS-IV), we multiply the above variables with the relationship intensity (RIA) variable to create additional instruments for the interaction terms. The results from these 2SLS-IV models are available in Table 5. The first-stage results (see the lower part of the models) support these instruments' appropriateness both in terms of coefficient sign and significance. The second-stage results (upper part of the models) provide support to the baseline findings. All the interactions between relationship intensity (RIA) and the four cultural heritage attributes are significant at the 1% level (see the upper part of models 1-4). In model 1, we find the instrumented interaction between individualism (INV) and relationship intensity (RIA) to be positive and significant at the 1% level, supporting hypothesis H1. In model 2, the interaction between uncertainty avoidance (UAI) and relationship intensity (RIA) is negative and significant at the 1% level. The latter finding is consistent with hypothesis H2. Finally, in models 3 and 4, we find that the interactions of relationship intensity (RIA) with masculinity (MAS) and power distance (PID) display a positive and negative, respectively, significant relationship with loan spreads. The latter two results provide empirical support to hypotheses H3 and H4, respectively.

3.5.2 Addressing Omitted Variable Bias

The baseline estimations in Table 4 might still be subject to some omitted variable issues, although we employ several fixed effects and control variables to reduce such concerns. Omitted variables issues could relate to bank CEO attributes or bank characteristics. In this subsection, we provide the results from tests that attempt to attenuate such issues. In syndicate lending, each bank usually grants several loans in a year. Hence, one could use several additional types of fixed effects to control for omitted variables.

In our baseline models, we employ bank fixed effects. In this way, we control for all time-invariant bank characteristics. Furthermore, we use control variables for bank risk, size, and capitalisation. However, several other time-variant factors could influence bank lending policies. For example, banks could have corporate governance structures such as highly independent boards (Srivastav and Hagendorff, 2016; Vallascas et al., 2017) that could moderate and control the bank policies CEOs impose. To attenuate concerns for time-variant omitted variables at the bank-level, we employ models that comprise bank*year fixed effects. This type of fixed effects controls for all time-variant bank characteristics. The results from these specifications are available in Panel A of Table 6. These models' results show that the interactions between relationship intensity (RIA) and the cultural heritage characteristics are significant and with a sign that is consistent with all four of our hypotheses (i.e., H1-H4). Note that the individual effect of cultural characteristics drops from these estimations due to collinearity with the bank-year fixed effects in these models.

Omitted variable issues may also relate to the bank CEO. Firstly, some time-invariant characteristics could correlate with bank CEOs' cultural heritage (e.g., religion). Secondly, some other time-invariant characteristics could affect bank CEOs' preferences and, hence, the policies they impose. A couple of such examples is gender and birth period (Malmendier and Nagel, 2011; Malmendier et al., 2011; Faccio et al., 2016). To lessen such concerns, we carry out estimations that use bank CEO fixed effects. This type of fixed effects also controls for an additional important time-invariant bank CEO characteristic. The latter is the generation of immigration that each bank CEO belongs to (e.g., first-generation immigrant versus second-generation immigrant and so on). The specifications that comprise bank CEO fixed effect are available in Panel B of Table 6. These models' findings show that we obtain significant interactions between relationship intensity (RIA) and three of the cultural heritage characteristics (individualism, uncertainty avoidance, and power distance). Hence, the results from the specifications that use CEO fixed effects continue to provide support to hypotheses H1, H2, and H4, respectively. Notice that CEO fixed effects induce the individual effect of the cultural heritage characteristics to drop from Panel B's models due to collinearity.

Finally, bank CEO related omitted variables bias could also stem from time-variant CEO attributes. In the baseline models, we control for compensation incentives (Vega and Delta). However, to account for all the potential time-variant bank CEO characteristics, we carry out estimations that include bank CEO*year fixed effects. These results are available in Panel C of Table 6. In these models, we find that all the four cultural heritage attributes of bank CEOs interact significantly with relationship intensity (RIA) to support our hypotheses. Note that also in Panel C the individual effects of the cultural heritage attributes drop from the models due to collinearity with the bank CEO*year fixed effects.

Overall, the tests that control omitted variables bias at the bank, and CEO levels provide consistent evidence supporting hypotheses H1 (individualism) and H2 (uncertainty avoidance).

3.5.3 Matched Sample Regressions

Our baseline findings could be subject to some selection bias issues. For example, some borrowing firms could be more prone to establish strong lending relationships. Bharath et al. (2011) argue that the decision of forming lending relationships is to a certain extent determined by the borrowing firm and its characteristics, such as size. This selection bias could influence our results. We utilise the propensity score matching (PSM) methodology to address, to some extent, potential matching issues. However, we recognise that this may be a source of concern as the matching criteria operates on unobservable factors that are not addressed by this methodology.

Following Bharath et al. (2011), we apply a propensity score matching (PSM) approach to address this potential selection bias issue (Heckman et al., 1998). The PSM method is widely used in empirical research to match treated and non-treated (control) groups based on observed characteristics to eliminate relevant differences. We begin the matching process with a logit regression of a high relationship intensity dummy (value of one for above the sample median of relationship intensity and zero otherwise) on several borrowing firm characteristics and loan controls. Following an approach similar to Bharath et al. (2011), we include in this first step of the PSM process firm size, ROA, z-score, the debt to assets ratio, liquidity, tangibility, industry dummies at the two-digit SIC level, a dummy for rated firms and S&P credit rating quality dummies. We also control for loan size, loan maturity, and loan type.

Next, we perform a one-to-one nearest neighbour match with the propensity scores we obtain from the logit estimation. To ensure no significant differences in terms of the borrowing firm characteristics between the treated and the control samples, we match with no replacement and a 10% caliper. Hence, we match high relationship intensity loans with low relationship intensity loans granted to borrowing firms with similar characteristics. Consequently, we estimate the baseline models using only the treatment and control loans (i.e., the matched samples). We depict the results from these tests in Panel A of Table 7. These models' findings support H1-H4 as the interactions between relationship intensity (RIA) and all four bank CEOs' cultural heritage attributes carry a significant coefficient with the same sign as the baseline models.

Another selection bias could stem from the possibility that some borrowing firms could be associated with banks led by CEOs with certain cultural heritage traits. For example, riskier firms could find it easier to obtain loans from banks led by CEOs with a more individualistic heritage. Several studies show that individualism associates with riskier behaviour (Chui et al., 2010; Li et al., 2013; Mourouzidou-Damtsa et al., 2019). Other cultural attributes also relate to risk appetite. To attenuate this concern, we follow a similar process as in the case of selection bias in lending relationships. Therefore, we generate dummies of low and high individualism of the bank CEOs (based on the sample median). We use this dummy as a dependent variable in a logit PSM regression that comprises borrowing firms' characteristics and loan controls. We follow the same procedure for the remaining three cultural attributes of the bank CEOs. Following this process, we create matched samples of similar loans in terms of borrowing firms' characteristics that differ regarding the banks' CEOs' cultural heritage (high or low). Then we run the baseline models using these matched samples. The results from these tests are in Panel B of Table 7 and continue to provide support to hypotheses H1 (individualism), H2 (uncertainty avoidance), and H4 (power distance).

Finally, selection bias could also emerge by banks selecting CEOs with specific cultural heritage attributes to implement a specific policy about lending relationships. For example, banks that want to gear their business model more towards relationship lending might select a CEO with cultural attributes that could facilitate relationships (e.g., a less individualistic or a more uncertainty avoidant CEO). Following a similar process as in the previous two cases of potential selection bias, we first estimate logit regressions that use as dependent variables the high-low cultural heritage dummies (based on the sample median) and as explanatory variables the relationship intensity (RIA) variable together with controls for bank and loan characteristics. Consequently, we create matched samples of similar loans in terms of relationship intensity and banks' characteristics that differ regarding the banks' CEOs' cultural heritage. Then, we carry out the baseline estimations for these matched samples. We tabulate the results from these regressions in Panel C of Table 7. These tests show that the interaction terms between relationship intensity (RIA) and the bank CEOs' cultural attributes are significant in the cases of individualism (INV), uncertainty avoidance (UAI), and power distance (PDI) and carry the expected signs. Hence, these findings provide further evidence supporting hypotheses H1, H2, and H4, respectively.

3.5.4 Alternative Measures of Relationship-Lending

We examine the robustness of the baseline findings by using two alternative measures of lending relationships. First, we employ a measure of relationship intensity based on the number of loans (RIN). The results from this exercise are in Panel A of Table 8. We show that interaction between relationship intensity (RIN) and bank CEOs' four cultural heritage characteristics are significant and carry the expected sign. These results provide support to all four hypotheses H1-H4. In Panel B of Table 8, we estimate models that use a lending relationship dummy (RELDUM). We find the relationship dummy (RELDUM) to display a significant interaction with the individualism (INV), uncertainty avoidance (UAI), and masculinity (MAS) cultural heritage characteristics of bank CEOs. Therefore, these results provide support to hypotheses H1, H2, and H3, respectively.

3.6 Further Robustness Tests

3.6.1 Alternative Measures of CEO Cultural Heritage

We use the Hofstede dimensions as our primary proxy for the cultural heritage dimensions of bank CEOs. To enhance our study and provide further validity to our baseline results, we employ alternative cultural heritage measures. Similar to Hofstede, Schwartz (2007) constructs a unique cultural profile for each country. The Schwartz cultural framework is widely accepted and used in the empirical finance literature. We replace the four main Hofstede cultural heritage dimensions with those that are analogous in the Schwartz framework. The alternative measures for power distance (PDI), individualism (INV), masculinity (MAS), and uncertainty avoidance (UAI) are egalitarianism, autonomy, harmony, and embeddedness, respectively.

Egalitarian cultures aim to encourage members of their society to view each other as moral equals who share basic interests as humans (Schwartz, 2007). This is the opposite of the power distance dimension, where members of a society accept that power is distributed unequally and often maintain hierarchical structures (Hofstede, 2001). Autonomous cultures encourage individuals to follow affectively positive experiences and independently pursue their interests. Autonomy is the closest to the core idea of individualism (Schwartz, 2007). Members of more individualistic societies are expected to take care of themselves and value independence of thought and action (Hofstede, 2001). Harmonious cultures emphasize integrating oneself into the social and natural world by appreciating surroundings rather than challenging or exploiting them for self-gain. Therefore, members of societies that value harmony are more likely to adopt a tender approach to life, much like feminine cultures in Hofstede's cultural framework. In contrast, those from masculine cultures are more likely to exploit an opportunity for advancement and self-gain. Masculine cultures are more performance-oriented and adopt a tougher approach (Hofstede, 2001). Finally, embedded cultures seek to maintain the status quo and place emphasis on tradition (Schwartz, 2007). This dimension is comparable to Hofstede's uncertainty avoidance where there is a belief in such societies that something different, change or ambiguity is perceived as dangerous (Hofstede, 2001). The baseline models that employ these alternative cultural heritage measures are available in Table 9.

The results from these models provide additional support to our baseline results. In model 1, we find that the interaction between the lending relationship variable (RIA) and autonomy is positive and significant at the 5%. In model 2, we show that embeddedness interacts negatively and significantly at the 1% level with RIA. We also find that the interaction between egalitarianism and RIA is positive and significant at the 1% level (see model 4 of Table 9). These results are consistent with the baseline findings regarding hypotheses H1, H2, and H4, respectively.

3.6.2 Controlling for all Dimensions and Horserace Model

We use one cultural heritage variable in the baseline estimations and its interaction with a lending relationship variable in each model. This is a common approach in culture studies because the cultural dimensions exhibit high correlation. In one of the main robustness tests in the main manuscript, we use models with CEO fixed effects. Such models control for all the cultural heritage measures, which are time-invariant. We estimate models that comprise all the cultural heritage dimensions in the same models in a further test. The results from these specifications are available in Table 10 and continue to provide support to the baseline findings (see models 1-4 of Table 10).

In another related test, we present the results from a horserace model regarding each cultural heritage dimension's interaction with the lending relationship variable. To reduce the severe collinearity issues in such a test, we employ as cultural heritage measures the residuals from regressions that use as dependent variable a cultural heritage characteristic and as explanatory variables the rest of the three cultural heritage characteristics. Hence, the residuals we derive from these regressions proxy for the portion of each cultural heritage characteristic that is not explained by the rest of the cultural heritage characteristics. The results from this horserace exercise are available in model 5 of Table 10 and are consistent with the baseline findings.

3.6.3 Alternative Clustering of Standard Errors

We also perform estimations of models that use several alternative ways of clustering the standard errors. We take into account that a bank can grant several loans and that each borrowing firm could obtain several loans. Hence, in Panel A of Table 11, we cluster the standard errors by both bank and borrowing firm. Next, we consider that the cultural heritage measures we use display variability at the CEO level. Hence, in Panel B of Table 11, we cluster standard errors by bank CEO. We also estimate models where we cluster the standard errors by the ancestral country of origin of each bank CEO (see models in Panel C of Table 11). The results from these models are similar to the findings of the baseline analysis.

3.6.4 CEO Ancestral Origin Fixed Effects

The cultural heritage characteristics of bank CEOs could be correlated with other prevalent characteristics in the ancestral country of origin of bank CEOs. In the main analysis, we tackle this issue in two ways. Firstly, we use instruments for the cultural heritage characteristics of bank CEOs. Secondly, we employ models with CEO fixed effects. In a further test, we employ models that comprise fixed effects for bank CEOs' ancestral country of origin. In this way, we control for all the characteristics of bank CEOs' ancestral country of origin. We depict the results from this test in Table 12. These models continue to support hypotheses H1, H2 and H4 about individualism, uncertainty avoidance, and power distance, respectively. Note that in the models of Table 12, the individual effect of the cultural heritage characteristics drops from the estimations due to collinearity with the fixed effects of bank CEOs' ancestral country of origin.

3.6.5 Non-Price Loan Contract Terms

We also investigate the conditioning effects of bank CEOs' cultural heritage on the association between lending relationships and the non-price loan contract terms. To this end, we use probit models that employ as dependent variables dummies that indicate if a loan is secured by collateral (Panel A of Table 13), if a loan comprises covenants (Panel B of Table 13), and if a loan is subject to performance pricing (Panel C of Table 13). We do not find significant effects in the interactions of interest in these estimations. Hence, our findings show that the conditioning effects of bank CEOs' cultural heritage on the association between lending relationships and the cost of bank loans are mainly evident in the pricing (loan interest rates) of corporate loans. These findings are consistent with Kysucky and Norden (2016), who show that the effect of lending relationships on loan contracts is more apparent in the loan interest rates.

3.7 Conclusion

We show that bank CEOs' cultural heritage attributes influence the extent to which banks share with their borrowers the savings that stem from lending relationships. Banks led by CEOs that trace their origin in more individualistic (H1) and masculine societies (H3) exhibit a decreased propensity to lower the cost of bank loans for their relationship borrowers. In contrast, we find the opposite result for banks led by CEOs originating from societies that exhibit more uncertainty avoidance (H2) and power distance (H4). The results that survive consistently all the numerous additional robustness tests, relate to individualism (H1) and uncertainty avoidance (H2). These findings are consistent with the degree to which these cultural dimensions prompt an appreciation of relationships in the societal and business contexts.

The results of this study have some useful research and managerial implications. The extant literature focuses mostly on how the borrowing firms' characteristics moderate or mediate the effect of lending relationships on the cost of bank loans. We show that it is also important to consider bank-level factors such as the culture of bank CEOs. Additional bank factors could likely play a role in banks' inclination to share with their borrowers the benefits of lending relationships. Thus, this is a promising avenue for future research.

Regarding managerial implications, some studies show that economic agents overlook the importance of cultural factors in influencing economic outcomes (Weber and Camerer, 2003; Edmans, 2011). Our results show that when it comes to lending, bank CEOs' cultural heritage has significant economic implications for relationship borrowers. Thus, borrowing firms could consider bank CEOs' cultural characteristics as a factor that could drive the degree to which they can benefit economically through lower loan prices by forming strong lending relationships. Such economic benefits could be significant for U.S. corporations as bank debt is the primary source of their financing. Debt represents around 75% of new corporate financing (Contessi et al., 2013). The majority of this debt is in the form of bank loans, even for large public corporations (Bharath et al., 2008).

Table 1: Definitions

Variable	Definition	Data Source
A. Lending Relationship Measures		
Relationship Intensity Amount (RIA)	The dollar ($) value of loans by a bank to a borrower in the last 5 years/total dollar ($) value of all loans granted to the borrower by all banks in the last 5 years.	DealScan
Relationship Intensity Number (RIN)	The number of loans by a bank to a borrower in the last 5 years/total number of all loans granted to the borrower by all banks in the last 5 years.	DealScan
Relationship Dummy (RELDUM)	A dummy variable that takes the value of one if a borrower has taken a loan from a bank in the last 5 years and zero otherwise.	DealScan
B. Cultural Heritage Measures		
Bank CEO Individualism (INV)	The degree to which a society is considered individualistic versus collectivist in terms of "I" and "We" in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Uncertainty Avoidance (UAI)	The degree to which society members feel uncomfortable with future uncertainty in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Masculinity (MAS)	The degree to which a society is considered masculine versus feminine in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Power Distance (PDI)	The degree to which a difference in power and status is accepted without justification in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Autonomy	The extent to which a culture encourages individuals to follow affectively positive experiences for themselves and to pursue their own directions independently in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for individualism.	Ancestry.com, Schwartz (2007)
Bank CEO Embeddedness	The extent to which a culture seeks to maintain the status quo and places cultural emphasis on tradition in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for uncertainty avoidance.	Ancestry.com, Schwartz (2007)
Bank CEO Harmony	The extent to which a culture places emphasis on integrating oneself into the social and natural world by appreciating surroundings in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for masculinity.	Ancestry.com, Schwartz (2007)
Bank CEO Egalitarianism	The extent to which a culture aims to encourage members of their society to view each other as moral equals who share basic interests as humans in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for power distance.	Ancestry.com, Schwartz (2007)
C. Firm Characteristics		
Firm Size	The natural logarithm of borrower total assets.	Compustat
Firm ROA	The net income divided by the total assets of the borrower.	Compustat
Firm Z-Score	Altman's Z-score is computed as (1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales)/total assets.	Compustat
Firm Debt/Assets	The total long-term debt divided by total assets.	Compustat

Firm Liquidity	The total current assets divided by the total current liabilities.	Compustat
Firm Tangibility	The net property, plant and equipment divided by total assets.	Compustat
Distance	The natural logarithm of distance in miles between borrower and lender (parent) using zip code.	Compustat
D. Bank & CEO Characteristics		
Bank Size	The natural logarithm of bank total assets.	Compustat Bank Fundamentals
Bank Tier-1 Capital Ratio	The ratio of tier-1 capital to total risk-weighted assets, a key measure of bank capitalization.	Compustat Bank Fundamentals
Bank Provisions for Loan Losses/Assets	Provisions for losses on loans divided by total assets.	Compustat Bank Fundamentals
Bank CEO Vega (Vega)	The change in the dollar value of the CEO's equity-based compensation for a 1% change in stock price volatility. We use the natural log of the variable.	Execucomp
Bank CEO Delta (Delta)	The change in the dollar value of the CEO's equity-based compensation for a 1% change in the stock price. We use the natural log of the variable.	Execucomp
E. Loan Characteristics		
All in Spread Draw (AISD)	The "all-in-spread drawn" (AISD) is the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained.	DealScan
Loan Size	The value of the loan in millions of dollars ($). In the estimations we use the natural log of the variable.	DealScan
Loan Maturity	The time in terms of months between the initiation of a loan and its maturity date. In the estimations we use the natural log of the variable.	DealScan
Syndicate Size	The number of lenders who participate in a loan.	DealScan
Secured	A dummy variable that equals one if the loan is secured and zero otherwise.	DealScan
Covenants	A dummy variable that equals one if a loan has a covenant and zero otherwise.	DealScan
Performance Pricing	Dummy equal to one if the loan has performance-pricing provisions, zero otherwise.	DealScan
F. Instruments		
Pathogen	A country-level measure of the relative presence of pathogens in the local ecology regarding nine specific pathogens harmful to human health.	Fincher et al. (2008)
Innovation (EIU)	The Innovation Performance Index expressed as patents per million population granted per country i.e., innovation intensity.	Economist Intelligence Unit (EIU)
Temperature (HIGHTEMP)	A dummy that takes the value of one when the ancestral country of origin of bank CEOs has a higher average temperature than the sample median and zero otherwise.	Nash and Patel (2019)
Latitude (LAT)	A country-level measure of distance from the equator.	Google Maps

G. Fixed Effects

Firm	The unique borrower ID for each firm.	DealScan
Bank	The unique ID for each bank.	Compustat
Year	The loan initiation year.	DealScan
CEO	The unique ID each bank CEO	Execucomp
Month	The loan initiation month.	DealScan
S&P Quality Rating	A dummy variable that indicates the S&P quality rating of the borrower.	DealScan
Rated	A binary variable that equals one if the borrower does not have a S&P quality rating and zero otherwise, also known as 'bank-dependent'.	DealScan
Loan Type	Dummy variables for loan type. These involve primarily two types of loans, lines of credit and term loans.	DealScan

Table 2: Summary Statistics

Variable	N	Mean	Standard Deviation	P25	P50	P75
A. Relationship Lending						
Relationship Intensity Amount (RIA)	15,911	0.58	0.42	0.00	0.71	1.00
Relationship Intensity Number (RIN)	15,911	0.57	0.42	0.00	0.67	1.00
Relationship Intensity Dummy (RELDUM)	15,911	0.74	0.44	0.00	1.00	1.00
B. Cultural Heritage Measures						
Bank CEO Individualism (INV)	15,911	70.42	22.32	67.00	80.00	89.00
Bank CEO Uncertainty Avoidance (UAI)	15,911	54.82	26.91	35.00	35.00	86.00
Bank CEO Masculinity (MAS)	15,911	62.14	9.53	57.00	66.00	66.00
Bank CEO Power Distance (PDI)	15,911	41.62	14.98	35.00	35.00	60.00
C. Firm Characteristics						
Firm Size	15,911	6.53	1.68	5.38	6.50	7.68
Firm ROA	15,888	-0.002	0.14	-0.02	0.03	0.06
Firm Z-Score	15,911	1.52	2.03	0.84	1.59	2.40
Firm Debt/Assets	15,891	0.32	0.27	0.13	0.27	0.44
Firm Liquidity	15,906	0.41	0.22	0.23	0.39	0.56
Firm Tangibility	15,911	0.54	0.39	0.24	0.45	0.77
Distance	15,911	6.04	1.63	5.51	6.49	7.22
D. Bank & CEO Characteristics						
Bank Size	15,911	12.84	1.32	12.03	13.23	13.94
Bank Tier 1 Capital Ratio	15,797	9.57	2.23	8.00	8.50	11.60
Bank Provisions (Loan Losses)/Assets	15,911	0.005	0.004	0.002	0.003	0.006
Bank CEO Vega (Vega)	15,911	4.98	5.26	4.41	6.03	6.60
Bank CEO Delta (Delta)	15,717	6.56	1.19	5.83	6.75	7.39

E. Loan Characteristics

All in Spread Draw (AISD bps)	15,911	216.83	123.72	125.00	200.00	300.00
Loan Size (in millions of $)	15,908	335.09	764.01	40	125	350
Loan Maturity (in months)	15,911	43.48	21.09	26	47	60
Syndicate Size	15,911	7.96	8.64	2.00	6.00	10.00
Secured (0/1)	15,911	0.63	0.48	0.00	1.00	1.00
Covenants (0/1)	15,911	0.71	0.45	0.00	1.00	1.00
Performance Pricing (0/1)	15,911	0.29	0.45	0.00	0.00	1.00

Table 2 represents the summary statistics for key variables in our sample data. We provide the mean, standard deviation, 25th percentile (P25), median (P50) and 75th percentile (P75). All variables are winsorized at the 1st and 99th percentiles, with the exception of culture and binary variables. We deflate monetary variables such as size (i.e., total assets) to 1992 U.S. dollars to account for the effects of inflation. To further reduce the impact of outliers, we use the natural logarithm of monetary variables unless stated otherwise i.e., firm, and bank size. Cultural measures fall within a 1-100 scale. Variable definitions are provided in Table 1.

Table 3: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	AISD	1.00																									
2	RIA	-0.03	1.00																								
3	RIN	-0.02	0.98	1.00																							
4	RDUM	-0.01	0.82	0.81	1.00																						
5	INV	-0.05	-0.14	-0.14	-0.09	1.00																					
6	UAI	0.03	0.14	0.14	0.09	-0.93	1.00																				
7	MAS	-0.08	-0.04	-0.04	-0.01	0.48	-0.50	1.00																			
8	PDI	0.09	0.08	0.08	0.05	-0.79	0.82	-0.57	1.00																		
9	FSIZE	-0.35	0.03	0.02	0.09	-0.12	0.10	0.12	0.00	1.00																	
10	FROA	-0.34	0.02	0.02	0.01	-0.07	0.06	0.01	-0.01	0.22	1.00																
11	FZSCORE	-0.30	-0.01	-0.01	-0.01	-0.02	0.02	0.02	-0.02	0.12	0.48	1.00															
12	DEBT/AS	0.23	-0.06	-0.06	-0.01	0.03	-0.03	0.09	-0.01	0.09	-0.11	-0.18	1.00														
13	FLIQU	-0.01	0.03	0.04	-0.02	0.05	-0.04	-0.10	-0.01	-0.37	-0.05	0.21	-0.33	1.00													
14	FTANG	-0.01	-0.02	-0.02	0.00	-0.07	0.07	-0.03	0.07	0.06	-0.07	-0.14	0.10	-0.36	1.00												
15	DIST	0.03	-0.08	-0.08	-0.04	-0.08	0.03	-0.06	0.04	0.06	0.02	0.03	0.03	-0.08	0.10	1.00											
16	BSIZE	-0.10	0.00	-0.01	0.07	-0.30	0.20	0.11	0.12	0.48	0.15	0.17	0.14	-0.28	0.06	0.23	1.00										
17	CAPT1	0.05	0.20	0.21	0.18	-0.37	0.27	0.05	0.06	0.25	0.06	-0.09	-0.03	-0.06	-0.01	0.04	0.27	1.00									
18	PROV	0.15	-0.05	-0.05	-0.04	-0.03	0.07	-0.06	0.07	-0.14	-0.12	0.01	-0.04	0.05	0.04	0.00	-0.02	-0.12	1.00								
19	VEGA	0.01	-0.06	-0.07	-0.04	-0.03	0.14	-0.09	0.18	-0.04	-0.03	0.02	0.00	0.00	0.03	-0.03	-0.02	-0.30	0.06	1.00							
20	DELTA	-0.07	0.04	0.03	0.05	-0.42	0.53	-0.21	0.56	0.17	0.05	0.06	0.06	-0.11	0.07	0.09	0.36	-0.13	-0.16	0.24	1.00						
21	LOANSIZE	-0.36	0.03	0.02	0.09	-0.11	0.10	0.13	0.00	0.80	0.19	0.14	0.14	-0.35	0.08	0.05	0.47	0.19	-0.14	-0.02	0.19	1.00					
22	MATURITY	-0.08	-0.06	-0.06	-0.06	-0.08	0.05	0.06	0.01	0.20	0.15	0.10	0.20	-0.20	-0.02	0.09	0.25	0.10	-0.13	-0.05	0.03	0.27	1.00				
23	SYNSIZE	-0.20	0.00	-0.01	0.05	0.04	-0.03	0.11	-0.05	0.51	0.07	0.03	0.13	-0.24	0.00	0.01	0.22	0.02	-0.08	0.03	0.11	0.51	0.18	1.00			
24	SECURE	0.45	-0.06	-0.06	-0.03	0.05	-0.04	-0.05	0.04	-0.33	-0.22	-0.17	0.20	0.03	-0.05	0.04	-0.13	-0.11	0.05	0.04	-0.01	-0.27	0.05	-0.11	1.00		
25	COVEN	0.09	0.02	0.01	0.02	0.09	-0.06	-0.02	0.04	-0.23	-0.07	-0.01	-0.01	0.08	-0.03	-0.03	-0.12	-0.24	0.10	0.11	0.05	-0.15	-0.06	0.03	0.26	1.00	
26	PREFPRICE	-0.24	-0.09	-0.09	-0.12	0.04	-0.03	0.04	-0.03	0.10	0.14	0.11	-0.06	-0.03	-0.01	-0.01	0.05	-0.07	-0.02	0.06	0.01	0.16	0.20	0.15	-0.08	0.22	1.00

This table reports Pearson correlations coefficients for the main variables used in our baseline regressions. This allows us to see which pairs have the highest correlation. The abbreviations are as follows: All in Spread Drawn (AISD), Power Distance (PDI), Individualism (INV), Masculinity (MAS), Uncertainty Avoidance (UAI), Relationship Intensity Amount (RIA) Relationship Intensity Number (RIN), Relationship Dummy (RDUM) Firm Size (FSIZE), Firm Return on Assets (ROA), Altman's Z-Score (ZSCORE), Firm Debt/Assets (DEBT/AS), Firm Liquidity (FLIQU), Firm Tangibility (TANG), Bank Size (BSIZE), Capital Tier-1 Ratio (CAPT1), Bank Provisions/Assets (PROV), Tranche Amount (LOANSIZE), Loan Maturity (MATURITY), Syndicate Size (SYNSIZE), Secured Indicator (SECURE), Covenants Indicator (COVEN), and Preference Pricing (PREFPRICE). Table 1 includes full details on the definitions the above variables. However, caution must be taken to avoid overinterpreting the results as these are simple pair-wise correlations that do not control for the impact of bank, firm, and loan characteristics. We used to the multivariate analysis where we examine the determinants of the loan spread, and the relationship between culture and relationship-lending after controlling for key financial characteristics

Table 4: Baseline Estimations

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread
RIA	-21.64***	10.25**	-38.54**	15.55**	-0.244
	(5.997)	(5.012)	(16.32)	(5.911)	(2.455)
INV	-0.662***				
	(0.112)				
RIA*INV	0.289***				
	(0.0823)				
UAI		0.554***			
		(0.106)			
RIA*UAI		-0.212***			
		(0.0725)			
MAS			-1.592***		
			(0.446)		
RIA*MAS			0.619**		
			(0.250)		
PDI				1.070***	
				(0.161)	
RIA*PDI				-0.397***	
				(0.126)	
Firm Size	-21.10***	-21.26***	-21.22***	-21.30***	-22.21***
	(2.640)	(2.604)	(2.577)	(2.475)	(2.453)
Firm ROA	-38.78***	-39.28***	-38.86***	-38.96***	-38.65***
	(7.514)	(7.552)	(7.891)	(7.732)	(7.717)
Firm Z-Score	-7.058***	-7.035***	-6.913**	-7.024***	-7.185***
	(2.584)	(2.590)	(2.588)	(2.595)	(2.613)
Firm Debt/Assets	44.14***	44.17***	44.00***	44.53***	44.67***
	(8.907)	(8.952)	(9.010)	(8.964)	(9.020)
Firm Liquidity	-51.58***	-52.48***	-50.19***	-50.66***	-52.68***
	(11.03)	(10.71)	(11.11)	(10.95)	(10.58)
Firm Tangibility	-24.82**	-24.79**	-25.96***	-24.51**	-26.68***
	(9.860)	(9.757)	(9.577)	(9.516)	(9.206)
Distance	-0.0285	-0.160	-0.147	-0.215	-0.518
	(1.494)	(1.479)	(1.437)	(1.485)	(1.439)
Bank Size	-20.45*	-23.76**	-18.04*	-10.59	-28.18***
	(10.54)	(8.891)	(10.60)	(10.41)	(9.743)
Bank Tier 1 Capital Ratio	-2.536	-2.161	-2.064	-2.686	-1.145
	(2.286)	(2.128)	(2.188)	(2.394)	(1.850)
Bank Provisions (Loan Losses)/Assets	858.2	613.5	623.3	394.7	981.3
	(874.9)	(918.2)	(920.4)	(925.6)	(831.0)
Vega	-0.0500	-0.119	-0.0195	0.00377	-0.0492
	(0.159)	(0.137)	(0.191)	(0.181)	(0.218)
Delta	-2.735	-5.526*	-3.164	-6.500**	0.0353
	(2.559)	(3.176)	(3.145)	(2.880)	(3.501)
Loan Size	-6.748***	-6.806***	-6.676***	-6.679***	-6.771***
	(0.983)	(0.987)	(0.969)	(0.976)	(1.008)
Loan Maturity	-9.790***	-9.802***	-9.621***	-9.852***	-9.464***
	(1.747)	(1.757)	(1.760)	(1.741)	(1.723)
Syndicate Size	-0.143	-0.142	-0.170*	-0.162*	-0.193**
	(0.0907)	(0.0907)	(0.0893)	(0.0884)	(0.0867)
Secured	31.29***	31.28***	31.04***	31.36***	30.95***
	(3.967)	(3.961)	(3.933)	(4.002)	(3.951)
Covenants	1.902	1.943	1.653	1.569	1.823
	(3.111)	(3.129)	(3.149)	(3.044)	(3.186)
Performance pricing	-10.58***	-10.71***	-10.48***	-10.60***	-10.55***
	(1.701)	(1.719)	(1.741)	(1.703)	(1.708)
Constant	785.4***	769.8***	805.8***	596.9***	816.5***
	(137.5)	(123.1)	(126.3)	(132.6)	(140.3)
Observations	15,081	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760	0.759
Firm FE	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
S&P Quality FE	Y	Y	Y	Y	Y
Rated FE	Y	Y	Y	Y	Y
Loan Type FE	Y	Y	Y	Y	Y
Clustering	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension (INV, UA, MAS, PDI) to our relationship-lending proxy. We calculate RIA The dollar ($) value of loans by a bank to a borrower in the last 5 years /total dollar ($) value of all loans granted to the borrower by all banks in the last 5 years. Regressions 1-5 use firm, bank, year, month, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 5: Instrumental Variable Estimations

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread
RIA	-25.92***	24.97***	-89.11***	32.87**
	(6.778)	(7.723)	(28.22)	(12.39)
INV	-0.424***			
	(0.0834)			
RIA*INV	0.339***			
	(0.100)			
UAI		0.882***		
		(0.209)		
RIA*UAI		-0.493***		
		(0.125)		
MAS			-2.683***	
			(0.404)	
RIA*MAS			1.432***	
			(0.450)	
PDI				1.620***
				(0.488)
RIA*PDI				-0.825***
				(0.303)
Firm Size	-20.39***	-20.91***	-20.67***	-20.99***
	(3.039)	(2.796)	(2.568)	(2.445)
Firm ROA	-37.98***	-39.46***	-38.58***	-38.74***
	(9.028)	(7.467)	(7.962)	(7.694)
Firm Z-Score	-6.286**	-6.959***	-6.757**	-6.966***
	(2.713)	(2.581)	(2.583)	(2.595)
Firm Debt/Assets	45.97***	43.92***	43.56***	44.48***
	(9.958)	(8.801)	(8.945)	(8.841)
Firm Liquidity	-54.16***	-51.94***	-48.05***	-49.64***
	(11.96)	(10.77)	(12.03)	(11.43)
Firm Tangibility	-28.34***	-23.68**	-25.57**	-23.41**
	(10.13)	(10.21)	(9.883)	(9.596)
Distance	-0.145	-0.00858	0.0797	-0.129
	(1.290)	(1.513)	(1.391)	(1.512)
Bank Size	-17.04	-21.49**	-12.74	-3.053
	(12.47)	(9.227)	(10.89)	(13.36)
Bank Tier 1 Capital Ratio	-0.894	-2.437	-2.484	-3.189
	(1.778)	(2.300)	(2.396)	(2.637)
Bank Provisions (Loan Losses)/Assets	1,368**	512.3	455.9	208.4
	(660.2)	(961.0)	(1,043)	(976.2)
Vega	-0.235	-0.140	-0.00342	0.0254
	(0.162)	(0.106)	(0.183)	(0.181)
Delta	-0.415	-7.137**	-4.646*	-8.520***
	(2.032)	(3.328)	(2.662)	(3.106)
Loan Size	-6.161***	-6.842***	-6.602***	-6.635***
	(0.917)	(0.974)	(0.961)	(0.963)
Loan Maturity	-8.668***	-10.04***	-9.777***	-10.10***
	(1.565)	(1.747)	(1.760)	(1.739)
Syndicate Size	-0.160*	-0.123	-0.156	-0.152*
	(0.0859)	(0.0960)	(0.0945)	(0.0904)
Secured	31.54***	31.33***	31.08***	31.52***
	(4.217)	(3.926)	(3.921)	(4.155)
Covenants	0.306	2.058	1.565	1.500
	(2.706)	(3.101)	(3.118)	(2.998)
Performance pricing	-8.307***	-10.81***	-10.45***	-10.63***
	(1.091)	(1.731)	(1.775)	(1.719)
First stage regressions				
Pathogen	-37.67***			
	(4.58)			
EIU		-14.43***		
		(2.39)		
HIGHTEMP			13.96***	
			(1.77)	
LAT				-1.12**
				(0.49)
RIA*Pathogen	-41.22***			
	(4.15)			
RIA*EIU		-18.28***		
		(5.66)		
RIA* HIGHTEMP			11.19***	
			(2.64)	
RIA* LAT				-1.61***
				(0.30)
Wald F-Test (WIT)	2.6e+04	6167.08	2459.97	2541.15
with critical value	7.03	7.03	7.03	7.03
Observations	15,081	15,081	15,081	15,081
R-squared	0.079	0.086	0.086	0.088

Firm FE	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
S&P Quality FE	Y	Y	Y	Y
Rated FE	Y	Y	Y	Y
Loan Type FE	Y	Y	Y	Y
Clustering	Bank	Bank	Bank	Bank

This table reports results from the instrumental variable regressions of loan spread on measures of culture as well as firm, bank, CEO and loan-level controls. The dependent variable is Loan Spread defined as the loan interest payment in basis points over LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our relationship-lending proxy. We calculate RIA The dollar ($) value of loans by a bank to a borrower in the last 5 years /total dollar ($) value of all loans granted to the borrower by all banks in the last 5 years. Our instruments are (1) Pathogen (2) Higher than average temperature (HIGHTEMP) (3) Economist Intelligence Unit data on national innovation performance (EIU) (4) LATITUTE (LAT) for INV, UAI, MAS, and PDI, respectively. WIT is the Wald F-statistic of the weak identification test by Kleibergen and Paap, which must be higher than its critical value to reject the null hypothesis. All regressions use firm, bank, year, month, firm, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 6: Addressing Omitted Variable Bias

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread
	Panel A: Controlling for time-variant bank omitted variables with bank*year fixed effects			
RIA	-22.48***	14.82**	-55.93***	22.50***
	(6.202)	(6.075)	(16.84)	(7.318)
RIA*INV	0.324***			
	(0.0916)			
RIA*UAI		-0.266***		
		(0.0847)		
RIA*MAS			0.903***	
			(0.262)	
RIA*PDI				-0.534***
				(0.164)
Constant	424.6***	424.8***	424.3***	425.7***
	(26.81)	(26.64)	(26.73)	(26.71)
Observations	15,015	15,015	15,015	15,015
R-squared	0.774	0.774	0.775	0.775
Firm FE	YES	YES	YES	YES
Bank-Year FE	YES	YES	YES	YES
	Panel B: Controlling for time-invariant CEO omitted variables with CEO fixed effects			
RIA	-17.94**	9.796	-27.93	17.57***
	(6.770)	(6.054)	(19.07)	(6.506)
RIA*INV	0.257***			
	(0.0935)			
RIA*UAI		-0.176*		
		(0.0993)		
RIA*MAS			0.454	
			(0.295)	
RIA*PDI				-0.419***
				(0.139)
Constant	812.7***	816.1***	826.6***	811.7***
	(157.8)	(157.6)	(158.6)	(156.5)
Observations	15,078	15,078	15,078	15,078
R-squared	0.763	0.763	0.763	0.763
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
CEO FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
	Panel C: Controlling for time-variant bank CEO omitted variables with CEO*year fixed effects			
RIA	-22.48***	14.82**	-55.93***	22.50***
	(6.202)	(6.075)	(16.84)	(7.318)
RIA*INV	0.324***			
	(0.0916)			
RIA*UAI		-0.266***		
		(0.0847)		
RIA*MAS			0.903***	
			(0.262)	
RIA*PDI				-0.534***
				(0.164)
Constant	424.6***	424.8***	424.3***	425.7***
	(26.81)	(26.64)	(26.73)	(26.71)
Observations	15,015	15,015	15,015	15,015
R-squared	0.774	0.774	0.775	0.775
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
CEO-Year FE	YES	YES	YES	YES
Variables and FE included in all Panels				
Control variables	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

In Panel A, we control for time-variant bank characteristics including bank*year FE. In Panel B we control for time-invariant CEO characteristics by including CEO fixed effects. In Panel C, we control for time-variant bank CEO characteristics by including CEO*year FE. In the lower part of the table, we indicate control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively. Note that in Panels A, B, and C, the individual effects of the cultural heritage characteristics of the bank CEOs drop from the models due to collinearity with the bank*year, Bank CEO, and Bank CEO*year fixed effects, respectively.

Table 7: Match Sample Regressions

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread
	Panel A: Matched samples based on PSM for borrowing firm characteristics and lending relationships formation			
RIA	-34.99***	11.58**	-51.22*	22.64***
	(6.394)	(5.656)	(27.13)	(7.671)
INV	-0.767***			
	(0.123)			
RIA*INV	0.439***			
	(0.0950)			
UAI		0.607***		
		(0.106)		
RIA*UAI		-0.285***		
		(0.0836)		
MAS			-1.714***	
			(0.485)	
RIA*MAS			0.781*	
			(0.420)	
PDI				1.179***
				(0.151)
RIA*PDI				-0.635***
				(0.158)
Constant	741.8***	721.3***	753.9***	536.9***
	(132.9)	(114.1)	(122.6)	(130.4)
Observations	12,288	12,288	12,288	12,288
R-squared	0.770	0.770	0.770	0.770
	Panel B: Matched samples based on PSM for Bank CEO cultural heritage and borrowing firm characteristics			
RIA	-11.61*	14.33	-28.17	45.69***
	(6.763)	(8.962)	(16.81)	(11.01)
INV	-0.556***			
	(0.165)			
RIA*INV	0.182**			
	(0.0889)			
UAI		0.274**		
		(0.116)		
RIA*UAI		-0.294**		
		(0.142)		
MAS			-1.505***	
			(0.366)	
RIA*MAS			0.393	
			(0.239)	
PDI				1.163***
				(0.313)
RIA*PDI				-0.964***
				(0.225)
Constant	775.5***	899.7***	935.1***	434.2*
	(144.2)	(195.3)	(146.5)	(223.7)
Observations	10,755	6,645	8,111	3,773
R-squared	0.762	0.785	0.776	0.816
	Panel C: Matched samples based on PSM for Bank CEO cultural heritage and bank characteristics			
RIA	-16.75*	9.688	-24.28	47.92***
	(8.722)	(6.538)	(20.76)	(14.85)
INV	-0.316*			
	(0.157)			
RIA*INV	0.279**			
	(0.106)			
UAI		0.477***		
		(0.0867)		
RIA*UAI		-0.234**		
		(0.0912)		
MAS			-1.942**	
			(0.784)	
RIA*MAS			0.322	
			(0.337)	
PDI				2.882***
				(0.445)
RIA*PDI				-1.192***
				(0.265)
Constant	674.3***	1,144***	515.8**	701.9**
	(181.1)	(175.1)	(243.1)	(337.2)
Observations	7,729	6,174	7,638	3,734
R-squared	0.798	0.778	0.760	0.790

Variables and FE included in all Panels				
Control variables	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

In Panel A, we control for the potential selection bias between borrowing firm characteristics and the formation of lending relationships. In Panel B, we control for the potential selection bias between borrowing firm characteristics and bank CEO cultural traits. In Panel C, we control for potential selection bias between bank characteristics including the propensity for the formation of lending relationships and bank CEO cultural traits. In the lower part of the table, we indicate the control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 8: Alternative Measures of Relationship-Lending

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread
Panel A: Relationship intensity in terms of the number of loans				
RIN	-22.12***	12.85**	-37.38**	16.58**
	(6.800)	(5.953)	(18.27)	(7.255)
INV	-0.671***			
	(0.107)			
RIN*INV	0.319***			
	(0.0959)			
UAI		0.558***		
		(0.103)		
RIN*UAI		-0.228**		
		(0.0869)		
MAS			-1.596***	
			(0.435)	
RIN*MAS			0.626**	
			(0.283)	
PDI				1.058***
				(0.151)
RIN*PDI				-0.384**
				(0.155)
Constant	778.0***	761.2***	797.7***	591.8***
	(137.2)	(123.4)	(125.9)	(133.0)
Observations	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760
Panel B: Lending relationship dummy				
RELDUM	-19.46**	8.835***	-24.88*	5.442
	(7.839)	(2.825)	(14.24)	(5.135)
INV	-0.675***			
	(0.109)			
RELDUM*INV	0.240**			
	(0.0901)			
UAI		0.584***		
		(0.0961)		
RELDUM*UAI		-0.209***		
		(0.0579)		
MAS			-1.501***	
			(0.391)	
RELDUM*MAS			0.377*	
			(0.214)	
PDI				0.988***
				(0.169)
RELDUM*PDI				-0.181
				(0.143)
Constant	789.9***	767.8***	803.5***	610.5***
	(138.3)	(121.9)	(126.4)	(132.5)
Observations	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760
Variables and FE included in All Panels				
Control Variables	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text using alternative relationship lending variables. In Panel A, we use a measure of relationship intensity based on the number of loans (RIN). In Panel B, we use a lending relationship dummy (RELDUM). In the lower part of the table, we indicate the control variables and FE included in all Panels. Standard errors are clustered at bank and year level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively

Table 9: Alternative Measures of Culture

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread
RIA	-134.1**	243.1***	-73.20	-336.1***
	(54.45)	(75.53)	(55.07)	(125.3)
Autonomy	-57.56***			
	(14.92)			
RIA* Autonomy	32.38**			
	(13.20)			
Embeddedness		75.22***		
		(20.67)		
RIA* Embeddedness		-72.89***		
		(22.44)		
Harmony			-5.884	
			(11.94)	
RIA*Harmony			17.94	
			(13.79)	
Egalitarianism				-88.64***
				(21.10)
RIA* Egalitarianism				68.60***
				(25.52)
Firm Size	-21.72***	-22.26***	-22.28***	-21.87***
	(2.593)	(2.511)	(2.415)	(2.502)
Firm ROA	-38.88***	-38.71***	-38.52***	-38.64***
	(7.668)	(7.939)	(7.796)	(7.961)
Firm Z-Score	-7.113***	-7.194***	-7.189***	-7.154***
	(2.597)	(2.636)	(2.608)	(2.618)
Firm Debt/Assets	44.68***	44.75***	44.64***	44.98***
	(8.984)	(9.065)	(9.163)	(8.991)
Firm Liquidity	-52.36***	-51.33***	-52.93***	-51.10***
	(10.60)	(10.49)	(10.46)	(10.68)
Firm Tangibility	-25.94***	-26.40***	-26.90***	-25.98***
	(9.671)	(9.272)	(9.104)	(9.440)
Distance	-0.187	-0.463	-0.514	-0.411
	(1.465)	(1.456)	(1.421)	(1.482)
Bank Size	-20.99**	-19.56*	-29.90***	-12.60
	(10.14)	(11.31)	(9.672)	(11.98)
Bank Tier 1 Capital Ratio	-1.759	-1.299	-1.275	-1.587
	(2.122)	(2.062)	(1.792)	(2.202)
Bank Provisions (Loan Losses)/Assets	917.5	935.2	930.7	868.0
	(850.8)	(821.8)	(809.6)	(852.4)
Vega	-0.0666	0.120	-0.113	0.0775
	(0.177)	(0.264)	(0.242)	(0.234)
Delta	0.0853	0.490	-0.910	-0.391
	(2.725)	(3.224)	(3.495)	(2.994)
Loan Size	-6.772***	-6.699***	-6.763***	-6.638***
	(0.988)	(0.960)	(0.980)	(0.973)
Loan Maturity	-9.652***	-9.523***	-9.395***	-9.675***
	(1.758)	(1.731)	(1.731)	(1.720)
Syndicate Size	-0.167*	-0.192**	-0.186**	-0.189**
	(0.0859)	(0.0867)	(0.0895)	(0.0857)
Secured	31.08***	30.99***	31.07***	31.04***
	(3.935)	(3.924)	(3.959)	(3.962)
Covenants	1.887	1.659	1.759	1.693
	(3.129)	(3.139)	(3.199)	(3.083)
Performance pricing	-10.57***	-10.55***	-10.58***	-10.53***
	(1.706)	(1.693)	(1.706)	(1.701)
Constant	961.8***	451.2**	870.6***	1,053***
	(141.1)	(186.8)	(154.1)	(169.7)
Observations	15,081	15,081	15,081	15,081
R-squared	0.759	0.759	0.759	0.760
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD). We replace the four main Hofstede dimensions with those that are analogous in Schwartz framework. The alternative measures for power distance, individualism, masculinity, and uncertainty avoidance are egalitarianism, autonomy, harmony and embeddedness, respectively. All regressions use firm, bank, year, month, S&P quality rating, rating (bank-dependence), loan type fixed effects. Standard errors are clustered at bank-level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 10: Controlling for all Dimensions & Horserace Model

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread	(5) Loan spread
RIA	-20.13***	9.584*	-33.06*	16.54***	-0.919
	(6.506)	(5.443)	(17.61)	(6.074)	(2.508)
INV	-0.274	-0.130	-0.118	-0.124	
	(0.259)	(0.272)	(0.271)	(0.272)	
UAI	0.0125	0.110	-0.00924	0.0157	
	(0.260)	(0.274)	(0.261)	(0.259)	
PDI	0.574**	0.584**	0.573**	0.770***	
	(0.228)	(0.228)	(0.227)	(0.248)	
MAS	-0.372	-0.376	-0.733	-0.417	
	(0.399)	(0.397)	(0.451)	(0.420)	
RIA*INV	0.273***				
	(0.0901)				
RIA*UAI		-0.191**			
		(0.0858)			
RIA*MAS			0.520*		
			(0.273)		
RIA*PDI				-0.419***	
				(0.130)	
INV residuals					-4.631***
					(0.739)
RIA*INV residuals					1.901**
					(0.825)
UAI residuals					4.317***
					(0.782)
RIA*UAI residuals					-1.550**
					(0.770)
MAS residuals					-1.962***
					(0.451)
RIA*MAS residuals					0.714*
					(0.380)
PDI residuals					3.723***
					(0.606)
RIA*PDI residuals					-1.426***
					(0.492)
Firm Size	-21.01***	-21.01***	-20.96***	-21.02***	-20.99***
	(2.596)	(2.578)	(2.549)	(2.542)	(2.564)
Firm ROA	-39.18***	-39.44***	-39.10***	-39.03***	-38.71***
	(7.622)	(7.606)	(7.684)	(7.733)	(7.698)
Firm Z-Score	-6.959***	-6.948***	-6.943***	-6.966***	-6.973***
	(2.573)	(2.573)	(2.579)	(2.574)	(2.573)
Firm Debt/Assets	44.23***	44.22***	44.17***	44.26***	44.24***
	(8.911)	(8.943)	(9.006)	(8.948)	(8.911)
Firm Liquidity	-50.31***	-50.63***	-50.12***	-50.71***	-50.12***
	(10.89)	(10.84)	(10.98)	(10.82)	(10.98)
Firm Tangibility	-24.60**	-24.50**	-24.90**	-24.45**	-24.69**
	(9.667)	(9.659)	(9.727)	(9.651)	(9.710)
Distance	-0.0281	-0.0609	-0.0407	-0.112	-0.0512
	(1.476)	(1.484)	(1.486)	(1.489)	(1.474)
Bank Size	-11.64	-11.80	-12.16	-11.26	-11.31
	(11.41)	(11.45)	(11.54)	(11.35)	(11.26)
Bank Tier 1 Capital Ratio	-2.777	-2.864	-2.887	-2.845	-2.745
	(2.430)	(2.436)	(2.409)	(2.416)	(2.428)
Bank Provisions (Loan Losses) / Assets	429.1	431.8	411.3	446.6	433.9
	(959.5)	(969.0)	(973.9)	(952.6)	(946.5)
Vega	-0.0211	0.00248	0.000883	-0.00347	-0.0312
	(0.188)	(0.182)	(0.187)	(0.182)	(0.191)
Delta	-6.127**	-6.254**	-6.459**	-6.086**	-6.027**
	(2.738)	(2.757)	(2.662)	(2.713)	(2.722)
Loan Size	-6.710***	-6.708***	-6.658***	-6.675***	-6.673***
	(0.975)	(0.980)	(0.967)	(0.968)	(0.976)
Loan Maturity	-9.799***	-9.811***	-9.781***	-9.857***	-9.825***
	(1.754)	(1.754)	(1.747)	(1.750)	(1.749)
Syndicate Size	-0.152	-0.151	-0.150	-0.153	-0.154*
	(0.0915)	(0.0922)	(0.0918)	(0.0915)	(0.0900)
Secured	31.39***	31.27***	31.32***	31.33***	31.47***
	(4.030)	(4.012)	(4.014)	(4.064)	(4.074)
Covenants	1.636	1.646	1.573	1.629	1.601
	(3.066)	(3.068)	(3.111)	(3.096)	(3.077)
Performance pricing	-10.57***	-10.58***	-10.55***	-10.57***	-10.55***
	(1.702)	(1.699)	(1.720)	(1.717)	(1.718)
Constant	668.0***	656.3***	689.8***	647.8***	644.7***
	(136.5)	(138.8)	(139.3)	(136.9)	(148.3)

Observations	15,081	15,081	15,081	15,081	15,081
R-squared	0.761	0.761	0.761	0.761	0.761
Firm FE	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Month FE	YES	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. Models 1-4 control for all the cultural heritage dimensions of bank CEOs in the same specification. Model 5 is a horse-race model that comprises simultaneously all the cultural heritage characteristics of bank CEOs and their interactions with the lending relationship proxy (RIA). To reduce collinearity issues, in model 5 we use for each cultural heritage characteristics the residuals from regressions that employ as dependent variable a cultural heritage characteristic and as explanatory variables the rest of the cultural heritage dimensions. The dependent variable is represented by the "all-in-spread drawn" (AISD). All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 11: Alternative Clustering of Standard Errors

Variables	(1) Loan spread	(2) Loan spread	(3) Loan spread	(4) Loan spread
Panel A: Bank and firm level clustering				
RIA	-21.64**	10.25**	-38.54*	15.55**
	(7.636)	(3.406)	(19.86)	(6.998)
INV	-0.662***			
	(0.102)			
RIA*INV	0.289**			
	(0.101)			
UAI		0.554***		
		(0.102)		
RIA*UAI		-0.212**		
		(0.0730)		
MAS			-1.592***	
			(0.343)	
RIA*MAS			0.619*	
			(0.299)	
PDI				1.070***
				(0.155)
RIA*PDI				-0.397*
				(0.196)
Constant	785.4***	769.8***	805.8***	596.9***
	(163.4)	(165.7)	(162.6)	(145.5)
Observations	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760
Panel B: CEO clustering				
RIA	-21.64***	10.25**	-38.54*	15.55**
	(7.915)	(4.423)	(19.61)	(7.008)
INV	-0.662***			
	(0.118)			
RIA*INV	0.289***			
	(0.0949)			
UAI		0.554***		
		(0.101)		
RIA*UAI		-0.212***		
		(0.0693)		
MAS			-1.592***	
			(0.362)	
RIA*MAS			0.619**	
			(0.296)	
PDI				1.070***
				(0.161)
PDI*MAS				-0.397**
				(0.188)
Constant	785.4***	769.8***	805.8***	596.9***
	(129.8)	(122.6)	(128.8)	(127.1)
Observations	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760
Panel C: CEO ancestral country of origin clustering				
RIA	-21.64**	10.25**	-38.54*	15.55**
	(7.636)	(3.406)	(19.86)	(6.998)
INV	-0.662***			
	(0.102)			
RIA*INV	0.289**			
	(0.101)			
UAI		0.554***		
		(0.102)		
RIA*UAI		-0.212**		
		(0.0730)		
MAS			-1.592***	
			(0.343)	
RIA*MAS			0.619*	
			(0.299)	
PDI				1.070***
				(0.155)
PDI*MAS				-0.397*
				(0.196)
Constant	785.4***	769.8***	805.8***	596.9***
	(163.4)	(165.7)	(162.6)	(145.5)
Observations	15,081	15,081	15,081	15,081
R-squared	0.760	0.760	0.760	0.760

Variables and FE included in all Panels				
Control Variables	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our relationship-lending proxy. We calculate RIA by as the loan by bank i to borrower m in the last five years ($) divided by the total amount of loans by borrower m in the last five years ($) as shown in Equation (1) of the main text. All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type fixed effects. Panel A includes estimations with bank and firm-level clustering. Panel B includes estimations with CEO-level clustering and Panel C estimations with CEO country of origin-level clustering. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 12: CEO Ancestral Origin Fixed Effects

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread
RIA	-18.14**	8.706	-27.07	16.70***
	(6.947)	(5.870)	(18.86)	(6.111)
RIA*INV	0.249**			
	(0.0982)			
RIA*UAI		-0.169*		
		(0.0955)		
RIA*MAS			0.429	
			(0.294)	
RIA*PDI				-0.415***
				(0.126)
Firm Size	-20.90***	-20.91***	-20.87***	-20.92***
	(2.516)	(2.503)	(2.476)	(2.472)
Firm ROA	-39.18***	-39.43***	-39.15***	-38.99***
	(7.678)	(7.672)	(7.741)	(7.790)
Firm Z-Score	-7.019***	-7.008***	-7.001***	-7.029***
	(2.595)	(2.595)	(2.603)	(2.598)
Firm Debt/Assets	44.46***	44.46***	44.42***	44.48***
	(8.832)	(8.865)	(8.921)	(8.848)
Firm Liquidity	-49.40***	-49.69***	-49.33***	-49.59***
	(10.86)	(10.80)	(10.93)	(10.80)
Firm Tangibility	-24.81**	-24.76**	-25.10**	-24.64**
	(9.596)	(9.584)	(9.654)	(9.590)
Distance	-0.0696	-0.0975	-0.0746	-0.150
	(1.516)	(1.524)	(1.529)	(1.532)
Bank Size	-16.11	-16.26	-16.79	-16.06
	(10.46)	(10.49)	(10.54)	(10.37)
Bank Tier 1 Capital Ratio	-2.960	-3.036	-3.084	-2.982
	(2.608)	(2.614)	(2.584)	(2.585)
Bank Provisions (Loan Losses)/Assets	481.2	494.2	474.7	535.8
	(958.8)	(967.1)	(967.3)	(946.5)
Vega	-0.283	-0.262	-0.260	-0.243
	(0.270)	(0.267)	(0.269)	(0.264)
Delta	-4.289	-4.352	-4.460	-4.023
	(2.832)	(2.855)	(2.802)	(2.800)
Loan Size	-6.638***	-6.635***	-6.596***	-6.600***
	(1.008)	(1.013)	(0.997)	(0.997)
Loan Maturity	-9.874***	-9.882***	-9.852***	-9.946***
	(1.732)	(1.733)	(1.727)	(1.732)
Syndicate Size	-0.156*	-0.155*	-0.154*	-0.157*
	(0.0911)	(0.0916)	(0.0908)	(0.0912)
Secured	31.23***	31.13***	31.17***	31.19***
	(3.965)	(3.948)	(3.954)	(3.994)
Covenants	1.817	1.824	1.762	1.822
	(3.117)	(3.120)	(3.164)	(3.142)
Performance pricing	-10.60***	-10.61***	-10.59***	-10.61***
	(1.759)	(1.756)	(1.776)	(1.771)
Constant	697.4***	700.6***	707.8***	695.5***
	(136.8)	(136.9)	(138.2)	(136.0)
Observations	15,081	15,081	15,081	15,081
R-squared	0.761	0.761	0.761	0.761
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
CEO country of origin FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our relationship-lending proxy. We calculate RIA by as the loan by bank i to borrower m in the last five years ($) divided by the total amount of loans by borrower m in the last five years ($) as shown in Equation (1) of the main text. All regressions use firm, bank, year, month, CEO country of origin FE, S&P quality rating, rated (bank-dependence), loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 13: Non-Price Loan Contract Terms

Variables	(1)	(2)	(3)	(4)
	Panel A: Secured by collateral or not			
RIA	-0.268*	-0.0762	-0.200	-0.131
	(0.160)	(0.133)	(0.278)	(0.186)
INV	0.000107			
	(0.00147)			
RIA*INV	0.00120			
	(0.00230)			
UAI		-0.000331		
		(0.00172)		
RIA*UAI		-0.00194		
		(0.00225)		
MAS			-0.00295	
			(0.00329)	
RIA*MAS			0.000265	
			(0.00443)	
PDI				0.000774
				(0.00223)
RIA*PDI				-0.00129
				(0.00449)
Constant	-1.651	-1.693	-1.656	-1.699
	(1.095)	(1.108)	(1.030)	(1.146)
Observations	15,367	15,367	15,367	15,367
	Panel B: Covenant restrictions or not			
RIA	0.474*	0.00916	0.00181	0.0333
	(0.255)	(0.125)	(0.453)	(0.164)
INV	0.000917			
	(0.00269)			
RIA*INV	-0.00386			
	(0.00328)			
UAI		-0.00157		
		(0.00222)		
RIA*UAI		0.00356		
		(0.00250)		
MAS			-0.00728	
			(0.00472)	
RIA*MAS			0.00327	
			(0.00674)	
PDI				-0.000810
				(0.00430)
RIA*PDI				0.00413
				(0.00461)
Constant	-1.683	-1.500	-1.676	-1.775
	(1.581)	(1.617)	(1.551)	(1.611)
Observations	15,265	15,265	15,265	15,265
	Panel C: Performance pricing or not			
RIA	-0.455***	-0.325**	-0.322	-0.324**
	(0.104)	(0.132)	(0.300)	(0.134)
INV	-0.00124			
	(0.000954)			
RIA*INV	0.00119			
	(0.00191)			
UAI		0.00131		
		(0.000822)		
RIA*UAI		-0.000853		
		(0.00163)		
MAS			-0.00233	
			(0.00273)	
RIA*MAS			-0.000749	
			(0.00496)	
PDI				0.00245*
				(0.00136)
RIA*PDI				-0.00113
				(0.00229)
Constant	-2.665*	-2.775*	-2.730*	-3.004*
	(1.501)	(1.515)	(1.440)	(1.561)
Observations	15,372	15,372	15,372	15,372

Variables and FE included in all Panels				
Control Variables	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
Firm state FE	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Loan type FE	YES	YES	YES	YES
Firm industry FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table depicts the results from probit models that explore conditioning effect of the cultural heritage of bank CEOs on the association between lending relationship (RIA) and three key non-price loan contract terms. Panel A uses as a dependent variable a secured dummy variable (which takes the value of 1 when a loan facility has a collateral and 0 otherwise). Panel B uses as dependent variable a covenant dummy (which takes the value of 1 when a loan has covenants and 0 otherwise) as a dependent variable. Panel C uses as dependent variable a performance pricing dummy (which takes the value of 1 when a loan is subject to performance pricing and 0 otherwise) as a dependent variable. All probit regressions use bank, year, month, S&P quality rating, rating (bank-dependence), state and industry of the borrowing firm, and loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Chapter 4 Does the cultural heritage of bank CEOs influence the cost of loans for innovative firms?

Does the cultural heritage of bank CEOs influence the cost of loans for innovative firms?

Abstract

In this paper, we explore how bank CEOs' cultural heritage shapes the nexus between firm innovation and the cost of bank loans in the U.S. syndicated loans market. We provide evidence to show that cultural heritage does, in fact, condition this relationship. Our most compelling results are from banks led by CEOs that trace their origin in more power distant societies are more inclined to reduce the cost of borrowing to innovative firms. In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to exploit the borrowing firm by charging higher loan costs. These findings are consistent with the view that certain cultural attributes affect the degree to which innovation is valued in the societal and business contexts. Our study highlights the importance of considering lender culture when investigating factors influencing the cost of bank loans.

JEL classification: G21, M14, Z10

Keywords: innovation, cost of bank loans, CEOs, cultural heritage

4.1 Introduction

It is no secret, that innovation brings several benefits to a firm such as improved productivity and cost reduction through improved efficiency and process optimisation. Arguably, the most important benefit is that innovation provides a firm with a competitive edge and potentially, a first-mover advantage. Apple, Google, Facebook, and Amazon – what do these companies have in common? They innovate. These tech-giants have successfully 'hacked' the consumer algorithm and facilitate an environment for innovation. For example, Google's famous 80/20 policy where employees allocate 20 percent of their working time for creative side projects. This has allowed them to successfully position themselves as market leaders. Not only is innovation, a source of a firm's sustainable competitive advantage but a key driving force of overall economic growth (Francis et al., 2012). For example, a 2018 estimate shows that the technology sector, consisting of Amazon, Facebook, Google, Twitter, Uber, and many other firms, contributed $2.1 trillion to the U.S. economy.[24] Innovation has become the lifeblood of the modern economy. However, for this innovation to even occur, it needs a source of finance. There is growing literature that supports the idea that well-operating and efficient financial markets play a central role in economic growth through their ability to promote technological innovation (Schumpeter, 1911; King and Levine, 1993; Hsu et al., 2014; Kerr and Nanda, 2015). In addition, banks play a crucial role in firm innovation by financing research and development, growth, capital expenditures, product, and process development (Brancati, 2015; Fernandez, 2017; Giebel and Kraft, 2020).

Innovating firms are also offered more favourable loan terms due to the benefits they can bring the lender. For example, Francis et al. (2012) use a sample of U.S. patenting firms to show that borrowers with higher innovation capability (captured by patent applications, higher R&D, productivity, or higher-quality patents) enjoy the benefit of lower loan spreads and better non-price loan terms as patenting activities reveal favourable private information. In the same vein, the tangibility of a patent provides a greater sense of security to a lender, compared to an abstract concept. Chava et al. (2017) find that with patent protection, intellectual property (IP) acquires a measure of asset tangibility and lenders take this into account when pricing loans. The practical implications of this tangibility should not be overlooked; a firm's intellectual property (IP) is protected by a patent, it can be sold off in the event of default allowing the patent to be used as collateral (Hochberg et al., 2014; Chava et al., 2017; Mann, 2018). These factors should, therefore, be conducive of more favourable loan terms. Hence, firms with such innovative

[24] https://www.reuters.com/article/us-usa-internet-economy-idUSKBN1WB2QB

activity are more likely to benefit from lower loan costs as this 'security' and market competitiveness is highly valued by lenders.

However, whilst there is a plentiful amount of literature on innovation and lending, the research on how banks' characteristics could affect this relationship is scarce. In this paper, we take a different approach from the extant studies and posit that culture could influence the nexus between firm innovation and the cost of bank loans in the U.S. syndicated loans market. The purpose of this paper is to provide some answers to the following question: "Does lender culture condition the effect of innovation on the cost of bank loans?".

Culture can be defined as "the collective programming of the mind which distinguishes the members of one group or society from those of another" (Hofstede,1984, p.82). Culture has a life of its own in the sense that, even when removed from its originating environment, it continues to exercise influence over individual outcomes (Fernández, 2011). Immigrants bring these transmittable principles and values to their new home and are passed down over several generations (Guiso et al., 2006). Culture remains persistent even when the host is removed from the original environment. It serves as an informal institutional device that shapes values and preferences and governs societal behaviour and economic transactions (North, 1990; Licht et al., 2005; Tabellini, 2010). In the context of our paper, the differences in the national culture offer a source of significant variation on the value that individuals, such as executives, and organisations place on innovation and creativity in the lending landscape. Hence, national culture could influence the degree to which banks value innovation and their inclination to share with borrowers the benefits stemming from firm innovative activity. We use the four main cultural dimensions provided by Hofstede (1980), power distance, individualism/collectivism, masculinity/femininity, and uncertainty avoidance, to provide a theoretical basis to this conjecture. Specifically, our sample is based on the U.S. due to its multiculturalism deriving from historical waves of immigration.

The power distance dimension reflects the extent to which a society perceives and accepts inequalities whether this stems from power, wealth, or status. High power distant societies conform to a hierarchical order within their community, with less powerful members accepting that power is unequally distributed (Hofstede, 2010). The predominance of authoritarian norms and conformity discourages uncontrollability and deviations from the status quo. As a result, predictable relationships are highly regarded (Hofstede, 1984; Doney et al., 1998). Banks led by CEOs originating from such societies may appreciate the higher predictability and status of borrowers that comes from secured patents granted. In addition, firms with a patent have superior information to their competitors and with that comes a more powerful market position and competitive advantage. Therefore, in our first hypothesis (H1) we predict that banks with a more power distant culture would display a greater appreciation of innovation activity and a higher propensity to reduce the price of loans for patenting borrowers.

The Individualism/collectivism dimension describes the extent of the individualistic versus the collectivist nature that prevails in each society and reflected in societal interactions (Hofstede, 1984). Those from individualistic cultures place greater emphasis on individual freedoms, autonomy and operate to serve their own self-interest (Hofstede, 2010). In contrast, those from more collectivist cultures prefer to be integrated into cohesive group relationships, forming strong bonds, in which protection is exchanged for loyalty (Hofstede, 2001; Li et al., 2013). Overconfidence and optimism are a common feature of individualistic societies. There is a plethora of studies that find a correlation between individualism and overconfidence, specifically related to financial decision-making and investment behaviour (Chui et al., 2010; Ferris et al., 2013; Breuer et al., 2014). Hence, an individualistic lender may be less likely to value such a protection mechanism and will be unlikely to reduce the cost of bank loans to reflect the additional layer of safety the borrower possesses but instead, continue to extract rents for their own gain. Our second hypothesis (H2) is that banks in which an individualist culture dominates, place less value on the protection mechanisms provided by patents and instead seek to extract the rents from innovative borrowers by charging higher loan prices.

Every society associates certain behaviours, as more appropriate to females or more so to males however, which behaviours belong to each gender differs from one society to another (Hofstede, 2001; Hofstede, 2010). The masculinity-femininity cultural dimension captures the spectrum in a society with respect to their associated stereotypical connotations. Masculinity is associated with assertiveness and competitiveness such as recognition of performance, material success and achievement. In contrast, femininity, encompasses values related typically to more nurturing and softer attitudes with higher importance placed on cooperation and honouring moral obligations. Therefore, we posit that lenders from highly masculine societies are less likely to value the protection that comes with a patent as they are not 'afraid' of competition or confrontation and thus, do not pass on the 'saving' to borrowers that stem from having this protection mechanism i.e., less chance of future dispute over intellectual property (IP), security with market position and so on. Hence, it would not be unreasonable to expect that a CEO from a more feminine society to value patents as helps to avoid future conflict and provides protection. Thus, in our third hypothesis (H3), we predict that banks with a more masculine culture are less likely to value the security that comes with a patented innovation but rather exploit the borrower's competitive advantage through higher loan costs.

The uncertainty avoidance dimension captures the degree to which the members of a society exhibit anxiety and feel uncomfortable when encountering ambiguity and future uncertainty (Hofstede, 2001; Hofstede, 2010). Uncertainty avoidance does not necessarily mean risk avoidance. However, it does address risk preference, risk perception and a reliance on risk-reducing strategies (Doney et al., 1998). Those from high uncertainty avoidant societies have a low tolerance for unstructured and unpredictable circumstances, which determines the extent that uncertainty is lessened and what mechanisms are developed alleviate this anxiety i.e. adopting strict codes of behaviour, establishing rules, and rejecting divergent ideologies and actions (Singh, 1990). "Extreme ambiguity creates intolerable anxiety. Every human society has developed ways to alleviate this anxiety. These ways belong to the domains of technology, law, and religion. Technology, from the most primitive to the most advanced, helps people to avoid uncertainties caused by nature. Laws and rules try to prevent uncertainties in the behaviour of other people" (Hofstede, 2010, pp. 201-202). Managers originating from such societies tend to be more conservative, prudent and endeavour to reduce their exposure to future uncertainty and display a stronger preference for predictable returns (Fidrmuc and Jacob, 2010; Zheng et al., 2012; Li et al., 2013). These managers are, therefore, likely to appreciate the patents that technological innovations yield. This leads us to our final hypothesis where we expect to see that banks with an uncertainty avoidant culture are more likely to value the reduced ambiguity and to display a higher propensity to share the benefits with innovative borrowers through lower loan prices (H4).

Theoretical and empirical research provides evidence to support the notion that a bank CEOs' cultural heritage plays a vital role in a bank's lending policy. We focus on the CEO of the lead bank as they are considered the most senior individuals within the organisation (Tsui et al., 2006; Berson et al., 2008; Sheikh, 2018). The Upper Echelon theory explains that organisational outcomes are in part predicted by characteristics of the top-level managerial team and where the experiences, values, and personalities of executives influence their interpretations of the situations faced and in turn, influence their choices made (Hambrick and Mason, 1984; Hambrick, 2007). These values and preferences infiltrate and filter down to shape a firm's corporate culture and economic outcomes (Lo, 2015; Bushman et al., 2018). Furthermore, there is empirical and real-world evidence which supports the notion that CEO culture plays a vital role in a bank's lending policy. Hagendorff et al. (2019) measure a lenders trust level using the average trust attitude in the CEO's ancestral country of origin and examine the implications of a lender's trust in corporate loans. Additionally, they obtain direct evidence on CEOs setting their bank's lending strategies for implementation by loan officers using a survey whereby over

90% of respondents agreed that the CEO shapes the bank's overall lending strategy and follow lending policies set by them.

Cross-country studies face significant challenges when attempting to isolate the effects of national culture. National culture correlates with several country-level factors that could exert an independent effect on financial contracts (Aghion et al., 2010). For instance, culture is reflected in a country's legal system and the contract enforcement mechanisms (Licht et al., 2005; Cline and Williamson, 2017).[25] Both these factors play a vital independent role in bank lending. To alleviate concerns surrounding such factors, we examine the bank policy and loan contract implications of the variation in the national cultural heritage of bank CEOs in a single country context and therefore, we are better able to exploit the homogeneity in regulatory framework, thus allowing us to capture the spill-over effects of culture more easily in a single country. This approach is in line with previous similar studies (Nguyen et al., 2018; Hagendorff et al., 2019).

The U.S. provides solid ground for this study due to its multicultural nature that stems from a long immigration history. Cultural heritage variations prompt differences in values and preferences on a national scale. The transmission of culture and reproduction of cultural values and practices is evident throughout history. Culture can be described as having a life of its own, even when removed from the environment in which it originates, the influence it exerts over individual outcomes, continues (Fernández, 2011). These values are imported with immigration to the host country and display strong intergenerational persistence (Guiso et al., 2006; DeBacker et al., 2015; Pan et al., 2020). Thus, heterogeneity in the national cultural heritage characteristics of U.S. banks' CEOs display a higher propensity to share (exploit) the benefits with innovative borrowers through lower (higher) loan prices.

To carry out the empirical analysis, we compile a largely hand-collected dataset on the CEOs' cultural heritage of 52 banks active as lead lenders for syndicated loans to around 1,660 borrowing firms in the U.S. over the 1992-2017 period. We begin by extracting the surnames of bank CEOs from the Execucomp database. Then, similarly to other studies (Kerr and Lincoln, 2010; Hegde and Tumlinson, 2014; Liu, 2016; Nguyen et al., 2018), we use the origin of the bank CEOs' surnames to infer ethnicity. We identify and verify the ethnic origin of bank CEOs using surnames through various data sources such as the biographies, interviews, ancestry.com, the 1940 U.S. census and previous versions, the U.S. immigration records, and the commercial database of Origins Info Ltd. By taking this approach, we are able to trace the origin of bank

[25] For example, Cline and Williamson (2017) find that individualism significantly increases efficiency in contract enforcement.

CEOs to 14 countries. As a result, we associate the ethnic origin of CEOs' surnames with the four national cultural heritage dimensions provided by Hofstede (Hofstede, 2001). Following this, we source U.S. syndicate loan data from the DealScan database which provides us with comprehensive information on loan characteristics. We identify the lead bank in each syndicate loan and use this information to merge it with our CEO cultural heritage dataset and data from Compustat Bank Fundamentals on the characteristics of the lead banks. We obtain and merge the characteristics of the borrowing firms from Compustat. Furthermore, we take into account the bank mergers and acquisitions during the period of our sample. It is rational to assume that post-M&A, the acquiring bank inherits the acquired bank's information on borrowing firms (Schenone, 2010; Prilmeier, 2017). Finally, to capture our measures of innovation we use the patent application and citation information from the KPSS dataset (Kogan et al., 2017) which has been used in existing empirical studies (Cohen et al., 2016; Ellis et al., 2019; Huang and Yuan, 2019). This contains detailed information on patents granted by the U.S. Patent and Trademark Office (USPTO) between 1926 to 2019. After making the necessary adjustments to the data (see section 3.4), we create four primary measures of innovation: (1) innovation efficiency of patents (2) patents (3) innovation efficiency of citations (4) citations. Our additional three measures capture patents per employee, dollar value of patents and an alternative measure of innovation efficiency, that are used in additional tests.

The empirical findings of our baseline models support our hypotheses. Using models with interaction terms, we find that the association between innovation and the cost of bank loans, as measured by the all-in-spread-drawn (AISD) above LIBOR, is conditioned by the cultural heritage characteristics of bank CEOs. We show that the interactions between our innovation measures and bank CEO cultural heritage in terms of power distance and uncertainty avoidance display a negative and significant relationship with loan spreads (hypothesis H1 and H4, respectively). In contrast, individualism and masculinity display a positive relationship with loan spreads (hypotheses H2 and H3, respectively). These findings show that the loan pricing implications with regards to innovation, are consistent with the conjecture that certain CEOs' cultural heritage traits prompt the reward (or rent extraction) of borrower innovation. These results are also economically significant. To illustrate, we use the individualism dimension (H2). The INV score of a bank led by a CEO of Greek heritage is 35 and a bank led by a CEO of Polish origin is 60. The differences in individualism between Greece and Poland is 25, this being similar to one standard deviation increase in individualism (22.65). The results imply that if individualism of the lead bank's CEO were zero (i.e., a totally collectivist bank CEO), then one standard deviation (0.345) increase in innovation efficiency of patents leads to a reduction in bank loans' cost by 16.35 basis points.[26] A 16.35 basis points reduction translates into around \$1.552 million in loan interest savings for the average loan, ceteris paribus. However, the interaction term between innovation efficiency (IE_Patents) and individualism (INV) implies that with each point of increase in the individualism of a bank's CEO (in the 0-100 scale) these savings decrease by around \$ 19,000. One point of increase in the individualism of the bank CEOs increases the coefficient of innovation efficiency. Thus, the decrease in basis points due to a one standard deviation increase in innovation efficiency falls to 16.151bps. Hence, interest savings in this case are \$1.533 million. This represents approximately a \$19,000 decrease in interest savings with each point of increase in individualism. Thus, borrowers' savings due to a one stand deviation increase in the innovation efficiency of patents with a bank led by a CEO with Greek heritage is around \$887,000 savings drop (increase in costs) to around -\$412,000 for a standard deviation increase in innovation efficiency of patents with a bank led by a CEO of Polish heritage, ceteris paribus.

To address any concerns in our methodology, we perform additional tests. In our baseline model, we incorporate numerous loan, bank, bank CEO, and borrowing firm control variables however, to further strengthen our model, we include fixed effects to limit potential omitted variable issues. These include firm, bank, year, month, rating quality, bank dependence, loan type, and purpose fixed effects. To further address omitted variable concerns, we use specific combinations of fixed effects models. To control for all time-variant CEO characteristics (e.g., compensation packages, age, gender, generation), we employ models with bank CEO*year fixed effects. To account for time-variant omitted variable concerns at the bank level (e.g., each bank's corporate governance structure), we estimate models that comprise bank*year fixed effects. In additional tests, we address the potential issue where bank CEOs' cultural heritage could be associated with other features of their country of origin. These characteristics may include traits that correlate with the bank CEOs' cultural heritage. Therefore, we must consider that our estimations may be subject to bias. Therefore, to mitigate such concerns, we estimate the relationship between CEO cultural heritage and loan spread within an instrumental variable framework. We are careful in selecting instruments for the cultural heritage traits that satisfy both the inclusion and exclusion restrictions.

Next, we perform estimations using matched samples from propensity score matching to address two potential selection bias issues. The first potential issue we have identified is between the firm and CEO, where more innovative firms approach banks with CEOs of a certain culture.

[26] Given the average loan size in the sample is \$ 258.68 million and the average loan maturity is 3.67 years (44.02866 months).

For example, if innovation is considered risky, such firms may approach lenders where the CEO are more risk tolerant. The second potential matching issue we have identified, is between the bank and CEO where banks choose CEOs of a certain culture that align with the bank future strategy. For example, if a bank decided to change their lending policy towards innovative firms, they may hire a CEO of a culture with characteristics that make them gravitate towards innovation. These selection biases could influence our results. Following Bharath et al. (2011) we apply a propensity score matching (PSM) approach to address these concerns.

We also run several additional robustness tests; we estimate models that employ alternative measures of innovation, and cultural heritage measures; we perform tests in which we use alternative ways of clustering the standard errors; we include models with fixed effects about the ancestral country of origin of bank CEOs; we use specifications that comprise fixed effects for the CEOs' ancestral country of origin, rerun our baseline regression using contemporaneous innovation variables, and finally, investigate alternative dependent variables such as non-price terms. Overall, our most compelling results are from banks led by CEOs that trace their origin in more power distant societies are more inclined to reduce the cost of borrowing to innovative firms. In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to extract rents from the monopolistic profits that parents facilitate by charging higher loan costs to the borrowing firm.

This study's main contribution is to demonstrate how banks' propensity to reward (extract rents from) firm innovation, through lower (higher) loan prices, is conditioned by the bank CEOs' cultural heritage. Our findings show that such predisposition follows a pattern that is consistent with the degree to which bank CEOs' cultural heritage influences this relationship. Therefore, our paper contributes to the stream of the literature that investigates lending with regards to firm innovation (Ayyagari et al., 2011; Francis et al., 2012; Kerr and Nanda, 2015; Chava et al., 2017). Furthermore, the empirical literature on the conditioning effects of banks' characteristics on the association between innovation and loan pricing is still scarce. Our study highlights the importance of considering lenders' culture when investigating the effects of innovation on the cost of bank loans.

Our paper also adds to the emerging literature that examines the effect of culture and CEO heritage on the economic outcomes of corporate firms (Liu, 2016; Mourouzidou-Damtsa et al., 2019; Pan et al., 2020). Specifically, our paper contributes to the area of literature that focuses on the banking sector (Hagendorff et al., 2019; Nguyen et al., 2019; Álvarez-Botas and González, 2021). Surprisingly, studies that focus on the impact of bank CEO attributes on lending policies using loan-level data are comparatively scarce. Some recent studies investigate how bank CEO attributes impact lending behaviour (Ho et al., 2018; Hagendorff et al., 2019; Lim and Nguyen, 2020). Our study also fits within this emerging stream of the literature. Whilst these elements have been studies individually, no studies have investigated these factors collaboratively (i.e., lending, innovation, and CEO cultural heritage). To the best of our knowledge, our paper is one of the first studies that examine whether the cultural heritage of a bank CEO cultural heritage can affect reward or exploitation of borrower innovation, through lower (higher) loan prices.

The rest of the paper is organised as follows. Section 2 develops four hypotheses surrounding each cultural dimension (power distance, individualism, masculinity, and uncertainty avoidance). Section 3 describes the data and methodology. Section 4 provides the main empirical findings, the results of the main robustness checks and results of further testing. Finally, section 5 offers a conclusion.

4.2 Hypothesis Development

There is a common theme that is found in the literature, that is, the relationship between innovation and the cost of bank loans. More specifically, the ability for innovative firms to secure more favourable loan prices. We highlight four avenues whereby this occurs. The first focuses on how patented innovation decreases information asymmetry. Francis et al. (2012) provides evidence to show that borrowers with higher innovation capability, benefit from lower loan spreads and better non-price loan terms as patenting activities reveal favourable private information. Financial intermediaries want to avoid the duplication of monitoring activities and negotiate contracts with innovators to induce optimal efforts and efficient monitoring processes. Higher-quality monitoring, in turn, allows lenders to offer better terms to entrepreneurs (De la Fuente and Marin, 1996). Secondly, patented innovation increases predictability of returns and borrower performance. Eberhart et al. (2008) find that there is a substantial increase in performance in the years following an R&D increase and document a negative relation between R&D increases and default risk. Studies have also shown that firms with R&D increases experience positive abnormal returns and higher earnings in future years (Lev and Sougiannis, 1996; Penman and Zhang, 2002; Ali et al., 2012). Patenting activity can also signal success (i.e., positive outcomes) of borrowers' innovation processes (Hoffmann and Kleimeier, 2021). This increase in performance and firm stability enables future firm performance to be less volatile. Thirdly, patents used as collateral. The tangibility of a patent provides a greater sense of security to a lender. Chava et al. (2017) find that with patent protection, intellectual property (IP) acquires a measure of asset tangibility and lenders take this into account when pricing loans protected by a patent. Patents can be sold off in the event of default allowing the patent to be used as collateral (Hochberg et al., 2014; Chava et al., 2017; Mann, 2018). These factors should, therefore, be conducive of more favourable loan spreads.

Lastly, patented innovation protects the borrower by preventing competitors replicating it without permission. Such a 'safety' mechanism means the property right belongs to the inventor (United States Patent and Trademark Office, 2018) and in our case, the borrower of the loan. Therefore, a lender is likely to provide lower cost of bank loans in exchange for this protection.

As described above, there is evidently a relationship between firm innovation and the cost of bank loans. However, in the next section, we navigate through this nexus whilst using the cultural dimensions provided by Hofstede. We explore how the cultural origins of the bank CEO condition the relationship between lending and innovation.

Bank CEO Power Distance and Innovation

Power distance reveals the extent to which a society perceives and accepts inequalities whether this stems from power, wealth, or status. High power distant societies conform to a hierarchical order within their community, with less powerful members accepting that power is unequally distributed (Hofstede, 1984). Conversely, low power distance societies, power is decentralised with greater equality prevalent throughout society and communication is more participative (Hofstede Insights, 2021).

The predominance of authoritarian norms and conformity discourages uncontrollability and deviations from the status quo. As a result, predictable relationships are highly regarded (Hofstede, 1984; Doney et al., 1998). Eberhart et al. (2008) find that there is a substantial increase in performance in the years following an R&D increase. Similarly, investment in innovation leads to higher future earnings (Ali et al., 2008). This increase in performance and firm stability enables future firm performance to be less volatile. Patents increase firm predictability by ensuring the borrowing firm owns the rights to an invention and prevents competitors replicating it without permission, for a fixed period (United States Patent and Trademark Office, 2018). Hence, lenders originating from high power distant societies may feel more comfortable awarding loans to borrowers with more predictable behaviour that stems from higher innovative activities and granted patents.

In a similar light, we believe lenders from such backgrounds may reward borrowers that have more patents, as it conforms to their hierarchical, bureaucratic-style and power-driven ideologies. Patenting activity signals success (i.e., positive outcomes) of borrowers' innovation processes (Hoffmann and Kleimeier, 2021). Firms with a patent have superior information to their competitors (e.g. a new innovative product, or process) and with that comes a more powerful market position and competitive advantage (Brem et al., 2016; Harrigan and DiGuardo, 2017). More successful firms that are highly innovative are more likely to be rewarded by lenders from high power distance backgrounds. Lenders from such origins value, not only the status that is accompanied by patents, but the assurance that allows their borrower to protect, and strengthen said market position and maintain status. This is then rewarded with lower loan costs by high power distant CEOs, as the borrowing firms' power increases.

The 'transference trust process' is based on the idea that the trustor draws on proof (i.e., patent granted by a powerful institution) from which trust is transferred to a 'target' (i.e., the borrower) (Strub and Priest, 1976; Granovetter, 1985). The underlying rationale for this process is that the individual (i.e., borrowing firm) can be trusted, based upon the assessment made by a trust source (i.e., USPTO) and hence, the trust is transferred. Those from power distant societies value hierarchy and institutional structures. The USPTO is a respected, established, and powerful institution with the authority to grant patents. If this establishment has determined that a firm's innovation is worthy of a patent, a power distance lender is likely to highly regard the decision of this institution and 'trusts' their decision. We posit that high-power distant lenders reward borrowers with lower loan spreads because they have been deemed trustworthy and safer as a result of having obtained a patent granted by such a powerful institution.

Patents provide an element of predictability and superior status. It is, therefore, natural to expect CEOs from countries high in power distance, to value structure, and benefits that come from competitive advantages provided by the regulatory system of patent registration and protection. Banks led by CEOs originating from high power distant societies appreciate the higher predictability and status of borrowers' behaviour that stems from secured patents granted by an official state body i.e. The United States Patent and Trademark Office (USPTO). Thus, we state our first hypothesis (H1) as follows:

H1: Banks led by CEOs that trace their origin to more power distant societies have a higher propensity to reward firms, with patented innovation, by lowering the cost of loans.

Bank CEO Individualism and Innovation

Individualism, as opposed to collectivism, is one of the two bipolar ends of this cultural dimension and describes the extent of the individualistic versus the collectivist nature that prevails in each society and reflected in societal interactions (Hofstede, 1984). Those from individualistic cultures place greater emphasis on individual freedoms, autonomy and operate to serve their own self-interest (Hofstede, 2010). On the other hand, those from more collectivist cultures prefer to be integrated into cohesive in-groups relationships, forming strong bonds, in which protection is exchanged for loyalty (Hofstede, 2001; Li et al., 2013).

Individualistic societies work is organised in such a way that the employees' interest are aligned with the employers (Hofstede, 2010). Therefore, an individualistic CEO is more likely to focus on their own career advancement, which coincides their organisation's financial gain, and charging higher loan spreads achieves such a goal. Hence, individualistic managers are more likely to extract rents from the innovation of a borrowing firm. They show a higher propensity to increase their own self-gain, as well as their employers. Patents provide protection from competition, and as a result, create a monopoly on profits for the firm. Financial reward structures within an organisation are associated with more individualistic societies (Schuler and Rogovsky, 1998; Chiang and Birtch, 2012) therefore, lenders from such societies are likely to exploit these monopolistic profits for their own self-gain.

There is a plethora of studies that find a correlation between individualism and overconfidence, specifically related to financial decision-making and investment behaviour (Chui et al., 2010; Ferris et al., 2013; Breuer et al., 2014). Several studies suggest that overconfidence is a cognitive bias (Harvey, 1997; Moore et al., 2018) where the confidence in one's judgment is unreliably greater than an objective judgement. Meikle et al. (2016) investigates the role of overconfidence within an organisation, focusing on ways in which, on an individual-level, can manifests itself and finds that the consequences of overconfidence can be significant, especially when it stems from those at the top of an organisation. Moreover, overconfidence and optimism are a common feature of individualistic societies. Those from individualistic societies judgement may be clouded by their overconfidence and do not fully recognise certain market threats. For example, lenders from high individualistic societies may place less value on the protection offered by a patent and place greater emphasis on their own ability to judge the situation. Furthermore, individualistic persons are less likely to need group conformity due to their overconfidence in their own ability to judge and no not seek the approval from a third party, in this case, are less likely to value the 'approval' of the USPTO. Hence, an individualistic lender may be less likely to value such a protection mechanism and do not reduce the cost of bank loans to reflect the additional layer of safety the borrower possesses but instead, continue to extract rents for their own gain.

The focus on self-interest is related to highly individualistic societies. Kale and McIntyre (1991) argue that in such cultures, it is accepted that members play adversarial roles as each side attempts to advance and protect their own interests and hence, some degree of conflict is expected. In contract, societies with less individualism (i.e. high collectivism), exhibit greater cooperation and place a higher priority on the avoidance of conflict (Hofstede, 1980). Hence, a collectivist lender is likely to value a patent, not only due to the protection it offers but can avoid potential conflicts should someone attempt to replicate their design unlawfully. Whereas collectivist societies have a greater reliance on regulatory oversight as a means of mitigating the costs of social disorder (Djankov et al., 2003) especially where market failures are a greater threat. Thus, collectivist societies will prefer greater contract enforcement regulation (i.e., patents) to limit potential costs and prevent such conflicts. This leads us to believe, collectivist lenders are likely to offer more competitive interest rates compared to lenders from high individualism societies.

Based on the above argument, we conjecture that banks led by CEOs from more collectivist societies are more likely to value innovation that could be rewarded through lower loan costs. On the contrary, banks led by CEOs from more individualistic societies, in which concerns for pure self-interest are prevalent, are more likely to exploit the superior market position of the borrowing firm and are less likely to value the protection of a patent. Thus, we state our second hypothesis (H2) as follows:

H2: Banks led by CEOs that trace their origin to more individualistic societies have a higher propensity to extract rents from firms with patented innovation by increasing the cost of loans.

Bank CEO Masculinity and Innovation

"The absolute and statistical biological differences between men and women are the same the world over, but the social roles of men and women in society are only partly determined by the biological constraints" (Hofstede, 2010, p.151). Every society recognises and associates certain behaviours, as more appropriate to females or more so to males however, which behaviours belong to each gender differs from one society to another (Hofstede, 2001; Hofstede, 2010). The masculinity-femininity cultural dimension captures the two opposite ends of the spectrum in a society with respect to their associated stereotypical connotations. Masculinity is associated with assertiveness and competitiveness such as recognition of performance, material success and achievement. In contrast, femininity, encompasses values related typically to more nurturing and softer attitudes with higher importance placed on cooperation and honouring moral obligations.

Masculinity has frequently been linked to materialism. Hofstede (2001) observes that material purchases such as cars and jewellery are more frequently made in masculine societies. This implies a need to "show off" (Ogden and Cheng, 2011). Furthermore, Ogden (2003) supports the notion that males are more materialistic than females. Thus, one could argue that masculinity is associated with higher levels of materialism. The desire for material possessions drives the need to ascertain wealth and financial success.[27] This leads us to believe that highly masculine lenders are likely to exploit the monopolistic profits that patent protection facilitates in order to advance their own wealth. This exploitation happens by increasing the cost of loans.

If masculine societies place greater emphasis on material possessions, success and achievement, the likelihood of taking advantage of circumstances to promote one's position and for self-gain, is high. Therefore, masculinity influences the probability that an individual will act opportunistically (Doney et al., 1998). Such self-serving behaviour is less likely to occur in feminine societies as it is incompatible with the dominant value system i.e., cooperation and moral integrity. Whereas lenders from highly masculine societies are likely to seize the opportunity to extract rents from borrowers' patents. This extraction, we believe, is in the form of higher loan costs to innovative firms. Feminine lenders offer socio-emotional support (translating into economic support) whereas masculine lenders exploit the borrower's competitive advantage.

Individuals from masculine societies have a competitive nature and do not shy away from rivalry, they are supposed to be assertive and 'tough' (Hofstede, 2010). Evidence suggests that masculinity within organisations is also highly correlated with other dysfunctional dogmas such as ruthless competition, showing no weakness and more controversial practices (Berdahl et al., 2018). Therefore, we posit that lenders from highly masculine societies are less likely to value the protection that comes with a patent as they are not 'afraid' of competition or confrontation and thus, do not pass on the 'saving' to borrowers that stem from having this protection mechanism i.e., less chance of future dispute over intellectual property (IP), security with market position and so on.

Parallel to above, studies have shown that masculinity has been linked to overconfidence (Ferris et al., 2013; Jakobsson et al., 2013; Yang and Zhu, 2016). This overconfidence may manifest itself in the decision making and threat assessment of masculine lenders, for example less weight placed on the protection from a patent. Furthermore, Doney et al. (1998) puts forward the idea that unpredictable behaviour may be accepted and even expected in masculine societies. If unpredictable behaviour is expected, a masculine lender may be less likely to value a protection mechanism.

Applying this to the banking sector, it would not be unreasonable to expect that a CEO from a masculine society would respond to the innovation of a borrowing firm in the opposite way, to

[27] Masculine cultures have high regard for super achievers (Kale and Barnes, 1992; Hofstede, 2010).

that of a CEO from a more feminine society (i.e., the protection from a patent is valued and helps to avoid future conflict regarding invention).

Based on the above discussion, we posit CEOs from masculine societies are less likely to value the security that comes with a patented innovation but rather exploit the borrower's competitive advantage through higher loan costs. This approach also aligns with the material success masculine CEOs strive for. Hence, we state our third hypothesis (H3) as follows:

H3: Banks led by CEOs that trace their origin to more masculine societies have a higher propensity to extract rents from firms with patented innovation by increasing the cost of loans.

Bank CEO Uncertainty Avoidance and Innovation

Uncertainty avoidance is the degree to which the members of a society exhibit anxiety and feel uncomfortable when encountering ambiguity and future uncertainty (Hofstede, 2001; Hofstede, 2010). Uncertainty avoidance does not necessarily mean risk avoidance. However, it does address risk preference, risk perception and a reliance on risk-reducing strategies (Doney et al., 1998). Those from high uncertainty avoidant societies have a low tolerance for unstructured and unpredictable circumstances, which determines the extent that uncertainty is lessened and what mechanisms are developed alleviate this anxiety i.e. adopting strict codes of behaviour, establishing rules, and rejecting divergent ideologies and actions (Singh, 1990). Contrastingly, those from low uncertainty avoidant societies have less anxiety and find deviance from the norm is more palatable. Members of such societies believe that rules should only be in place where necessary and if they do not work they should be abandoned or altered (Hofstede Insights, 2021). "Extreme ambiguity creates intolerable anxiety. Every human society has developed ways to alleviate this anxiety. These ways belong to the domains of technology, law, and religion. Technology, from the most primitive to the most advanced, helps people to avoid uncertainties caused by nature. Laws and rules try to prevent uncertainties in the behaviour of other people" (Hofstede, 2010, pp. 201-202).

There is strong evidence to suggest that the characteristics of individuals originating from high uncertainty avoidant societies also manifest themselves in the banking industry. Managers originating from such societies tend to be more conservative, prudent and endeavour to reduce their exposure to future uncertainty and display a stronger preference for predictable returns (Fidrmuc and Jacob, 2010; Zheng et al., 2012; Li et al., 2013). Evidence has shown that there is a significant increase in operating performance in the years following an R&D increase (Eberhart et al., 2008) and investment in innovation leads to higher future earnings (Ali et al., 2008). This means the future firm performance is more predictable and thus, less ambiguous.

As a result, a firm with a patent is likely to be highly valued by an uncertainty avoidant lender and will reduce the cost of loans to reflect the eased concern surrounding the future of the borrower.

In the same vein, the tangibility of a granted patent provides a greater sense of security to an uncertainty avoidant lender, compared to an abstract concept. Chava et al. (2017) find that with patent protection, intellectual property (IP) acquires a measure of asset tangibility and lenders take this into account when pricing loans. The practical implications of this tangibility should not be overlooked; in the event a firm's intellectual property (IP) is protected by a patent, it can be sold off in the event of default allowing the patent to be used as collateral (Hochberg et al., 2014; Chava et al., 2017; Mann, 2018). These factors should therefore be conducive of more favourable loan terms. Hence, firms with significant innovative activity (proxied by patents) are more likely to benefit from lower loan costs as this 'security' is highly valued by an uncertainty avoidant lender.

Furthermore, uncertainty avoidant lenders have a low tolerance for unknown situation and are therefore likely to value the patenting activities of borrowing firms, as patents act as a safety mechanism, provide protection for a fixed period and as a result, reduce future ambiguity. Therefore, such a device, enables a level of predictability in the borrowers' behaviour and thus reducing a CEOs anxiety regarding the future. Hence, CEOs from high uncertainty avoidant societies rewarded borrowers with lower loan costs in exchange for higher protection mechanisms that are governed by strict regulations and rules.

It has been documented that uncertainty avoidance may have a positive effect on innovation, where technological innovation is a mechanism used to help such societies maintain order (Efrat, 2014) and minimise ambiguity by planning which could facilitate innovation in return (Nakata and Sivakumar, 1996). Such planning and order will be highly valued by an uncertainty avoidant lender as this behaviour aligns with their own conservativism i.e., the anxiety surrounding "what is different is dangerous" is less daunting when planned and controlled for.

The final argument we put forward is concerned with a concept named 'identification-based trust' which forms on the basis of common values (Doney et al., 1998). Patents can enhance the 'trust' a lender puts in a borrower and helps to alleviate uncertainty as a borrower has taken measures to protect themselves, which means they also value security, predictability, and dislike competition. This builds trust between the two parties due to their shared values and beliefs. Trustors (i.e. lenders) assume that trustees (i.e. borrowers) exhibit 'trust-like' behaviour where shared characteristics make them more trustworthy (Husted, 1989). As these individuals (i.e. borrowers) are 'self-interest-seeking', and want to achieve positive net present value results, they are likely to refrain from opportunistic or deviant behaviour, making them more predictable (Doney et al., 1998) which is valued by an uncertainty avoidant lender.

Based on the above arguments, we posit that banks led by CEOs originating from high uncertainty avoidant societies will strive to maintain a high level of certainty in their lending operations. We state our fourth and final hypothesis (H4) as follows:

H4: Banks led by CEOs that trace their origin to more uncertainty avoidant societies have a higher propensity to reward firms, with patented innovation, by lowering the cost of loans.

4.3 Data and Methods

We construct a sample of syndicated loans matched with innovation data, loan, firm, bank, and CEO characteristics to test our hypotheses outlined above. Our final sample consists of 12,281 loans, 1,574 innovating firms (borrowers), 51 banks (lenders), 94 bank CEOs across 14 countries.[28] The detailed description on how this was collated is outlined in the forthcoming sections.

4.3.1 Loan Data

We source U.S. syndicate loan data from the DealScan database maintained by the Loan Pricing Corporation (LPC) for the period between 1992-2017. This provides comprehensive information on loan deal characteristics such as amount, maturity, spread, price, covenants, and other key features. Following previous literature that utilises loan-level data (Schenone, 2010; Bharath et al., 2011; Prilmeier, 2017), we focus on the syndicated lending market which allows us to identify past lending interactions between the lead lender and borrowing firm. Our sample begins in 1992 as this is the earliest year available from the Execucomp database and is required to match bank CEOs with the corresponding loan data.

Traditionally, the lead (lender/arranger/bank) plays the most important role within the syndicate deal. Hence, for the purpose of our study, we are particularly interested in the lead bank as it is the primary point of contact for the borrower and acts as an intermediary between the borrower and participant lenders (Ivashina, 2009; Prilmeier, 2017). The identification of a

[28] The countries of origin of the CEO surnames are France, Germany, Greece, Hungary, Ireland, Israel, Italy, Netherlands, Poland, Serbia, Sweden, the United Kingdom, Canada, and the United States. We assign the United States as country of origin in a few cases when a surname is absent from the immigration records and the Origins Info Ltd database (commercial vendor) came back with a U.S. origin. Our results are unchanged when these cases are excluded.

single lead is the building block required to capture the interaction of agents in our empirical analysis. Where the lead bank is clearly stated or where the loan facilities contain one lender, we classify such banks as the lead banks (Sufi, 2007). In the absence of explicit information, we follow previous studies to identify the main lender of each syndicated loan. Specifically, we follow the ranking hierarchy provided by Chakraborty et al. (2018). In most of our sample we are able to identify the lead arranger when the lender is denoted as "Admin Agent" as opposed to "Participant" within the DealScan database. This method allows us to eliminate the possibility of misclassifying a simple participant as a lead bank but play in fact a small role in the syndicate deal. This is particularly important as the participants with a minor role in the syndicate loan, is less likely to determine the loan characteristics, whereas the lead lender has the majority control over the process.

Following this method, we can identify the lead bank for >95% of the raw sample. For the remaining observations we are unable to identify a lead bank since; (i) data is missing with no lender information available or (ii) multiple leads identified with no explicit information to characterise the relationship to the borrower. As our sample contains multiple loan facilities to the same borrowing firm and year, we treat each loan facility as a unique observation as they may comprise of different loan features such as size, purpose and maturity (Hasan et al., 2017). As standard in the literature, we exclude loans to financial companies (SIC between 6000-6999) and utility firms (SIC 4900-4949) as these industries are subject to stricter regulatory requirements, the conditions of granting loans differ from the remaining firms in the sample.

4.3.2 Bank and Firm Data

Once we have identified the lead bank, we are able to merge the loan data from Dealscan with the lender characteristics from Compustat Bank Fundamentals. To do so, we follow the methodology provided by Schwert (2018) and use the lender link table.[29] This contains DealScan lender names matched to the Compustat GVKEYs and merger and acquisition (M&A) details. However, the table only provides information up to 2012 therefore, we verify the existing table as well as identifying and update this information to capture M&A activity that occurred during our sample period using data from the FED, media articles and news events. It is imperative to keep track as acquired banks no longer exist in the DealScan database once it has become a subsidiary of the surviving bank. To illustrate this, take First Chicago NBD Corp which was acquired by Bank One in 1998. Bank One was subsequently acquired by JP Morgan in 2004

[29] This table is available on https://sites.google.com/site/mwschwert/.

thus, both becoming a subsidiary of said bank. To avoid any survivorship bias, we include firms that did not survive the full period of our study. Post-M&A the acquiring bank inherits the information obtained by the acquired bank and therefore the relationship with the borrower. Naturally, post-M&A, the acquiring bank inherits the acquired bank's information on borrowers and, therefore, the lending information with these firms (Schenone, 2010; Prilmeier, 2017).

Next, we match loan data to the borrowing firm's characteristics that we plan to use as control variables in our empirical analysis. This is achieved through the DealScan-Compustat link developed by Chava and Roberts (2008). This matching table allows us to use the DealScan database's information, such as borrowing firms' names and unique identifiers, to match them to borrowers' financial characteristics from the Compustat database. The updated link contains matches until the end of 2017, the end of our sample period.

4.3.3 Bank CEOs Cultural Heritage

One of the most central components of our study lies in determining the cultural heritage of the lenders' CEO. We use four methods to verify our findings. We use Execucomp to obtain governance data including the first and last name of all bank CEOs. Our sample begins in 1992 as this is the earliest available date on the database. We are easily able to merge this information with our previously collected data using the year and bank GVKEY.

First, we manually check each name for any errors in the database. The spelling of certain names, particularly those with accents, have missing characters. In addition, the database does not provide information on the previous family names of CEOs. This is especially relevant to the female CEOs who no longer carry their maiden name. We then use a variety of sources including obituaries, news articles, biographies, and state digital archives of marriage certificates to determine the maiden names. We record any information found during the investigation regarding the background of the CEO i.e., family origin or immigration details. However, as this information is not available for all CEOs hence, we use alternative methods to determine their country of origin.

Second, we use Forebears (forebears.io), a genealogical database that gives the initial direction of the country of origin. Third, we verify our initial findings with the 1940 United States Federal Census and cross-reference this with immigration and travel records, specifically the New York, Passenger and Crew Lists (including Castle Garden and Ellis Island) between 1820-1957.[30] Finally, we verify our sample using Origins Info Ltd, a recognised commercial entity of name

[30] This census is no longer subject to the "72-Year Rule" of U.S. confidentiality regulations.

classification services that utilises sources such as the American Dictionary of Family name. This system utilises the idea that CEOs with the surnames Wu or Cheng are likely of Chinese ethnicity, those with surnames Nocella or Terracciano of Italian ethnicity, those with surnames such as Papademetriou of Greek ethnicity and so on. The use of surnames to infer country of origin is well established in the literature and has been used in such cultural studies (Kerr and Lincoln, 2010; Hegde and Tumlinson, 2014; Pan et al., 2015; Gompers et al., 2016; Liu, 2016).

While these sources provide comprehensive information regarding the origin of surnames and, to some extent, eliminate the possibility of discrepancies, we acknowledge that CEOs could have mixed ancestry. Therefore, it is harder to identify the origin. However, empirical evidence suggests that less than 15% of bank CEOs have mixed ancestry in the U.S.(Nguyen et al., 2018). Furthermore, existing literature suggests that cross-cultural marriages were not common amongst immigrants in the 20th century and presence of endogamy was strong during this period (Pagnini and Morgan, 1990).

After tracing the origin of the bank CEOs' surnames, we use the cultural dimensions developed by Hofstede (2010) to assign a four scores to each CEO. Each score (dimension) has a 0-100 scale, these are Power Distance (PDI), Individualism (INV), Masculinity (MAS) and Uncertainty Avoidance (UAI). This is commonly used method in the literature, used to quantify cultural characteristics.[31]

4.3.4 Measures of Innovation

To create our measures of innovation, we begin by using the patent application and citation data from Kogan et al. (2017).[32] The dataset provided by Kogan, Papanikolaou, Seru, and Stoffman (2017; hereafter, KPSS), has been used in existing empirical studies (Cohen et al., 2016; Ellis et al., 2019; Huang and Yuan, 2019).[33] This contains detailed information on patents granted by the U.S. Patent and Trademark Office (USPTO) between 1926 to 2019. It includes patent number, number of citations received by each patent, the value of the patent (real and nominal), issue date and filing date of patent application and the CRSP "permno" and "permco" identifiers. The database contains two-time placers for each patent: its application date (filing

[31] We aggregate historical countries to their modern-day counterparts and group smaller nationalities into larger groups. For example, Bavarian and Prussian that both fall under German origins and United Kingdom includes those that identified as British, English, Scottish and Welsh. This is necessary procedure to assign the cultural characteristics to each bank CEO.

[32] We thank Leonid Kogan, Amit Seru, Noah Stoffman and Dimitris Papanikolaou for providing the patent and citation data.

[33] Data available from: GitHub - KPSS2017/Technological-Innovation-Resource-Allocation-and-Growth-Extended-Data: This repository provides the extended data(till 2019) following Kogan, L., Papanikolaou, D., Seru, A. and Stoffman, N., QJE 2017

date) and grant date (issue date). We follow Hirshleifer et al. (2013) and choose the grant date as the effective date of each patent to prevent any potential look-ahead bias.[34]

For firms with no patent information from the KPSS dataset, we set the patent and citation counts to zero (Huang and Yuan, 2019). As explained in the literature, there are two truncation problems associated with the data. This problem arises due to the historical 2-year lag between the patent application and the grant date. This gives rise to the first truncation issue where patents have been applied for but not yet granted and thus, are not observed in the data (Dass et al., 2017). The second truncation issue stems from citations where patents continue to garner citations for long periods of time (Ellis et al., 2019).[35] To address the truncation problem associated with data, we follow (Hall et al., 2001; Hall et al., 2005; Lerner and Seru, 2017) and adjust patent numbers using the empirical application grant distribution and the citation numbers. For example, about 60% of patents in the data are granted within 3 years, so we can weight the patent count in 2016 upward by a factor of 1.6 (100/60) to account for some 2016 patents applied for but not yet granted. To adjust our citations, we follow the time fixed effect adjustment proposed in Hall et al. (2001); Lerner and Seru (2017).[36] The fixed effects approach for adjusting citations relies on the re-scaling the citation data about a patent population during a certain period expressed as a ratio. Based on the example provided in Hall et al. (2001), this approach treats a patent that received 11 citations and belongs to a group in which the average patent received 10 citations, as equivalent to a patent that had received 22 citations but belongs to a group in which the average was 20. Hence, the two patents would now be comparable in ratio form of 1.1. Similarly, such patents would be inferior compared to a patent that received 3 citations but belonged to a group where the average was 1.

However, to alleviate any concerns with regards to methodologies adopted to adjust for the truncation, we implement other measures of innovation that are not affected by this issue such as dollar value of patents. More details are provided in the forthcoming sections. Innovating firms often self-cite their existing patent however, we address this issue by using a number of alternative methods of capturing firm innovation that does not utilise citation data.

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[34] If we chose the filing date as the effective date, it may have skewed the results as the patent may not necessarily have granted in the time period of our sample. By using grant date, we are better able to assess the response of banks (i.e., reward vs. exploitation) to firms that have secured patents. In the subsequent sections we use both the lagged (T-1) and contemporary (grant date) version in baseline analysis and robustness checks and yield similar and significant results.

[35] Though we observe citations only through 2017.

[36] This methodology for adjusting citations does not require tech class but rather adopts a time fixed effect approach where the annual heterogenous component is corrected by dividing the number of citations by each firm with the average number of citations received by patent cohorts in the same year. As highlighted above, we do not use the application date of the patent but rather, the grant date as our time placer.

We measure innovation using four main variables as standard in the literature which include: Innovation Efficiency of Patents (IE_Patents), Innovation Efficiency of Citations (IE_Citations), Patents and Citations. In further tests, we also use Patents/Employee and a market value-based proxy, Patent Dollar Value, (Hirshleifer et al., 2013; Acharya et al., 2014; Kogan et al., 2017; Huang and Yuan, 2019). We also use an alternative measure of Innovation Efficiency of citations based on the methodology provided by Deng et al. (1999) to adjust patent citations. Variable definitions are available in Table 1. In our main models, we use t-1 i.e., the lagged innovation measure is used; one year before the loan inception.

$$IE_{Patents} = \frac{Adjusted\ Patents}{(R\&D_{i,t-2}+0.8*R\&D_{i,t-3}+0.6*R\&D_{i,t-4}+0.4*R\&D_{i,t-5}+0.2*R\&D_{i,t-6})} \quad (1)$$

$$IE_{Citations} = \frac{Adjusted\ Citations}{(R\&D_{i,t-3}+R\&D_{i,t-4}+R\&D_{i,t-5}+R\&D_{i,t-6}+R\&D_{i,t-7})} \quad (2)$$

Once we have adjusted our patents and citations, we follow the methodology in Hirshleifer et al. (2013). The denominator in equation 1 is firm i's R&D expenses in the year ending t – 2, and so on. The R&D expenses in this innovation efficiency measure is based upon the expenses over the preceding five years, assuming a 20% annual depreciation. As standard, we set missing R&D to zero in computing the denominator. Furthermore, we allow a two-year gap between R&D capital and patents granted as, on average, it takes two years for the USPTO to grant a patent from the application date (Hall et al., 2001). The denominator in equation 2 follows similar rationale, where patents granted in year t–1 would correspond to R&D expenses incurred in year t–3.

4.4 Empirical Findings

4.4.1 Regression Specification

To test our hypotheses, we use the following multivariate linear regression equation:

$$Loan\ Spread_t = a + \beta_{1(Innovation)t-1} + \beta_{2(CEO\ Cultural\ Heritage)t} + \beta_{3(Innovation\ t-1\ *\ CEO\ Cultural\ Heritage\ t)} + Firm\ Controls_{t-1} + Bank\ Controls_{t-1} + CEO\ Controls_t + Loan\ Controls_t + Set\ of\ Fixed\ Effects + \varepsilon \quad (3)$$

We investigate whether the cultural origin of the lenders' CEO influences the relationship between borrower innovation and the cost of bank loans. Following existing studies on the determinants of bank loans' cost, we use the loan spread as our dependent variable. Specifically, the "all-in-spread drawn" (AISD), which is the loan interest payment in basis points above

LIBOR plus the annual fee for each loan that a firm obtains (Hagendorff et al., 2019; Delis et al., 2020). In equation (3), we are particularly interested in the coefficient $\beta 3$. Our models include the interaction terms between the innovation measures and the four key cultural dimensions of Hofstede (2010); power distance index (PDI), individualism (INV), masculinity (MAS) and uncertainty avoidance (UAI). In line with the literature, we introduce each cultural dimension separately in our initial analysis (Chui and Kwok, 2008; Zheng et al., 2012; El Ghoul and Zheng, 2016). We take these steps due to the cross correlation of the cultural dimensions (Mihet, 2013).

To reduce the potential for omitted variable bias, we use a wide range of loan-level characteristics that may influence loan spreads. As standard in the literature, we control for loan size and loan maturity (Santos and Winton, 2008; Chakraborty et al., 2018; Schwert, 2018). Furthermore, we account for the syndicate size by accounting for the total number of lenders that participated in the loan (Schwert, 2018). We also use three dummy variables that indicate if a loan is secured by collateral, or the presence of loan covenants or is subject to performance pricing. We also include loan type and loan purpose fixed effects, as stated below.

Next, we control for bank and CEO characteristics. We use the natural logarithm of total assets as a measure of the lenders' size. To capture the lead bank's capitalization, we include a key Basel III regulatory measure calculated as the ratio of tier-1 (core) capital to total risk-weighted assets. This is the core funding source relative to the level of risk-weighted assets used to determine a bank's capital adequacy. We also include provisions (for loans and asset losses) to total assets. The use of provisions to assets captures the quality of a bank's assets and serves as a proxy for bank risk profile. With regards to bank CEO controls, we use their respective compensation incentives. Specifically, Vega and Delta, which capture risk and performance incentives, respectively. We source data on the CEO incentives from the Execucomp database.

We control for several characteristics of the borrowing firms. We use the natural logarithm of firm total assets as proxy for size. We include ROA as our profitability indicator. Firm liquidity is captured by dividing total current assets by the total current liabilities and firm tangibility by the ratio of net property, plant, and equipment to total assets. Altman's Z-score is used as a risk measure, computed as 1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales/total assets. Moreover, we capture two lender-borrower relationship variables including geographic distance as the proximity between lenders and borrowers reduces information asymmetries which has loan pricing implications (Hollander and Verriest, 2016) and lastly, a dummy binary variable with taking the value of one if the borrower had taken a loan from a bank in the last 5 years and zero otherwise (Bharath et al., 2011).

Our multi-level dataset allows us to utilise several fixed effects to further alleviate concerns of omitted variable bias. These include borrower fixed effects, the presence of a credit rating, the S&P quality of rating, lead lender fixed effects, loan type, loan purpose, and time fixed effects (year and month). We utilise fixed effects models as this provided an efficient way to remove omitted variable bias by measuring variations within banks, firms, and other groups across time. This is of particular importance for the purpose of our study due to the number of elements we analyse over the 25-year period. We follow related papers (Hagendorff et al., 2019) when designing our model specification. However, we note that whilst we use fixed effects in our regressions, this is not considered a true fixed effect model. This is because, as Delis et al. (2017) posit each loan profile is unique and with its own unique characteristics (i.e., spread, covenants, duration etc.) and is not repeated overtime. Hence, this is not considered a true panel, as the same loan is not repeated over time. In essence, each loan is treated as a unique observation.

The sample of loan facilities is essentially, a cross-section of loans across banks and firms. We include the data for variables according to the timing noted in equation 3. We use high dimensional fixed effects for the key actors (banks and firms). As a result, this yields large R-squared values. We note that that the time dimension is not an issue, as the loan deals are not repeated in time as each loan is treated as a unique observation (as previously stated). Like Delis et al. (2017), we do not use a true panel dataset for firms and banks, in the sense that loan facilities are not repeated. Therefore, the elements affecting bank lending is already captured by the loan-level controls and the bank- and firm-related fixed effects.

Moreover, we recognise that the loan purpose could stem from a number of different reasons therefore, we have used loan purpose fixed effects to mitigate to some extent the affect the reason/purpose a company is obtaining the loan, which effects loan pricing. We follow prior studies that have utilised loan purpose to mitigate this concern (Schwert, 2018). From a theoretical basis when lenders evaluate borrowers, in order to give them a loan or not, they evaluate potential borrowers on a long series of observable characteristics that could influence information asymmetry. For example, patenting activity reduces information asymmetry; borrowers with higher innovation capability, benefit from lower loan spreads and better non-price loan terms as patenting activities reveal favourable private information. This is a factor that could affect firm performance, risk (credit worthiness) and information asymmetry. Observable characteristics such as innovation are tangible factors that could affect performance and information asymmetry, hence, is something that banks will evaluate when lending, as previous literature shown (Francis et al., 2012).

We are interested in innovation from the perspective of a lender and follow the approach highlighted in the literature, which finds that borrowers with higher innovation capability (captured by patents) enjoy the benefit of more favourable loan terms as these activities reveal positive private information and signal promising future success (Francis et al., 2012; Hoffmann and Kleimeier, 2021). The role of innovation in this case, is that it provides overall more desirable lending conditions.

More specifically observed innovation (i.e., innovation which has been completed and patented) could affect lending in the following ways: the first is through a decrease in information asymmetry. The process of obtaining a patent requires a high level of disclosure of detailed information about the output of a firm's innovation effort to the USPTO. Although banks can have access to such private information on borrowers, it is unlikely that banks have the level of expertise to assess the originality and the usefulness of a firm's innovation output. Furthermore, even in the case that banks have experts to evaluate borrowing firms' innovation effort, this would imply significant screening and monitoring costs. A patent granted by the USPTO confirms that a firm's innovation effort has produced an original and commercially useful output. Patents are also traded in the secondary market, and a market value is assigned to them. In this sense, patent protection enables firms' innovation output to acquire tangible asset properties (Chava et al., 2017). This could further decrease information asymmetry and, consequently, screening and monitoring costs.

Secondly, observed innovation observed innovation (i.e., innovation which has been completed and patented) could increase firm performance, decrease default risk and improve the predictability of future firm performance. Patented innovation, in particular, is linked to decreased default risk, increased firm value, and improved future operating performance, valuation, and returns (Eberhart et al., 2008; Matolcsy and Wyatt, 2008; Hirshleifer et al., 2013; Hsu et al., 2014). Even in the case that a firm runs into financial difficulties, it can take advantage of the fact that patents can be sold off in the secondary market to raise cash (Hochberg et al., 2014; Chava et al., 2017; Mann, 2018). Therefore, banks might appreciate these potential effects of innovation and feel more certain about their predictions of borrowers' cash flows during the loan repayment period.

Lastly, observed innovation (i.e., innovation which has been completed and patented) borrowing firms by preventing competitors from replicating their innovation outputs without permission. Such a safety mechanism stems from the fact that a patent denotes that the exclusive property right of innovation belongs to the inventor (USPTO, 2018). Hence, patented innovation provides some form of shielding from competition in technology, which increases the chances of a firm's survival and success (Eisdorfer and Hsu, 2011). Therefore, banks are likely to appreciate this protection stemming from patented innovation.

As described above, there are solid theoretical grounds to support an association between firms' patented innovation and loan pricing. We are not investigating the CEOs appetite for innovation, but rather how CEOs from different cultural backgrounds value (respond to) firms that have innovated, having already solidified a patent. We follow, Hirshleifer et al. (2013) and capture the granted patents as a fraction of research and development expenses over the preceding five years. For example, some CEOs are more willing to lend to firms that have already innovated (ex-post) rather than those who want to innovate (which entails a different risk profile).

We are also aware that demand and supply factors may be influenced by the economic conditions of the market (state of the economy). Since our research is contained within a single country namely, the U.S., to account for all possible economic conditions we use year fixed effects (this wipes out all yearly economic shocks, that is common to all firms and banks). Supply conditions are also determined by bank characteristics i.e., risk-taking of the bank, for this reason we control for bank characteristics such as Capital Tier 1 ratio and also control for bank fixed effects in our baseline models. We also control for time-variant loan supply conditions using Bank*Year fixed effects in panel A of Table 5a and 5b, which account for and saturate the model from any time-varying changes in lead bank (supply-side) behaviour (Delis et al., 2019). Furthermore, CEO cultural heritage could affect loan supply for example, banks that led by high uncertainty avoidant CEOS could shy away from innovating firms, for this reason we use CEO fixed effects that mitigates, to some extent this issue (as culture is time-invariant). However, we are still able to identify the interaction effect even though the individual cultural heritage variable is wiped out. Whereas its interaction with the variables of interest i.e., innovation, are time variant and therefore survive (are not wiped out). The demand factors relate mostly to borrower characteristics hence, we use several firm characteristics as controls and also, use firm fixed effects to account for firm unobserved characteristics. This is consistent with previous literature that controls for demand and supply conditions in the loan market (Hagendorff et al., 2019; Delis et al., 2016).

The U.S. has a competitive banking landscape, with borrowers having ample choice in potential lenders for example, we have 53 banks in our sample. However, the choice of banks may become narrower depending on loan supply conditions. For example, Mi and Han (2020) show that syndicated loan prices are positively associated with the concentration of lead arranger's markets. The competitive landscape of banks plays a significant role in this case. A firm (borrower) has greater bargaining power over banks (lenders) if bank competition is high (as other banks may try lure new customers through lower loan prices). Hence, competition can affect the pricing strategies of banks. Therefore, this is another important reason why we use year fixed effects as this can absorb the competitive conditions (concentration) in the banking sector. This is particularly useful in our analysis as our study is focused on a single country context (i.e., the United States) therefore, concentration only has yearly variation.

However, there are measures of bank market power that are estimated at the bank level such as the Lerner index (Elzinga and Mills, 2011). For this reason, we account for bank market power measures that vary by bank and year, by using bank*year fixed effects to eliminate these variations. This is because measure of bank market power is bank specific and change by year (i.e., Lerner index). In using such fixed effects, we are able to absorb the effect of these competitive/bank market power effects.

Finally, all monetary variables are deflated to 1992 dollars and winsorized at the 1st and 99th percentiles. To mitigate simultaneity, we use lagged values of the bank and firm-level control variables, whereas the bank CEO controls remain at time (t) as CEOs are in constant communication with the lending team and thus, have contemporaneous information during at loan inception. Hagendorff et al. (2019) provide evidence to show that CEOs set the broad parameters on loans and highlight that regular communications with the syndication team contribute to ensure that the lending parameters set by the CEO are followed closely. We also cluster the standard errors at the bank level as each bank gives multiple loans. However, in our further tests, we run the same baseline models using alternative levels of clustering.

The summary statistics and correlation matrix are provided in Table 2 and 3, respectively. The summary statistics are similar to other studies that utilise similar innovation variables (Hirshleifer et al., 2013; Bernile et al., 2018; Ellis et al., 2019) and to those of lending literature (Bharath et al., 2011; López-Espinosa et al., 2017). We note that the Hofstede's cultural heritage variables yield similar statistics to those in the studies of Nguyen et al. (2018) and Hagendorff et al. (2019).

4.4.2 Baseline Results

We employ the baseline equation (3) to test the hypotheses that lenders' CEOs' cultural heritage values could condition the relationship between firm innovation and the cost of bank loans (i.e., hypotheses 1-4). Results from these regressions are in Tables 4a and 4b, patent-based measures (IE_Patents and Patents) and citation-based measures (IE_Citations and Citations), respectively. The interaction effects models provide findings that support our hypotheses (models 1-8 of Table 4a and 4b).

In model 9 and 10 of Table 4a and 4b, we find the individual effect of firm innovation (captured by patent and citation-based measures) to have a negative effect on loan spreads, suggesting that greater firm innovation decreases the cost of lending to innovating firms. These results are as expected and very much in line with existing innovation literature. There is a common theme that is found in the literature, highlighting the ability for innovative firms to secure more favourable loan terms.

Firstly, patenting activity reduces information asymmetry. Francis et al. (2012) provides evidence to show that borrowers with higher innovation capability, benefit from lower loan spreads and better non-price loan terms as patenting activities reveal favourable private information. Financial intermediaries want to avoid the duplication of monitoring activities and negotiate contracts with innovators to induce optimal efforts and efficient monitoring processes. Higher-quality monitoring, in turn, allows lenders to offer better terms to entrepreneurs (De la Fuente and Marin, 1996). Secondly, patented innovation increases predictability of returns and borrower performance. Eberhart et al. (2008) find that there is a substantial increase in performance in the years following an R&D increase and document a negative relation between R&D increases and default risk. Patenting activity can also signal success (i.e., positive outcomes) of borrowers' innovation processes (Hoffmann and Kleimeier, 2021). This increase in performance and firm stability enables future firm performance to be less volatile. Thirdly, patents used as collateral. The tangibility of a patent provides a greater sense of security to a lender. Chava et al. (2017) find that with patent protection, intellectual property (IP) acquires a measure of asset tangibility and lenders take this into account when pricing loans protected by a patent. Patents can be sold off in the event of default allowing the patent to be used as collateral (Hochberg et al., 2014; Chava et al., 2017; Mann, 2018). These factors should, therefore, be conducive of more favourable loan spreads. Lastly, patented innovation protects the borrower by preventing competitors replicating it without permission. Such a 'safety' mechanism means the property right belongs to the inventor (United States Patent and Trademark Office, 2018) and in our case, the borrower of the loan. Therefore, a lender is likely to provide lower cost of bank loans in exchange for this protection.

Innovation Efficiency of Patents & Number of Patents

In models 1 and 5, we show that the interaction between power distance (PDI) and patent-based innovation measures are negative and significant at the 1%. In the same models, the individual effect of our patent-based innovation measures on bank loans' cost is positive and significant at the 5% level and 1% level, respectively. This result provides supporting evidence to hypothesis H1. It indicates that banks led by CEOs that trace their origins to more power distant societies value firm patents and would therefore, reduce loan costs. This reduction reflects the value such CEOs place on borrower predictability and superior status of borrowers that stems from secured patents granted. This finding is consistent with the notion that individuals from power distant societies highly regard predictable behaviour (Hofstede, 1984;

Doney et al., 1998), value the status, and competitive advantage (Brem et al., 2016; Harrigan and DiGuardo, 2017) that patents create.

On the contrary, models 2 and 6 show that the interaction between individualism (INV) and patent-based innovation measures are positive and significant at the 1% level. In the same models, the individual effect of our patent-based innovation measures on bank loans' cost is negative and significant at the 1% level. This finding provides supporting evidence to hypothesis H2. The result is consistent with the notion that banks led by CEOs from more individualistic societies are likely to be display more overconfidence, overoptimism, adversarial attributes, and focus on self-gain (Chui et al., 2010; Antonczyk and Salzmann, 2014; Breuer et al., 2014). Therefore, such lenders more likely to exploit the superior market position of the borrowing firm and are less likely to value the protection of a patent. Furthermore, their cognitive bias (overconfidence) and adversarial characteristics make them less likely to shy away from conflicts whereas a collectivist lender will place a higher value on the avoidance of conflict, which a patent offers.

Moreover, banks led by CEOs originating from more masculine cultures are similar to those of individualism and consistent with hypothesis H3. In models 3 and 7, we find that interaction between masculinity (MAS) and patent-based innovation measures are positive. In the same models, the individual effect of our patent-based innovation measures on bank loans' cost is negative. In models 7 the results are significant at the 1% level. This finding is consistent with the notion that masculinity has an association with opportunistic behaviour, competitive nature, and materialism (Hofstede, 2001; Ogden, 2003; Berdahl et al., 2018). Therefore, lenders with CEOs from highly masculine societies are less likely to value the security that comes with a patented innovation but rather exploit the borrower's competitive advantage of the borrower, through higher loan costs. This approach also aligns with the material success masculine CEOs strive for.

In contrast to the dimensions of individualism and masculinity, and as expected, we find uncertainty avoidance to follow the findings of power distance. In models 4 and 8, we find that the interaction between uncertainty avoidance (UAI) and patent-based innovation measures are negative and significant at the 5% and 1% level, respectively. In the same models, the individual effect of our patent-based innovation measures on bank loans' cost are positive. This result provides supporting evidence to hypothesis H4. This implies that banks led by CEOs that trace their origins to more uncertainty avoidant societies value the tangibility, protection and predictability of a borrower having secured a patent. This reduces the danger of IP theft and. Based on this, banks led by CEOs originating from high uncertainty avoidant societies will reflect this in their lending operations and in turn, provide lower loan costs. This is consistent with prior literature; managers originating from such societies tend to be more conservative, prudent and endeavour to reduce their exposure to future uncertainty and display a stronger preference for predictable returns (Fidrmuc and Jacob, 2010; Zheng et al., 2012; Li et al., 2013). Hence, rewarding firms with patented innovation.

Innovation Efficiency of Citations & Number of Citations

In models 1 and 5 of Table 4b, we show that the interaction between power distance (PDI) and citation-based innovation measures are negative and significant at the 1%. In the same models, the individual effect of our citation-based innovation measures on bank loans' cost is positive and significant at the 1% level and 10% level, respectively. This result provides supporting evidence to hypothesis H1. This indicates that banks led by CEOs that trace their origins to more power distant societies would value the citations a patent yield and would therefore, reduce loan costs. This reduction reflects the value such CEOs place on borrower predictability and superior status of borrowers that stems from successful highly cited patents.

Models 2 and 6 of Table 4b, show that the interaction between individualism (INV) and citation-based innovation measures are positive and significant at the 5% and 1% level, respectively. In the same models, the individual effect of our citation-based innovation measures on bank loans' cost is negative and significant at the 5% and 1% level, respectively. This finding provides supporting evidence to hypothesis H2. The result is consistent with the notion that banks led by CEOs from more individualistic societies are likely to be display more overconfidence and focus on self-gain. Therefore, such lenders more likely to exploit the superior market position of the borrowing firm, where patents are highly cited.

Similarly, banks led by CEOs originating from more masculine cultures also follow the same logic as individualistic CEOs and we find them to be consistent with hypothesis H3. In models 3 and 7 of Table 4b, we find that interaction between masculinity (MAS) and citation-based innovation measures are positive. In the same models, the individual effect of our citation-based innovation measures on bank loans' cost is negative. In models 7 the results are significant at the 1% level. This finding is consistent with the notion that masculinity has an association with opportunistic behaviour and competitive tendencies. Therefore, lenders with CEOs from highly masculine societies are more likely to take advantage and exploit the competitiveness of their borrower by increasing the cost of loans.

In models 4 and 8 of Table 4b, we find that the interaction between uncertainty avoidance (UAI) and citation-based innovation measures are negative and significant at the 10% and 1% level, respectively. In the same models, the individual effect of our citation-based innovation measures on bank loans' cost are positive. This result provides supporting evidence to hypothesis H4.

This implies that banks led by CEOs that trace their origins to more uncertainty avoidant societies value the tangibility and predictability of a borrower having secured a patent with many citations. Hence, banks led by CEOs originating from high uncertainty avoidant societies will reflect this in their pricing of loans. In essence, the higher number of citations, means the patent is valuable which provides the borrower with assurance.

Economic Effects

These results regarding our hypotheses are also economically significant. To illustrate, we use the individualism dimension (hypothesis H2). The INV score of a bank led by a CEO of Greek heritage is 35 and a bank led by a CEO of Polish origin is 60. The differences in individualism between Greece and Poland is 25, this being similar to one standard deviation increase in individualism (22.65). The results of model 2 of Table 4a imply that if individualism of the lead bank's CEO were zero (i.e., a totally collectivist bank CEO), then one standard deviation (0.345) increase in innovation efficiency of patents leads to a reduction in bank loans' cost by 16.35 basis points (-47.38*0.345). Given the average loan size in the sample is $ 258.68 million and the average loan maturity is 3.67 years (44.02866 months). Hence, a 16.35 basis points reduction translates into around $1.552 million (258.68 *3.67*0.001635) in loan interest savings for the average loan, ceteris paribus. However, the interaction term between innovation efficiency (IE_Patents) and individualism (INV) implies that with each point of increase in the individualism of a bank's CEO (in the 0-100 scale) these savings decrease by around $19,000. One point of increase in the individualism of the bank CEOs increases the coefficient of innovation efficiency to -46.814 (-47.38 + 0.566). Thus, the decrease in basis points due to a one standard deviation increase in innovation efficiency falls to 16.151 (-46.814 * 0.345). Hence, interest savings in this case are $1.533 million (258.68*3.67*0.001615). This represents approximately a $19,000 decrease in interest savings with each point of increase in individualism.

Thus, borrowers' savings due to a one stand deviation increase in the innovation efficiency of patents with a bank led by a CEO with Greek heritage is around $887,000 (1.552 – (35*0.019)). These savings drop (increase in costs) to around $412,000 (1.552 – (60*(0.019)) for a standard deviation increase in innovation efficiency of patents with a bank led by a CEO of Polish heritage, ceteris paribus. These differences in the borrower's loan interest costs are economically meaningful. We find similarly significant economic effects for the remaining three dimensions of bank CEOs' cultural heritage (uncertainty avoidance, masculinity, and power distance).[37] We

[37] In the case of power distance, the coefficient of model 1 of Table 4a shows that a one standard deviation (0.345) increase in innovation efficiency of patents leads to a 13.15 basis point (38.12*0.345) increase in loan interest costs when power distance is zero. This translates into around $1.249m ($258.68m*3.67 years*0.001315) additional interest costs for the average loan. However, the coefficient of the interaction term between power distance and

also observe parallel results using other measure of innovation.[38] By way of comparison, Hagendorff et al. (2019) show that a one standard deviation-increase in lender trust implies a reduction in interest expenses of about $500,000 based on their sample. In addition, Lin et al. (2018) show that a one standard deviation increase in private benefits of control increases the average loan costs in their sample by around $178,600.

4.5 Main Robustness Tests

4.5.1 Omitted Variable Bias

Although we employ several control variables and several type of fixed effects and controls in our baseline estimations, omitted variable issues still remain. We attempt to further attenuate these concerns by employing additional fixed effects. Such issues could stem from CEO attributes, bank, or governance characteristics that could influence the lending policy of the bank. Furthermore, in syndicate lending, a single bank usually grants several loans in a year. Hence, one could use several additional types of fixed effects to control for omitted variables. Our estimations are shown in Tables 5a and 5b (patent-based and citation-based measures, respectively), across three panels A-C.

In our baseline models, we use bank fixed effects, which enables us to control for all time-invariant bank characteristics. In addition, we control for bank size, risk, and capitalization. Still, there are several other time-variant factors could influence bank lending policies. For example, Srivastav and Hagendorff (2016) find that corporate governance structures such as the effectiveness of bank boards, the CEO compensation structure, and the risk management systems employed, greatly shape bank outcomes. Furthermore, banks independent boards could moderate and control the bank policies CEOs impose (Vallascas et al., 2017). To alleviate concerns regarding time-variant omitted variables at the bank-level, we employ models that

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(PDI) and innovation efficiency of patents (IE_Patents) denotes that each point of increase in the power distance index of a bank CEO is associated with a $33,000 decrease in these additional loan interest costs. Contrastingly, in the case of masculinity, the coefficient of model 3 of Table 4a shows a 24.27 basis point interest savings for the average loan in the case of a one standard deviation increase in innovation efficiency of patents when masculinity is zero. The interaction between masculinity (MAS) and innovation efficiency of patents (IE_Patents) implies that each point of increase in the masculinity index of a bank CEO leads to a $37,000 decrease in these interest savings. For uncertainty avoidance, the coefficient of model 4 of Table 4a shows that a one standard deviation (0.345) increase in innovation efficiency of patents leads to a 6.32 basis point (18.31*0.345) increase in loan interest costs when uncertainty avoidance is zero. This translates into around $0.600m ($258.68m*3.67years*0.000632) additional interest costs for the average loan. However, the coefficient of the interaction term between uncertainty avoidance (UAI) and innovation efficiency of patents (IE_Patents) denotes that each point of increase in the uncertainty avoidance index of a bank CEO is associated with a $15,000 decrease in these additional loan interest costs.

[38] We observe similar economic results using our other three main measures of innovation (Patents, IE_Citations, and Citations) however, for brevity we do not report the results. These are available upon request.

comprise bank*year fixed effects. This type of fixed effects controls for all time-variant bank characteristics. The results from these specifications are shown in Panel A of Table 5a and Table 5b. This shows that the interactions between our measures of innovation and the CEO cultural heritage characteristics are consistent with our baseline results and with all four of our hypotheses (i.e., H1-H4), whilst maintaining significance. We note that the individual effect of cultural characteristics from these estimations are omitted due to collinearity with the bank-year fixed effects used in these models.

We also consider that omitted variable issues may be associated with the bank CEO. Certain time-invariant characteristics such as religion (Adhikari and Agrawal, 2016), gender (Skała and Weill, 2018) or birth period (Malmendier and Nagel, 2011), that could be correlated with bank CEOs' cultural heritage can influence a bank CEOs decision-making. Furthermore, other time-invariant characteristics could influence bank CEOs' preferences and, in turn, the policies and operating practices. To address such concerns, we carry out estimations that use bank CEO fixed effects. This type of specification also controls for an additional important time-invariant bank CEO characteristic such as the generation of immigration that each bank CEO belongs to (e.g., first-generation immigrant versus second-generation immigrant). Our results are shown Panel B of Tables 5a and 5b. These models' findings show that we obtain significant interactions between our innovation measures (both patent-based and citation-based) and three of the cultural heritage characteristics (power distance, individualism, and uncertainty avoidance). Hence, the results from the specifications that use CEO fixed effects continue to provide support to hypotheses H1, H2, and H4, respectively. The CEO fixed effects cause the individual effect of the cultural heritage characteristics to become omitted from Panel B's models due to collinearity.

Finally, we expand upon the aforementioned specification. Bui et al. (2021) provide evidence which suggests that the bank CEOs with a high risk-taking attitude (by their option exercising behavior) help facilitate firm technological progress through lending practices. Whilst in our baseline models, we control for compensation incentives (Vega and Delta), we further attempt to account for all other potential time-variant bank CEO characteristics we include CEO*year fixed effects to further lessen the omitted variable bias concerns that could influence loan costs. The results are available in Panel C of Tables 5a and 5b. We find similar results to our previous models where all interactions between innovation measures and cultural heritage (excluding model 3 in Table 5a) are highly significant and aligned with our hypotheses. We note that the individual effects of the cultural heritage attributes are omitted from the models due to collinearity with the bank CEO*year fixed effects. Overall, the tests that control omitted variables bias at the bank-year, bank CEO, and CEO-year provide consistent evidence supporting hypotheses.

4.5.2 Instrumental Variable Estimations

The bank CEOs' cultural heritage could be associated with other features of their country of origin. These characteristics may include traits that correlate with the bank CEOs' cultural heritage. Therefore, we must consider that our estimations may be subject to bias. Therefore, to mitigate such concerns, we estimate the relationship between CEO cultural heritage and loan spread within an instrumental variable framework. We use a variety of instruments from areas including geography, genetics, linguistics, and sociology (Kashima and Kashima, 1998; Hall and Jones, 1999; Spolaore and Wacziarg, 2009; Nash and Patel, 2019).

Power Distance Instrument: Latitude

Geographic instruments provide a valuable determinant for causality and is praised for its exogenous nature (Rodrik et al., 2004), therefore to instrument power distance (PDI), we use a country-level measure of distance to the equator captured by latitude. Hofstede (1984) and Shackleton and Ali (1990) show that power distance displays a negative and significant correlation with distance from the equator. The inverse relationship between power distance and latitude implies that differences in power distance are deep-rooted in countries closer to the equator (Hofstede, 2001). Thus, the distance from the equator as an instrument for power distance can satisfy the inclusion restriction as it is correlated with the endogenous variable. However, it is unclear how the distance from the equator of the ancestral country of origin of bank CEOs could directly influence bank loan spread (i.e., the exclusion restriction). To construct this instrument (LAT), we source the latitude of a country's capital from google maps. Distance from the equator line, captured by latitude, has been used as an instrument for culture in previous studies (Hall and Jones, 1999; Acemoglu et al., 2014).

Individualism Instrument: Pronouns

To instrument individualism, we use an indicator variable of 1 if the nation's prominent language allows the omission of first-person singular pronouns in an independent clause (such as "I" in English), 0 if the language does not. Nash and Patel (2019) show that many studies use linguistic-based instruments for individualism. Specifically, Kashima and Kashima (1998) posit that a language's use of certain pronouns reflects a culture's conception of the prominence of the individual where the potential omission of subject-indexing pronouns (i.e. "pronoun drop") reflect the perspective on the relation between the individual and the group. They conclude that a language's rules regarding "pronoun drop" capture whether a culture places more focus on the uniqueness of the individual or on the significance of the group. As such, "pronoun drop". This should, therefore, be related to a culture's degree of individualism versus collectivism and hence, the negative relationship between pronoun drop and individualism ought to satisfy the inclusion restriction. Furthermore, it is not an unreasonable assumption that that linguistics in the country of origin of a bank's CEO could indirectly affect the cost of bank loans (i.e., the exclusion restriction). The language aspect would, therefore, only affect bank loans through the cultural origin of said CEO rather than the bank loans directly.[39]

Masculinity Instrument: Height

Existing studies have identified a link between a country's climate and its masculinity score (Hofstede, 2001; Tang and Koveos, 2008) whereby warmer climates contribute to the formation of masculine cultures. We expand upon this and use height as our instrument, which is also associated with climate.[40] As with other species, human variation in body size appears to be strongly influenced by climatic factors (Leonard and Katzmarzyk, 2010). Their morphology analysis confirms an inverse relationship between body mass and temperature. One of the "ecogeographical rules" explain that body mass increases with decreasing temperatures (Bergmann, 1847). Therefore, if larger animals are better suited to colder environments and vice versa, we expect height to have a negative relationship with masculinity (i.e., the inclusion restriction).[41] Furthermore, it is not likely that the height in the ancestral country of origin of a bank CEO could directly affect bank loans' prices (i.e., the exclusion restriction). The masculinity dimension has not received the same amount of attention in the behavioural finance literature as its counterparts, for this reason, instrumenting for the masculinity dimension has proven difficult as there are limited candidates for its instruments. We use average male height in centimetres as our chosen instrument.[42]

Uncertainty Avoidance Instrument: Genetic Distance from Greece

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[39] In additional unreported results, we also include pathogens as an instrument for individualism. A country-level measure of the relative presence of pathogens in the local ecology regarding nine specific pathogens harmful to human health (Fincher et al., 2008). Therefore, in a society more at risk of contagious diseases, a collectivist culture serves an antipathogen defence function which has evolved to mitigate exposure to new pathogens (Nash and Patel, 2019). Hence, we also include historic prevalence of pathogens in our model to instrument individualism and find our results consistent with those shown in Table 6a and 6b.

[40] Data available from: NCD Risk Fact Collaboration http://ncdrisc.org/data-downloads-height.html

[41] In our unreported results, we regress average male height in centimetres on masculinity index and find a negative relationship as expected.

[42] We have exhausted many of the instruments currently available in the literature including equator, average temperature, FST-Japan and % of women in the workforce. We also test our own instruments we have created including: FST Distance Hungary (highest masculinity score in our sample), average female salary per country, and LGBTQ rights country score using both the continuous and binary forms of the variables.

Nash and Patel (2019) show that many studies use religion-based instruments for uncertainty avoidance (UAI). However, we avoid such instruments because bank CEOs' religious traits could directly affect bank policies.[43] Instead, for our final instrument, we adopt a similar approach to that of Spolaore and Wacziarg (2009). Often used as an instrument for the masculinity dimension (El Ghoul and Zheng, 2016; Nash and Patel, 2019), FST distance from Japan is a measure of genetic distance based on estimated differences in alleles between the population of a given country and the population of Japan. Japan is selected as the reference country as ranks highest in Masculinity. However, to instrument for uncertainty avoidance, we use the same genetic distance data and create FST distance from Greece as it scores the highest on the uncertainty avoidance dimension at 100. Higher values of FST-Greece indicate greater genetic difference between the two countries and should therefore, have a negative association with the uncertainty avoidance dimension. Similarly, in our unreported regression results, we also find a negative and highly significant relationship between the two variables (i.e., the inclusion restriction). In addition, it is unlikely that the genetic distance between Greece and the country of origin of a bank's CEO could directly affect the cost of bank loans (i.e., the exclusion restriction).[44]

In our two-stage least squares instrument variable estimations (2SLS-IV), we multiply the above variables with our innovation measures to create additional instruments for the interaction terms. The results from these 2SLS-IV models are available in Table 6a (patent-based measures) and Table 6b (citation-based measures). In each of our first-stage results, we find support that these instruments are appropriate both in terms of coefficient sign and significance in almost all cases. The second-stage results for Table 6a (patent-based measures) provide support to the baseline findings with respect to power distance (H1), individualism (H2), and uncertainty

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[43] As an additional test, we utilise a sociological instrument defined as the percentage of a nation's population that follow hierarchical religions where Catholicism, Islam and Orthodox religions are considered to be the most hierarchical (Lopez-de-Silanes et al., 1997). Religion plays an important role in creating and defining moral circles for example, many religions penalise marriages with nonadherent members (Hofstede, 2010). This demonstrates the restraint exhibited by such individuals who are bound by these moral parameters and are pressured to abstain from uncertain, ambiguous, and stressful situations. Hofstede predicted that such differences in cultural norms stemmed from a society's religious practices. Hence, we expect that cultures with a high hierarchical religion percentage will have a positive relationship with the uncertainty avoidance. In the second stage of our 2SLS-IV model, we include CEO fixed effects to wipe out time-invariant effects such as religion of the bank CEO. We find our result remain consistent and significant as those shown in Table 6a and 6b.

[44] As a third and final test for uncertainty avoidance, we use the Innovation Performance Index expressed as patents per million population granted per country i.e., innovation intensity provided by the Economist Intelligence Unit (EIU). We posit that those from low uncertainty avoidant cultures prefer tasks with uncertain outcomes that require problem solving. In addition, innovators in these societies feel independent of rules (Hofstede, 2001) and are therefore more likely to embrace the freedom associated with creativity at work. It can be argued that innovation is associated with the willingness to place oneself in undefined creative space. Therefore, we propose innovation can also serve as an instrument for uncertainty avoidance and expect a negative relationship i.e., cultures high in uncertainty avoidance will be less innovating/inventive i.e., negatively correlated. We find our result remain consistent and significant as those shown in Table 6a and 6b.

avoidance (H4) as the interactions between our innovation measures and cultural heritage attributes are significant at least to a 5% level (see model 1, 2, 4, 5, 6, and 8). The second-stage results for Table 6b (citation-based measures) provide support to the baseline findings for power distance (H1), individualism (H2), and uncertainty avoidance (H4) as the interactions between our innovation measures and cultural heritage attributes are significant at least to a 5% level (see model 5, 6, and 8). We find less evidence regarding innovation efficiency of citations in models 1-4. Overall, we find out strongest results stem from the power distant, individualism, uncertainty avoidant cultural dimensions and generally, greater significance with regards to patent-based measures. In later sections, we test alternative innovation measures i.e., dollar value of patents.

4.5.3 Matched Sample Regressions

We perform estimations using matched samples from propensity score matching to address two potential selection bias issues. The first potential issue we have identified is between the firm and bank CEO, where more innovative firms approach banks with CEOs of a certain culture. For example, if innovation is considered risky, such firms may approach lenders where the CEO are more risk tolerant. For instance, individualistic CEOs tend to show traits of overoptimism and overconfidence (Antonczyk and Salzmann, 2014) that may make them more likely to underestimate, or even willing, to take on higher risks. The second potential matching issue we have identified, is between the bank and CEO where banks choose CEOs of a certain culture that align with the bank future strategy. For example, if a bank decided to change their lending policy towards innovative firms, they may hire a CEO of a culture with characteristics that make them gravitate towards innovation. These selection biases could influence our results. We utilise the propensity score matching (PSM) methodology to address, to some extent, potential matching issues. However, we recognise that this may be a source of concern as the matching criteria operates on unobservable factors that are not addressed by this methodology.

Following (Bharath et al., 2011), we adopt this approach to help address these concerns. This method is widely used in empirical research to match treated and non-treated (control) groups based on observed characteristics such as size, to eliminate relevant differences. To address the first potential selection bias, we begin the matching process with a logit regression of a high cultural dimension i.e., individualism (value of one for above the sample median of INV and zero otherwise) on our innovation measures and several borrowing firm characteristics and loan controls. We follow a similar approach to that of (Bharath et al., 2011) and include in this first step of the PSM process: firm size, ROA, z-score, liquidity, tangibility, industry dummies at the two-digit SIC level, a dummy for rated firms and S&P credit rating quality dummies. We also control for loan size, loan maturity, loan type and purpose. Next, we perform a one-to-one nearest neighbour match with the propensity scores we obtain from the previous logit estimation. To ensure no significant differences in terms of the borrowing firm characteristics between the treated and the control samples, we match with no replacement and a maximum tolerated difference between matched subjects using a 10% caliper as used in Hasan et al. (2014). Finally, we estimate the baseline models using only the treatment and control loans (i.e., the matched samples).

We depict the results from these tests in Panel A of Table 7a (patent-based measures) and 8b (citation-bases measures). The results show the interactions between our innovation measures and all four bank CEOs' cultural heritage attributes are consistent with the sign directions in the baseline models. However, we find the interactions in model 1,2,5, and 6 of Table 7a provide the greatest support to H1 and H2 as they are highly significant at least to a 5% level in both cases. This is also the case for model 1 and 5 in Table 7b.

As highlighted above, another selection bias could stem from the possibility that some banks could be selecting CEOs with certain cultural heritage traits to implement a specific lending policy. For example, banks that want to gear their business model more towards patent-based innovation lending, may select a CEO with cultural attributes that could facilitate this. Several studies show that cultural characteristics are often associated with different risk-taking behaviour (Chui et al., 2010; Li et al., 2013; Mourouzidou-Damtsa et al., 2019). Therefore, it is not unreasonable to expect a high power distant and high uncertainty avoidant CEO may have a preference towards lending to firms with secured patents. To address this second potential selection bias, we follow a similar method as before, beginning the matching process with a logit regression of a high cultural dimension i.e., power distance (value of one for above the sample median of PDI and zero otherwise) on several bank characteristics and loan controls. We create matched samples of similar loan profiles in terms of bank characteristics that differ regarding the banks' CEOs' cultural heritage. Then, we carry out the baseline estimations for these matched samples.

The results from these regressions are shown in Panel B of Table 7a and 7b. These tests show that the interaction terms between our innovation measures and the bank CEOs' cultural attributes are significant in many cases and carry the expected signs in all cases however, the most compelling evidence to support our hypothesis (H2) stems from individualism in Table 7a and 7b, models 2 and 5.

4.5.4 Alternative Measure of Innovation

To further examine the robustness of the baseline findings, we use three alternative measures of innovation. We first employ a measure of innovation based on the natural logarithm of one plus the number of annual number of patents granted per 1,000 firm employees (ln(1+Patents/Employees)). The results from this exercise are shown in models 1-4 of Table 8. The interaction between the patents per employees and bank CEOs' four cultural heritage characteristics are mostly significant and carry the expected sign. These results provide support to thee of our four hypotheses H1 (power distance), H2 (individualism), and H4 (uncertainty avoidance) with a high level of significance in most cases. We then use a measure of innovation based on the natural logarithm of one plus the number of annual dollar value of patents granted deflated to 1992 dollars (ln(1+Dollar Value)). The results from this exercise are shown in models 5-8 of Table 8. We show that interaction between the dollar value of the patent and bank CEOs' four cultural heritage characteristics are significant and carry the expected sign. These results provide support to all four of our hypotheses H1-H4. Finally, we use an alternative measure of innovation output and follow the numerator of Deng et al. (1999) defined as the total number of citations received in a given year (t) by patents granted in the previous five years (t – 1 to t – 5), divided by the average number of citations occurring in year (t) to all patents granted in the five years prior. This is a similar innovation measure to that in our baseline and that used in (Hirshleifer et al., 2013) however, adopting a different method for adjusting citations. The results from this exercise are shown in models 9-12 of Table 8. The interaction between this innovation measure and bank CEOs' four cultural heritage characteristics are mostly significant and carry the expected sign. These results provide support to all three of our four hypotheses H1 (power distance), H2 (individualism), and H4 (uncertainty avoidance) significant at 1% level.

4.6 Further Robustness Tests

4.6.1 Alternative Measures of Culture

We use the Hofstede dimensions as our primary proxy for culture. In our main results we aim to answer whether banks led by CEOs that trace their origin to more power distant (H1), and uncertainty avoidant (H4) societies have a higher propensity to reward firms, with patented innovation, by lowering the cost of loans and contrastingly, whether banks led by CEOs that trace their origin to more individualistic (H2), and masculine (H3) societies have a higher propensity to extract rents from firms with patented innovation by increasing the cost of loans. However, to enhance our study and provide further validity to our initial results, we employ alternative measures of culture. Similar to Hofstede, Schwartz constructs a unique cultural profile for each country that is used to develop orientations that subscribe to each of the dimensions. These are egalitarianism, autonomy, harmony and embeddedness (Schwartz, 2007). The Schwartz cultural framework is widely accepted and used in empirical literature (Licht et al., 2007; Breuer et al., 2014; El Ghoul and Zheng, 2016). We replace the four main Hofstede dimensions with those that are analogous in Schwartz framework

Egalitarian cultures aim to encourage members of their society to view each other as moral equals who share basic interests as humans (Schwartz, 2014). This is the opposite to the power distance dimension where members of society that power is distributed unequally and often maintain hierarchical structures (Hofstede, 2010). Autonomous cultures encourage individuals to follow affectively positive experiences for themselves and to pursue their own directions independently (Schwartz, 2014). Autonomy is the closest to the core idea of individualism (Schwartz, 1994) where individuals are expected to take care of themselves and freedom to adopt their own approach is considered important (Hofstede, 2001). Harmonious cultures place emphasis on integrating oneself into the social and natural world by appreciating surroundings rather than challenging or exploiting them for self-gain (Schwartz, 2014). Societies that value harmony are therefore more likely to adopt a tender approach to life much like feminine cultures in Hofstede's cultural framework. In contrast, those from masculine cultures are more likely to exploit an opportunity for advancement and self-gain. Masculine cultures are more performance oriented and adopt a tougher approach (Hofstede, 2010). Finally, embedded cultures seek to maintain the status quo and place cultural emphasis on tradition (Schwartz, 2009). This dimension is comparable to Hofstede's uncertainty avoidance where there is a belief in such societies that something different, change or ambiguity is perceived as dangerous (Hofstede, 2010).

We display our results in Table 9a and 9b. Overall, we find that the sign directions are consistent with our hypotheses H1-H4. In Table 9a (patent-based measures) the interaction between our innovation measure and alternative cultural dimensions are significant in models 1,2,5, and 6. These give further credence to our hypotheses H1 and H2. In models 1-8 of Table 9b (citation-based measures), we find that the sign directions are generally as we anticipated, with the exclusion of model 7 however, this is not significant. The interaction between our innovation measure and alternative cultural dimensions are significant in models 1 and 5 of Table 9b. This result supports our baseline findings regarding hypothesis H1.

4.6.2 Controlling for all Dimensions and Horserace Model

In our baseline estimations, we have used one cultural heritage variable per model, that corresponds with the respective interaction (i.e., innovation measure*culture). This is a common approach in similar studies as the cultural dimensions exhibit high correlation. In one of the main robustness tests (see Panel C of Table 5a and 5b), we use models with CEO fixed effects, which controls for all the cultural heritage measures, which are time-invariant. However, we estimate models that comprise all the cultural heritage dimensions in the same models in a further test. The results from these specifications are available in Table 10a and 10b. The output from these estimations shows a consistent sign direction with our baseline findings. As before, the most compelling evidence and significant results come from models 1, 2, 4, 5, 6, and 8 in each table, that supports hypotheses H1, H2, and H4.

In an additional test, presented in Table 10c, we use a horserace model that comprises of the interactions of all cultural heritage attributes of bank CEOs with our innovation measures. In order to reduce the collinearity issues common in such tests, we replace the cultural heritage values with the residuals from regressions that use as dependent variable, a cultural heritage characteristic and as explanatory variables the rest of the three cultural heritage characteristics. For example, to obtain the residual for the power distance dimension, we use this as our dependent variable and run a regression using the remaining dimensions (individualism, masculinity, and uncertainty avoidance) as explanatory variables. Hence, the residuals we derive from these regressions proxy for the portion of each cultural heritage characteristic that is not explained by the remaining cultural heritage characteristics. The results from this horserace exercise are available in models 1-4 of Table 10c and are consistent with the baseline findings.

4.6.3 Alternative Clustering of Standard Errors

In our previous estimations, we cluster standard errors at the bank level. However, as each borrowing firm typically obtains more than one loan facility in the same year, there is a possibility the loan spread residual is also correlated with the borrowing firm. Such idiosyncrasies could exist among various levels therefore, we estimate our model using different clustering approaches to observe any material differences. Hence, in Panel A of Table 11a and 11b, we cluster the standard errors by both bank and borrowing firm. We also consider that the cultural heritage measures we use display variability at the CEO level. Hence, in Panel B of Table 11a and 11b, we cluster standard errors by bank CEO. We also estimate models where we cluster the standard errors by the ancestral country of origin of each bank CEO, available in Panel C of Table 11a and 11b. The results from these models are similar to the findings of our main analysis.

4.6.4 CEO Ancestral Origin Fixed Effects

It is possible that the cultural characteristics of a bank CEO are correlated with other prevalent characteristics in their ancestral country of origin. In our main analysis, we address this issue by firstly, re-estimating our models whilst including bank CEO fixed effects. Secondly, we implement an instrumental variable analysis, using instruments for the cultural heritage of bank CEOs. In our additional estimations, we include fixed effects for bank CEOs' ancestral country of origin. This allows us to control for all the characteristics of bank CEOs' ancestral country of origin, that may not have previously been accounted for. The results are provided in Table 12a and 12b. The individual effect of the cultural heritage characteristics is omitted from the estimations due to collinearity with the fixed effects of bank CEOs' ancestral country of origin. These models continue to support hypotheses H1, H2 and H4 with regards to power distance, individualism, and uncertainty avoidance, respectively.

4.6.5 Contemporaneous Measures

In our main models, we use t-1 i.e., the lagged innovation measure is used; one year before the loan inception to investigate how lenders respond to patents granted. However, we also use the contemporary innovation measures and use the grant date as the effective date of each patent and measure firm's innovation output in year t to each corresponding loan. In models 1-8 of Table 13a and 13b, we replicate the regression specification in equation 3 and find our results hold and remain significant.

4.6.6 Non-Price Loan Contract Terms

Finally, turning to Table 14a and 14b, to examine the conditioning effects of bank CEOs' cultural heritage on the association between innovation and the non-price loan contract terms we use dependent variable dummies, that indicate if a loan is secured by collateral (Panel A), and if a loan comprises covenants (Panel B). To do so, we utilise a probit regression model. We do not find strong result in the interactions of interest in these estimations. We find little evidence to support the influence of bank CEOs' cultural heritage on the association between innovation and the non-price loan contract terms based on the results in Panel A-B in Table 14a (patent-based measures). We find slightly stronger evidence in model 1 of Panel A-B in Table 14b (citation-based measures) and whilst this is significant, it is not consistent over both our citation-based innovation measures and are therefore, tentative in interpreting this result. However, this does confirm our findings that show that the conditioning effects of bank CEOs' cultural heritage on the association between innovation and the cost of bank loans are mainly evident in loan pricing rather than non-price terms which is consistent with prior literature (Kysucky and Norden, 2016).

4.7 Conclusion

In this paper, we explore how bank CEOs' cultural heritage shapes the nexus between firm innovation and the cost of bank loans in the U.S. syndicated loans market. Our most compelling results are from banks led by CEOs that trace their origin in more power distant, and uncertainty avoidant societies are more inclined to reduce the cost of borrowing to innovative firms (H1 and H4, respectively). In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to exploit the borrowing firm by charging higher loan costs (H2). The results that survive consistently all the numerous additional robustness tests, relate to power distance (H1) and individualism (H2). These findings are consistent with the view that certain cultural attributes affect the degree to which innovation is valued in the societal and business contexts and highlights the importance of considering lender culture when investigating factors influencing the cost of bank loans. Our analysis provides useful insight into executive preferences and how these implicate lending policies. The extant literature focuses mainly on how the borrowing firm characteristics effects the cost of bank loans. However, we show that it is also important to consider bank-level factors such as the culture of bank CEOs. Considering, that the majority of bank debt is the primary source of firm financing, borrowing firms should consider the driving factors behind CEO preferences, such as cultural characteristics that could drive the degree to which they can benefit economically through lower loan prices.

Table 1: Definitions

Variable	Definition	Data Source
A. Innovation Measures		
IE_Patents	We follow the innovation efficiency measure in Hirshleifer et al. (2013) where patent counts are scaled by cumulative R&D expense over the previous five years, assuming an annual depreciation rate of 20%. See equation (1).	KPSS Patent Database Compustat
IE_Citations	We follow the innovation efficiency measure following Hirshleifer et al. (2013) using adjusted patent citations (adjustment method provided by Lerner and Seru (2017)) over the previous five years, scaled by the sum of 5-year R&D expense. See equation (2).	KPSS Patent Database Compustat
Patents	The natural logarithm of one plus the number of patents (ln(1+Patents)).	KPSS Patent Database
Citations	The natural logarithm of one plus the number of citations (ln(1+Citations)).	KPSS Patent Database
Patents/Employee	The natural logarithm of one plus the number of annual number of patents granted per 1,000 firm employees (ln(1+Patents/Employees)).	KPSS Patent Database Compustat
Dollar Value	The natural logarithm of one plus the number of annual dollar value of patents granted deflated to 1992 dollars (ln(1+Dollar Value)).	KPSS Patent Database
IE_Citations_Alt	Our numerator is defined as the total number of citations received in a given year (t) by patents granted in the previous five years (t – 1 to t – 5), divided by the average number of citations occurring in year (t) to all patents granted in the five years prior scaled by the scaled by the sum of 5-year R&D expense.	Deng et al. (1999); Hirshleifer et al. (2013)
B. Cultural Heritage Measures		
Bank CEO Individualism (INV)	The degree to which a society is considered individualistic versus collectivist in terms of "I" and "We" in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Uncertainty Avoidance (UAI)	The degree to which society members feel uncomfortable with future uncertainty in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Masculinity (MAS)	The degree to which a society is considered masculine versus feminine in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Power Distance (PDI)	The degree to which a difference in power and status is accepted without justification in the CEOs' genealogical country of origin. The index has a 0 – 100 range.	Ancestry.com, Hofstede et al. (2010)
Bank CEO Autonomy	The extent to which a culture encourages individuals to follow affectively positive experiences for themselves and to pursue their own directions independently in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for individualism.	Ancestry.com, Schwartz (2007)
Bank CEO Embeddedness	The extent to which a culture seeks to maintain the status quo and places cultural emphasis on tradition in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for uncertainty avoidance.	Ancestry.com, Schwartz (2007)
Bank CEO Harmony	The extent to which a culture places emphasis on integrating oneself into the social and natural world by appreciating surroundings in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for masculinity.	Ancestry.com, Schwartz (2007)
Bank CEO Egalitarianism	The extent to which a culture aims to encourage members of their society to view each other as moral equals who share basic interests as humans in the CEOs' genealogical country of origin. This measure is used as an alternative proxy for power distance.	Ancestry.com, Schwartz (2007)
C. Firm Characteristics		
Firm Size	The natural logarithm of borrower total assets.	Compustat
Firm ROA	The net income divided by the total assets of the borrower.	Compustat
Firm Z-Score	Altman's Z-score is computed as (1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales)/total assets.	Compustat
Firm Liquidity	The total current assets divided by the total current liabilities.	Compustat
Firm Tangibility	The net property, plant and equipment divided by total assets.	Compustat
Distance	The natural logarithm of distance in miles between borrower and lender (parent) using zip code.	Compustat
Relationship Dummy (RELDUM)	A dummy variable that takes the value of one if a borrower has taken a loan from a bank in the last 5 years and zero otherwise.	DealScan

D. Bank & CEO Characteristics		
Bank Size	The natural logarithm of bank total assets.	Compustat Bank Fundamentals
Bank Tier-1 Capital Ratio	The ratio of tier-1 capital to total risk-weighted assets, a key measure of bank capitalization.	Compustat Bank Fundamentals
Bank Provisions for Loan Losses/Assets	Provisions for losses on loans divided by total assets.	Compustat Bank Fundamentals
Bank CEO Vega (Vega)	The change in the dollar value of the CEO's equity-based compensation for a 1% change in stock price volatility. We use the natural log of the variable.	Execucomp
Bank CEO Delta (Delta)	The change in the dollar value of the CEO's equity-based compensation for a 1% change in the stock price. We use the natural log of the variable.	Execucomp
E. Loan Characteristics		
All in Spread Draw (AISD)	The "all-in-spread drawn" (AISD) is the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained.	DealScan
Loan Size	The value of the loan in millions of dollars ($). In the estimations we use the natural log of the variable.	DealScan
Loan Maturity	The time in terms of months between the initiation of a loan and its maturity date. In the estimations we use the natural log of the variable.	DealScan
Syndicate Size	The number of lenders who participate in a loan.	DealScan
Secured	A dummy variable that equals one if the loan is secured and zero otherwise.	DealScan
Covenants	A dummy variable that equals one if a loan has a covenant and zero otherwise.	DealScan
Performance Pricing	Dummy equal to one if the loan has performance-pricing provisions, zero otherwise.	DealScan
F. Instruments		
Latitude (LAT)	A country-level measure of distance from the equator.	Google Maps & Hall and Jones (1999)
Pronoun (PRO)	An indicator variable of 1 if the country's prominent language allows the omission of first-person singular pronouns in an independent clause, 0 if not.	Kashima and Kashima (1998)
FST-Greece (GRE)	Measure of genetic distance based on estimated differences in alleles between the population of a given country and the population of Greece. Greece ranks highest in Uncertainty Avoidance.	Cavalli-Sforza et al. (1995); Spolaore and Wacziarg (2009)
Height (HIE)	The average over 18 male height in centimetres of each country measured in centimetres.	NCD Risk Factor Collaboration
G. Fixed Effects		
Firm	The unique borrower ID for each firm.	DealScan
Bank	The unique ID for each bank.	Compustat
Year	The loan initiation year.	DealScan
CEO	The unique ID each bank CEO	Execucomp
Month	The loan initiation month.	DealScan
Firm State	The state in which the borrowers' headquarters is located.	Compustat
Industry	The borrower's industry based on the standard industry classification code (SIC) – two digits.	DealScan
S&P Quality Rating	A dummy variable that indicates the S&P quality rating of the borrower.	DealScan
Rated	A binary variable that equals one if the borrower does not have a S&P quality rating and zero otherwise, also known as 'bank-dependent'.	DealScan
Loan Purpose	Dummy variables for the primary loan purpose i.e., refinance, working capital, takeover etc.	DealScan
Loan Type	Dummy variables for loan type. These involve primarily two types of loans, lines of credit and term loans.	DealScan

Table 2: Summary Statistics

Variable	N	Mean	Standard Deviation	P25	P50	P75
A. Innovation Measures						
IE_Patents	12,281	0.067	0.345	0.000	0.000	0.016
IE_Citations	12,281	0.045	0.190	0.000	0.000	0.002
Patents	12,281	0.776	1.438	0.000	0.000	1.099
Citations	12,281	0.706	1.411	0.000	0.000	0.673
B. Cultural Heritage Measures						
Bank CEO Power Distance (PDI)	12,281	42.15	15.03	35.00	35.00	60.00
Bank CEO Individualism (INV)	12,281	68.57	22.65	35.00	70.00	89.00
Bank CEO Masculinity (MAS)	12,281	62.06	9.21	57.00	66.00	66.00
Bank CEO Uncertainty Avoidance (UAI)	12,281	56.63	27.63	35.00	35.00	92.00
C. Firm Characteristics						
Distance	12,281	6.13	1.57	5.70	6.57	7.24
Relationship Dummy	12,281	0.77	0.42	1.00	1.00	1.00
Firm Size	12,281	6.76	1.64	5.64	6.80	7.86
Firm ROA	12,281	0.01	0.12	-0.01	0.03	0.07
Firm Z-Score	12,281	1.65	1.70	0.94	1.67	2.45
Firm Liquidity	12,281	0.40	0.22	0.22	0.39	0.55
Firm Tangibility	12,281	0.55	0.39	0.24	0.45	0.80
D. Bank & CEO Characteristics						
Bank CEO Vega (Vega)	12,281	4.87	5.95	4.38	6.12	6.67
Bank CEO Delta (Delta)	12,281	6.63	1.25	5.83	7.05	7.49
Bank Size	12,281	13.04	1.29	12.36	13.35	14.13
Bank Tier 1 Capital Ratio	12,281	9.91	2.28	8.22	8.70	12.30
Bank Provisions (Loan Losses)/Assets	12,281	0.00	0.00	0.00	0.00	0.01
E. Loan Characteristics						
All in Spread Draw (AISD)	12,281	206.10	120.78	125.00	200.00	275.00
Loan Size (in millions of $)	12,281	258.68	377.96	39.71	119.12	299.21
Loan Maturity (in months)	12,281	44.03	20.45	28.00	48.00	60.00
Syndicate Size	12,281	8.17	8.33	3.00	6.00	11.00
Secured (0/1)	12,281	0.60	0.49	0.00	1.00	1.00
Covenants (0/1)	12,281	0.71	0.45	0.00	1.00	1.00
Performance Pricing (0/1)	12,281	0.30	0.46	0.00	0.00	1.00

Table 2 represents the summary statistics for key variables in our sample data. We provide the mean, standard deviation, 25th percentile (P25), median (P50) and 75th percentile (P75). All variables are winsorized at the 1st and 99th percentiles, with the exception of culture and binary variables. We deflate monetary variables such as size (i.e., total assets) to 1992 U.S. dollars to account for the effects of inflation. To further reduce the impact of outliers, we use the natural logarithm of monetary variables unless stated otherwise i.e., firm, and bank size. Vega and Delta are stated in $000s. Cultural measures fall within a 1-100 scale. Definitions are provided in Table 1.

Table 3: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	AISD	1.00																										
2	IE_PAT	-0.05	1.00																									
3	IE_CITE	-0.05	0.33	1.00																								
4	PATENTS	-0.20	0.23	0.32	1.00																							
5	CITATIONS	-0.19	0.21	0.40	0.96	1.00																						
6	PDI	0.08	0.03	-0.02	0.06	0.06	1.00																					
7	INV	-0.05	-0.02	0.03	-0.08	-0.07	-0.81	1.00																				
8	MAS	-0.09	-0.04	-0.05	-0.05	-0.05	-0.60	0.48	1.00																			
9	UAI	0.03	0.02	-0.03	0.08	0.07	0.84	-0.93	-0.52	1.00																		
10	DISTANCE	0.06	-0.03	-0.03	-0.05	-0.04	0.03	-0.06	-0.03	0.03	1.00																	
11	REL DUMMY	0.01	0.00	-0.02	-0.01	-0.01	0.07	-0.11	-0.04	0.10	-0.03	1.00																
12	FSIZE	-0.33	-0.04	-0.04	0.38	0.35	0.01	-0.13	0.12	0.11	0.03	0.05	1.00															
13	FROA	-0.32	-0.13	-0.03	0.02	0.01	-0.01	-0.05	0.03	0.03	-0.01	0.00	0.20	1.00														
14	FZSCORE	-0.30	-0.04	-0.04	-0.04	-0.05	-0.03	0.02	0.04	-0.01	-0.01	-0.01	0.05	0.45	1.00													
15	FLIQUID	-0.03	0.08	0.11	0.12	0.12	0.00	0.06	-0.10	-0.04	-0.08	-0.02	-0.36	-0.05	0.30	1.00												
16	FTANG	-0.01	-0.02	-0.08	-0.09	-0.10	0.04	-0.04	-0.02	0.06	0.09	0.00	0.04	-0.07	-0.13	-0.38	1.00											
17	BSIZE	-0.09	-0.01	-0.08	0.08	0.06	0.12	-0.31	0.12	0.21	0.21	0.05	0.46	0.14	0.15	-0.27	0.06	1.00										
18	CAPT1	0.10	-0.01	-0.02	0.08	0.05	0.05	-0.37	0.06	0.26	0.03	0.16	0.23	0.02	-0.14	-0.08	-0.03	0.29	1.00									
19	PROV	0.14	0.05	0.02	-0.03	-0.02	0.06	-0.02	-0.05	0.06	0.03	-0.06	-0.13	-0.12	0.02	0.03	0.06	-0.03	-0.11	1.00								
20	LOANSIZE	-0.35	-0.05	-0.06	0.25	0.22	0.01	-0.13	0.13	0.11	0.03	0.06	0.79	0.18	0.10	-0.34	0.07	0.46	0.19	-0.14	1.00							
21	MATURITY	-0.04	-0.02	-0.06	-0.07	-0.08	0.01	-0.10	0.07	0.07	0.07	-0.06	0.18	0.14	0.07	-0.20	-0.01	0.28	0.14	-0.13	0.26	1.00						
22	SYNSIZE	-0.22	-0.02	-0.03	0.18	0.15	-0.03	0.02	0.10	-0.01	0.01	0.02	0.51	0.09	0.01	-0.24	0.00	0.24	0.02	-0.07	0.51	0.17	1.00					
23	SECURE	0.45	-0.01	-0.02	-0.23	-0.21	0.04	0.03	-0.06	-0.02	0.07	-0.02	-0.32	-0.22	-0.16	0.03	-0.03	-0.12	-0.08	0.05	-0.26	0.06	-0.13	1.00				
24	COVEN	0.07	0.01	0.02	-0.11	-0.10	0.02	0.10	-0.04	-0.06	-0.02	0.00	-0.24	-0.06	0.02	0.08	-0.03	-0.14	-0.26	0.10	-0.16	-0.06	0.04	0.26	1.00			
25	VEGA	-0.01	0.01	0.00	-0.01	0.01	0.19	-0.04	-0.11	0.15	-0.04	-0.05	-0.03	-0.02	0.03	0.01	0.03	-0.05	-0.31	0.06	-0.02	-0.05	0.03	0.04	0.11	1.00		
26	DELTA	-0.09	0.02	-0.03	0.07	0.06	0.59	-0.42	-0.23	0.55	0.09	0.04	0.17	0.05	0.05	-0.09	0.07	0.33	-0.15	-0.19	0.18	0.04	0.12	-0.01	0.03	0.24	1.00	
27	PERFPRICE	-0.21	-0.02	0.00	0.02	0.02	-0.02	0.03	0.04	-0.02	-0.02	-0.14	0.09	0.12	0.10	-0.03	-0.01	0.05	-0.08	0.00	0.15	0.19	0.17	-0.06	0.24	0.08	0.01	1.00

This table reports Pearson correlations coefficients for the main variables used in our baseline regressions. This allows us to see which pairs have the highest correlation. The abbreviations are as follows: All in Spread Drawn (AISD), Innovation Efficiency of Patents (IE_PAT), Innovation Efficiency of Citations (IE_CITE), Patents (PATENTS), Citations (CITATIONS), Power Distance (PDI), Individualism (INV), Masculinity (MAS), Uncertainty Avoidance (UAI), Distance (DISTANCE), Relationship Lending Dummy (REL DUMMY), Firm Size (FSIZE), Firm Return on Assets (FROA), Altman's Z-Score (FZSCORE), Firm Liquidity (FLIQUID), Firm Tangibility (FTANG), Bank Size (BSIZE), CapitalTier-1 Ratio (CAPT1), Bank Provisions/Assets (PROV), Loan Amount (LOANSIZE), Loan Maturity (MATURITY), Syndicate Size (SYNSIZE), Secured Indicator (SECURE) and Covenants Indicator (COVEN), Vega (VEGA), Delta (DELTA), and Performance Pricing (PERFPRICE). Table 1 includes full details on the definitions the above variables. However, caution must be taken to avoid over interpreting the results, as these are simple pair-wise correlations that do not control for the impact of bank, firm and loan characteristics. We used to the multivariate analysis where we examine the determinants of the loan spread, and the relationship between culture and firm innovation after controlling for key financial characteristics.

Table 4a: Baseline Estimations (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread	(9) Loan Spread	(10) Loan Spread
IE_Patents	38.12**	-47.38***	-70.35	18.31					-4.453	
	(17.39)	(10.97)	(47.05)	(14.60)					(7.822)	
IE_Patents*PDI	-0.997***									
	(0.327)									
IE_Patents*INV		0.566***								
		(0.180)								
IE_Patents*MAS			1.096							
			(0.828)							
IE_Patents*UAI				-0.464**						
				(0.176)						
Patents					6.502***	-6.820***	-31.86***	2.473		-2.082*
					(2.027)	(1.491)	(3.917)	(1.615)		(1.058)
Patents*PDI					-0.182***					
					(0.0258)					
Patents*INV						0.0853***				
						(0.0160)				
Patents*MAS							0.486***			
							(0.0656)			
Patents*UAI								-0.0647***		
								(0.0116)		
PDI	0.831***				0.893***					
	(0.170)				(0.167)					
INV		-0.437***				-0.478***				
		(0.123)				(0.129)				
MAS			-1.203**				-1.481***			
			(0.461)				(0.399)			
UAI				0.403***				0.433***		
				(0.116)				(0.119)		
Firm Size	-16.37***	-16.35***	-16.32***	-16.34***	-16.73***	-16.69***	-16.20***	-16.58***	-16.81***	-16.57***
	(3.405)	(3.499)	(3.387)	(3.505)	(3.599)	(3.586)	(3.639)	(3.668)	(3.212)	(3.240)
Firm ROA	-51.23***	-50.86***	-52.00***	-51.03***	-49.30***	-48.97***	-50.01***	-49.39***	-51.37***	-51.51***
	(15.07)	(14.68)	(15.13)	(14.70)	(15.71)	(15.17)	(15.73)	(15.32)	(15.02)	(15.09)
Firm Z-Score	-8.234*	-8.279*	-8.215*	-8.326*	-8.393*	-8.392*	-8.260*	-8.405*	-8.439*	-8.468*
	(4.285)	(4.268)	(4.298)	(4.269)	(4.353)	(4.324)	(4.305)	(4.316)	(4.301)	(4.318)
Firm Liquidity	-50.91***	-52.14***	-50.54***	-52.63***	-51.22***	-52.59***	-49.97***	-53.18***	-52.06***	-51.71***
	(10.83)	(11.11)	(10.95)	(11.15)	(10.77)	(11.09)	(10.90)	(11.06)	(11.43)	(11.44)
Firm Tangibility	-18.96	-19.76	-19.99*	-19.69	-20.26	-21.07*	-20.23	-20.69	-20.45*	-20.40*
	(12.05)	(11.95)	(11.76)	(12.05)	(12.70)	(12.29)	(12.34)	(12.50)	(11.52)	(11.49)
Distance	-0.605	-0.649	-0.569	-0.714	-0.630	-0.637	-0.741	-0.729	-1.038	-1.021
	(1.367)	(1.388)	(1.367)	(1.367)	(1.349)	(1.376)	(1.385)	(1.350)	(1.357)	(1.351)
Relationship Dummy	1.031	1.065	1.449	1.102	1.078	1.069	1.502	1.142	1.327	1.332

	(2.543)	(2.536)	(2.512)	(2.534)	(2.524)	(2.519)	(2.512)	(2.529)	(2.560)	(2.539)
Bank Size	-13.17	-23.45**	-18.85*	-25.64***	-13.14	-23.07**	-19.61*	-25.56***	-28.61***	-28.64***
	(10.51)	(10.06)	(10.12)	(8.913)	(10.46)	(10.20)	(10.02)	(8.936)	(9.392)	(9.359)
Bank Tier 1 Capital Ratio	-3.671	-3.646	-3.143	-3.335	-3.488	-3.500	-3.101	-3.210	-2.095	-2.101
	(2.712)	(2.652)	(2.629)	(2.536)	(2.758)	(2.702)	(2.704)	(2.586)	(2.293)	(2.287)
Bank Provisions (Loan Losses)/Assets	284.2	733.1	571.2	517.8	317.5	742.8	572.0	518.7	825.3	826.3
	(965.6)	(893.0)	(933.9)	(929.9)	(966.8)	(895.7)	(946.0)	(931.7)	(866.9)	(869.8)
Vega	0.0269	-0.0178	0.00345	-0.0986	0.0355	-0.00988	0.00946	-0.0973	-0.0339	-0.0280
	(0.165)	(0.146)	(0.168)	(0.121)	(0.163)	(0.144)	(0.166)	(0.119)	(0.179)	(0.178)
Delta	-7.484***	-3.832*	-4.232	-6.353**	-6.923***	-3.609	-3.833	-6.116**	-1.046	-1.095
	(2.315)	(2.202)	(2.817)	(2.911)	(2.293)	(2.158)	(2.724)	(2.870)	(2.832)	(2.804)
Loan Size	-7.802***	-7.839***	-7.764***	-7.886***	-7.749***	-7.801***	-7.697***	-7.852***	-7.823***	-7.809***
	(1.148)	(1.161)	(1.168)	(1.169)	(1.146)	(1.147)	(1.169)	(1.159)	(1.189)	(1.184)
Loan Maturity	-8.892***	-8.835***	-8.744***	-8.819***	-8.919***	-8.893***	-8.730***	-8.854***	-8.700***	-8.691***
	(1.925)	(1.953)	(1.989)	(1.950)	(1.935)	(1.954)	(1.982)	(1.959)	(1.950)	(1.934)
Syndicate Size	-0.323***	-0.315***	-0.340***	-0.315***	-0.327***	-0.316***	-0.350***	-0.316***	-0.357***	-0.357***
	(0.0914)	(0.0935)	(0.0918)	(0.0920)	(0.0918)	(0.0942)	(0.0911)	(0.0920)	(0.0913)	(0.0913)
Secured	30.26***	30.18***	29.91***	30.34***	30.46***	30.29***	29.99***	30.50***	29.94***	29.92***
	(4.682)	(4.716)	(4.671)	(4.721)	(4.642)	(4.681)	(4.556)	(4.688)	(4.716)	(4.738)
Covenants	1.673	1.909	1.753	1.944	1.798	2.034	1.828	2.037	1.682	1.678
	(4.370)	(4.510)	(4.405)	(4.515)	(4.285)	(4.454)	(4.343)	(4.450)	(4.346)	(4.397)
Performance Pricing	-8.670***	-8.690***	-8.554***	-8.759***	-8.622***	-8.628***	-8.635***	-8.702***	-8.636***	-8.667***
	(1.786)	(1.806)	(1.820)	(1.803)	(1.805)	(1.816)	(1.826)	(1.823)	(1.800)	(1.795)
Constant	641.4***	815.4***	796.2***	806.8***	636.7***	813.8***	821.4***	804.1***	824.3***	824.3***
	(135.2)	(132.1)	(121.2)	(120.4)	(134.4)	(132.9)	(120.8)	(119.8)	(134.7)	(134.1)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.745	0.746	0.746	0.746	0.746	0.746	0.744	0.744
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension (PDI, INV, MAS, and UAI) to our innovation proxies. We calculate IE_Patents as the patent counts are scaled by cumulative R&D expense over the previous five years, assuming an annual depreciation rate of 20%. Patents is calculated as ln(1+Patents) where patents have been adjusted for truncation. Regressions 1-8 include firm, bank, year, month, S&P quality rating, rating (bank-dependence), and loan type fixed effects. In model 9 and 10 we show the innovation variable without interactions to highlight the direct (negative) effect of innovation on loan pricing. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 4b: Baseline Estimations (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread	(9) Loan Spread	(10) Loan Spread
IE_Citations	35.72***	-44.42**	-40.58	5.765					-7.541*	
	(11.18)	(17.16)	(26.31)	(8.520)					(3.971)	
IE_Citations*PDI	-1.144***									
	(0.314)									
IE_Citations*INV		0.478**								
		(0.212)								
IE_Citations*MAS			0.562							
			(0.434)							
IE_Citations*UAI				-0.284*						
				(0.153)						
Citations					3.181*	-5.247***	-26.61***	-0.0935		-2.484**
					(1.603)	(1.560)	(4.258)	(1.399)		(0.952)
Citations*PDI					-0.124***					
					(0.0257)					
Citations*INV						0.0479***				
						(0.0154)				
Citations*MAS							0.393***			
							(0.0590)			
Citations*UAI								-0.0350***		
								(0.0120)		
PDI	0.816***				0.850***					
	(0.168)				(0.174)					
INV		-0.423***				-0.441***				
		(0.127)				(0.132)				
MAS			-1.125**				-1.389***			
			(0.438)				(0.399)			
UAI				0.386***				0.403***		
				(0.118)				(0.121)		
Firm Size	-16.27***	-16.22***	-16.33***	-16.27***	-16.40***	-16.22***	-16.06***	-16.20***	-16.87***	-16.49***
	(3.339)	(3.411)	(3.322)	(3.364)	(3.476)	(3.502)	(3.572)	(3.543)	(3.179)	(3.275)
Firm ROA	-51.64***	-50.90***	-52.64***	-51.23***	-49.68***	-49.74***	-50.29***	-50.10***	-51.53***	-51.31***
	(15.31)	(14.67)	(15.06)	(14.66)	(15.46)	(14.87)	(15.55)	(15.04)	(14.93)	(15.15)
Firm Z-Score	-8.281*	-8.328*	-8.240*	-8.358*	-8.407*	-8.413*	-8.271*	-8.420*	-8.424*	-8.467*
	(4.322)	(4.283)	(4.313)	(4.283)	(4.370)	(4.334)	(4.343)	(4.333)	(4.306)	(4.326)
Firm Liquidity	-50.40***	-51.76***	-50.25***	-52.35***	-50.56***	-51.89***	-49.66***	-52.50***	-52.03***	-51.52***
	(10.90)	(11.20)	(11.07)	(11.34)	(10.86)	(11.23)	(10.86)	(11.26)	(11.51)	(11.50)
Firm Tangibility	-19.10	-19.50	-20.15*	-19.61	-19.54	-19.97	-19.84	-19.85	-20.46*	-20.15*
	(11.85)	(12.00)	(11.68)	(11.94)	(12.28)	(12.06)	(12.10)	(12.15)	(11.55)	(11.47)
Distance	-0.685	-0.712	-0.647	-0.755	-0.614	-0.634	-0.778	-0.716	-1.053	-1.009
	(1.350)	(1.371)	(1.369)	(1.371)	(1.374)	(1.394)	(1.407)	(1.376)	(1.357)	(1.359)
Relationship Dummy	0.923	0.946	1.410	1.017	1.038	1.054	1.482	1.124	1.342	1.370

	(2.643)	(2.612)	(2.545)	(2.611)	(2.543)	(2.542)	(2.522)	(2.547)	(2.599)	(2.552)
Bank Size	-13.47	-23.22**	-19.01*	-25.55***	-13.28	-23.28**	-19.98*	-25.64***	-28.37***	-28.58***
	(10.36)	(9.966)	(10.07)	(8.885)	(10.39)	(10.12)	(10.01)	(8.936)	(9.321)	(9.355)
Bank Tier 1 Capital Ratio	-3.726	-3.657	-3.125	-3.339	-3.535	-3.517	-3.128	-3.228	-2.101	-2.069
	(2.740)	(2.683)	(2.640)	(2.560)	(2.733)	(2.677)	(2.674)	(2.561)	(2.303)	(2.288)
Bank Provisions (Loan Losses)/Assets	285.2	726.0	562.7	506.3	289.6	720.5	542.0	497.5	839.5	825.2
	(963.9)	(887.7)	(934.7)	(925.7)	(969.6)	(895.5)	(947.6)	(932.4)	(866.7)	(871.6)
Vega	0.0241	-0.0183	0.00190	-0.101	0.0273	-0.0147	-0.000271	-0.102	-0.0343	-0.0293
	(0.169)	(0.149)	(0.170)	(0.126)	(0.168)	(0.146)	(0.173)	(0.123)	(0.180)	(0.178)
Delta	-7.478***	-3.861*	-4.075	-6.322**	-7.208***	-3.745*	-3.969	-6.237**	-1.037	-1.073
	(2.347)	(2.219)	(2.847)	(2.919)	(2.301)	(2.176)	(2.787)	(2.884)	(2.830)	(2.801)
Loan Size	-7.734***	-7.809***	-7.757***	-7.859***	-7.735***	-7.806***	-7.687***	-7.856***	-7.818***	-7.819***
	(1.143)	(1.164)	(1.167)	(1.171)	(1.146)	(1.154)	(1.174)	(1.166)	(1.190)	(1.189)
Loan Maturity	-8.898***	-8.856***	-8.744***	-8.818***	-8.874***	-8.852***	-8.712***	-8.820***	-8.684***	-8.677***
	(1.913)	(1.944)	(1.975)	(1.939)	(1.940)	(1.958)	(1.980)	(1.959)	(1.927)	(1.935)
Syndicate Size	-0.312***	-0.301***	-0.337***	-0.303***	-0.320***	-0.309***	-0.343***	-0.310***	-0.352***	-0.355***
	(0.0904)	(0.0933)	(0.0921)	(0.0918)	(0.0916)	(0.0945)	(0.0907)	(0.0924)	(0.0921)	(0.0916)
Secured	30.05***	30.11***	29.85***	30.25***	30.40***	30.27***	29.91***	30.42***	29.94***	29.93***
	(4.636)	(4.719)	(4.677)	(4.722)	(4.670)	(4.692)	(4.569)	(4.705)	(4.730)	(4.732)
Covenants	1.786	2.034	1.784	2.043	1.674	1.905	1.808	1.923	1.706	1.614
	(4.303)	(4.456)	(4.392)	(4.449)	(4.352)	(4.496)	(4.404)	(4.498)	(4.335)	(4.392)
Performance Pricing	-8.586***	-8.622***	-8.527***	-8.694***	-8.706***	-8.699***	-8.698***	-8.770***	-8.608***	-8.691***
	(1.772)	(1.816)	(1.828)	(1.816)	(1.817)	(1.823)	(1.834)	(1.823)	(1.808)	(1.797)
Constant	645.9***	810.7***	792.8***	805.7***	640.2***	811.5***	820.9***	804.9***	821.4***	822.3***
	(133.5)	(130.8)	(120.9)	(120.1)	(133.6)	(132.5)	(122.0)	(120.1)	(134.0)	(134.1)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.745	0.745	0.745	0.746	0.745	0.746	0.746	0.744	0.744
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension (PDI, INV, MAS, and UAI) to our innovation proxies. We calculate IE_Citations as the adjusted patent citations over the previous five years, scaled by the sum of 5-year R&D expense. Citations is calculated as ln(1+Citations) where citations have been adjusted for truncation. Regressions 1-8 include firm, bank, year, month, S&P quality rating, rating (bank-dependence), and loan type fixed effects. In model 9 and 10 we show the innovation variable without interactions to highlight the direct (negative) effect of innovation on loan pricing. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 5a: Addressing Omitted Variable Bias (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
Panel A: Controlling for time-variant bank omitted variables with bank*year fixed effects								
IE_Patents	45.88**	-51.23***	-66.64*	27.68**				
	(20.04)	(11.52)	(38.81)	(13.64)				
IE_Patents*PDI	-1.120***							
	(0.399)							
IE_Patents*INV		0.662***						
		(0.184)						
IE_Patents*MAS			1.094					
			(0.694)					
IE_Patents*UAI				-0.582***				
				(0.164)				
Patents					8.838***	-6.495***	-36.71***	4.098**
					(2.403)	(1.653)	(3.301)	(1.781)
Patents*PDI					-0.214***			
					(0.0320)			
Patents*INV						0.0978***		
						(0.0180)		
Patents*MAS							0.588***	
							(0.0604)	
Patents*UAI								-0.0726***
								(0.00948)
Constant	404.3***	406.2***	404.1***	405.4***	409.6***	410.7***	406.2***	409.0***
	(40.92)	(40.80)	(40.08)	(40.97)	(42.52)	(41.58)	(43.25)	(42.17)
Observations	11,937	11,937	11,937	11,937	11,937	11,937	11,937	11,937
R-squared	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
Bank*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Panel B: Controlling for time-invariant CEO omitted variables with CEO fixed effects								
IE_Patents	39.29**	-45.57***	-58.94	18.71				
	(17.99)	(10.90)	(54.05)	(14.75)				
IE_Patents*PDI	-1.035***							
	(0.349)							
IE_Patents*INV		0.549***						
		(0.182)						
IE_Patents*MAS			0.924					
			(0.934)					
IE_Patents*UAI				-0.460**				
				(0.179)				
Patents					7.333***	-5.903***	-31.43***	2.788*
					(2.145)	(1.187)	(5.040)	(1.563)

Patents*PDI					-0.190***			
					(0.0315)			
Patents*INV						0.0801***		
						(0.0144)		
Patents*MAS							0.494***	
							(0.0835)	
Patents*UAI								-0.0595***
								(0.0100)
Constant	853.6***	851.9***	841.6***	851.1***	863.1***	856.7***	857.4***	856.4***
	(139.7)	(139.6)	(139.6)	(139.3)	(139.4)	(139.1)	(136.7)	(139.0)
Observations	11,994	11,994	11,994	11,994	11,994	11,994	11,994	11,994
R-squared	0.748	0.748	0.748	0.748	0.748	0.748	0.749	0.748
CEO FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Panel C: Controlling for time-variant bank CEO omitted variables with CEO*year fixed effects								
IE_Patents	45.88**	-51.23***	-66.64*	27.68**				
	(20.04)	(11.52)	(38.81)	(13.64)				
IE_Patents*PDI	-1.120***							
	(0.399)							
IE_Patents*INV		0.662***						
		(0.184)						
IE_Patents*MAS			1.094					
			(0.694)					
IE_Patents*UAI				-0.582***				
				(0.164)				
Patents					8.838***	-6.495***	-36.71***	4.098**
					(2.403)	(1.653)	(3.301)	(1.781)
Patents*PDI					-0.214***			
					(0.0320)			
Patents*INV						0.0978***		
						(0.0180)		
Patents*MAS							0.588***	
							(0.0604)	
Patents*UAI								-0.0726***
								(0.00948)
Constant	404.3***	406.2***	404.1***	405.4***	409.6***	410.7***	406.2***	409.0***
	(40.92)	(40.80)	(40.08)	(40.97)	(42.52)	(41.58)	(43.25)	(42.17)
Observations	11,937	11,937	11,937	11,937	11,937	11,937	11,937	11,937
R-squared	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
CEO*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES

Variables and FE included in all Panels								
Controls Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

In the above Table, we control for omitted variable bias concerns with regards to our Patent-Based innovation measures. In Panel A, we control for time-variant bank characteristics including bank*year FE. In Panel B, we control for time-invariant CEO characteristics by including CEO fixed effects. In Panel C, we control for time-variant bank CEO characteristics by including CEO*year FE. In the lower part of the table, we indicate control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively. Note that in Panels A, B, and C, the individual effects of the cultural heritage characteristics of the bank CEOs drop from the models due to collinearity with the bank*year, Bank CEO, and Bank CEO*year fixed effects, respectively.

Table 5b: Addressing Omitted Variable Bias (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
Panel A: Controlling for time-variant bank omitted variables with bank*year fixed effects								
IE_Citations	40.46***	-45.04**	-55.54**	8.041				
	(11.46)	(18.51)	(22.13)	(8.984)				
IE_Citations*PDI	-1.295***							
	(0.297)							
IE_Citations*INV		0.479**						
		(0.232)						
IE_Citations*MAS			0.810**					
			(0.369)					
IE_Citations*UAI				-0.350**				
				(0.145)				
Citations					4.719**	-5.247***	-31.72***	0.790
					(1.935)	(1.609)	(4.184)	(1.590)
Citations*PDI					-0.146***			
					(0.0279)			
Citations*INV						0.0574***		
						(0.0159)		
Citations*MAS							0.490***	
							(0.0625)	
Citations*UAI								-0.0397***
								(0.00920)
Constant	404.0***	404.8***	405.0***	404.5***	406.6***	406.6***	405.4***	405.7***
	(39.90)	(39.50)	(39.48)	(39.40)	(41.79)	(40.99)	(43.07)	(41.32)
Observations	11,937	11,937	11,937	11,937	11,937	11,937	11,937	11,937
R-squared	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
Bank*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Panel B: Controlling for time-invariant CEO omitted variables with CEO fixed effects								
IE_Citations	43.23***	-41.53**	-37.85	8.761				
	(10.87)	(18.68)	(29.39)	(9.028)				
IE_Citations*PDI	-1.311***							
	(0.325)							
IE_Citations*INV		0.465**						
		(0.223)						
IE_Citations*MAS			0.558					
			(0.476)					
IE_Citations*UAI				-0.313*				
				(0.158)				
Citations					3.909**	-4.521***	-26.73***	0.123
					(1.716)	(1.288)	(4.401)	(1.354)

Citations*PDI					-0.130***			
					(0.0291)			
Citations*INV						0.0443***		
						(0.0135)		
Citations*MAS							0.407***	
							(0.0641)	
Citations*UAI								-0.0303***
								(0.00974)
Constant	854.0***	849.9***	842.2***	849.4***	857.7***	853.1***	858.4***	853.1***
	(139.5)	(138.6)	(139.6)	(139.1)	(138.9)	(138.7)	(137.4)	(138.8)
Observations	11,994	11,994	11,994	11,994	11,994	11,994	11,994	11,994
R-squared	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748
CEO FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Panel C: Controlling for time-variant bank CEO omitted variables with CEO*year fixed effects								
IE_Citations	40.46***	-45.04**	-55.54**	8.041				
	(11.46)	(18.51)	(22.13)	(8.984)				
IE_Citations*PDI	-1.295***							
	(0.297)							
IE_Citations*INV		0.479**						
		(0.232)						
IE_Citations*MAS			0.810**					
			(0.369)					
IE_Citations*UAI				-0.350**				
				(0.145)				
Citations					4.719**	-5.247***	-31.72***	0.790
					(1.935)	(1.609)	(4.184)	(1.590)
Citations*PDI					-0.146***			
					(0.0279)			
Citations*INV						0.0574***		
						(0.0159)		
Citations*MAS							0.490***	
							(0.0625)	
Citations*UAI								-0.0397***
								(0.00920)
Constant	404.0***	404.8***	405.0***	404.5***	406.6***	406.6***	405.4***	405.7***
	(39.90)	(39.50)	(39.48)	(39.40)	(41.79)	(40.99)	(43.07)	(41.32)
Observations	11,937	11,937	11,937	11,937	11,937	11,937	11,937	11,937
R-squared	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
CEO*Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES

Variables and FE included in all Panels								
Controls Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

In the above Table, we control for omitted variable bias concerns with regards to our Citation-Based innovation measures. In Panel A, we control for time-variant bank characteristics including bank*year FE. In Panel B, we control for time-invariant CEO characteristics by including CEO fixed effects. In Panel C, we control for time-variant bank CEO characteristics by including CEO*year FE. In the lower part of the table, we indicate control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively. Note that in Panels A, B, and C, the individual effects of the cultural heritage characteristics of the bank CEOs drop from the models due to collinearity with the bank*year, Bank CEO, and Bank CEO*year fixed effects, respectively.

Table 6a: Instrumental Variable Estimations (patent-based measures of innovation)

Second Stage	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Patents	33.33	-39.36***	-65.10	22.91				
	(22.92)	(13.82)	(66.39)	(15.21)				
IE_Patents*PDI	-0.875**							
	(0.423)							
IE_Patents*INV		0.473**						
		(0.228)						
IE_Patents*MAS			1.007					
			(1.148)					
IE_Patents*UAI				-0.527***				
				(0.183)				
Patents					5.537**	-5.433***	-15.73	2.808
					(2.135)	(1.158)	(61.74)	(1.853)
Patents*PDI					-0.158***			
					(0.0298)			
Patents*INV						0.0780***		
						(0.0181)		
Patents*MAS							0.224	
							(0.998)	
Patents*UAI								-0.0777***
								(0.0208)
PDI	0.942***				1.005***			
	(0.223)				(0.227)			
INV		-0.197*				-0.255**		
		(0.108)				(0.114)		
MAS			-1.849				-1.854	
			(1.372)				(1.473)	
UAI				0.310***				0.363***
				(0.0916)				(0.104)
Firm Size	-16.29***	-15.66***	-15.95***	-16.67***	-16.59***	-16.07***	-15.78***	-16.99***
	(3.421)	(4.239)	(3.600)	(4.681)	(3.579)	(4.299)	(3.824)	(4.907)
Firm ROA	-51.24***	-46.47***	-52.19***	-33.56**	-49.57***	-44.66***	-51.18***	-31.06*
	(15.03)	(14.40)	(15.28)	(15.97)	(15.60)	(14.88)	(17.36)	(16.65)
Firm Z-Score	-8.216*	-7.643*	-8.033*	-15.01***	-8.354*	-7.701*	-8.055*	-15.23***
	(4.294)	(4.378)	(4.287)	(2.979)	(4.361)	(4.437)	(4.411)	(3.030)
Firm Liquidity	-50.69***	-53.00***	-49.59***	-34.51**	-50.92***	-53.75***	-49.23***	-34.92**
	(10.77)	(11.17)	(10.59)	(14.78)	(10.72)	(11.14)	(10.79)	(14.75)
Firm Tangibility	-18.81	-22.08*	-19.88	-12.34	-19.93	-23.28*	-20.08	-13.93
	(12.13)	(12.54)	(11.94)	(15.75)	(12.67)	(12.96)	(12.02)	(16.33)
Distance	-0.531	-0.688	-0.332	-1.312	-0.546	-0.707	-0.461	-1.304
	(1.408)	(1.178)	(1.527)	(1.324)	(1.391)	(1.160)	(1.587)	(1.302)

Relationship Dummy	0.961	-0.383	1.510	1.315	0.996	-0.343	1.521	1.345
	(2.536)	(2.660)	(2.547)	(2.642)	(2.521)	(2.659)	(2.545)	(2.633)
Bank Size	-10.75	-17.10	-13.28	11.15	-10.51	-17.53	-14.46	10.29
	(11.22)	(11.97)	(14.97)	(13.83)	(11.25)	(11.95)	(14.80)	(13.70)
Bank Tier 1 Capital Ratio	-3.909	-1.339	-3.748	-3.216	-3.772	-1.224	-3.647	-2.979
	(2.880)	(1.712)	(2.942)	(2.715)	(2.926)	(1.748)	(2.977)	(2.741)
Bank Provisions (Loan Losses) / Assets	198.7	1,250*	395.7	482.4	220.4	1,266*	399.7	503.8
	(1,012)	(712.8)	(969.7)	(1,200)	(1,016)	(713.3)	(1,002)	(1,197)
Vega	0.0376	-0.158	0.0229	0.804***	0.0463	-0.155	0.0245	0.772***
	(0.173)	(0.154)	(0.177)	(0.280)	(0.170)	(0.149)	(0.171)	(0.271)
Delta	-8.455***	-1.667	-5.961	-5.329**	-8.054***	-1.531	-5.486	-5.163**
	(2.762)	(1.776)	(4.426)	(2.099)	(2.693)	(1.747)	(4.198)	(2.027)
Loan Size	-7.793***	-7.357***	-7.745***	-7.885***	-7.746***	-7.344***	-7.721***	-7.847***
	(1.140)	(1.217)	(1.148)	(0.979)	(1.136)	(1.207)	(1.201)	(0.960)
Loan Maturity	-8.923***	-7.977***	-8.741***	-8.476***	-8.948***	-8.017***	-8.714***	-8.486***
	(1.923)	(2.066)	(2.010)	(1.995)	(1.932)	(2.064)	(1.991)	(2.002)
Syndicate Size	-0.318***	-0.326***	-0.331***	-0.281***	-0.321***	-0.325***	-0.337***	-0.282***
	(0.0918)	(0.0988)	(0.0947)	(0.0891)	(0.0918)	(0.0976)	(0.0866)	(0.0895)
Secured	30.33***	29.61***	29.92***	29.86***	30.51***	29.74***	29.96***	30.10***
	(4.715)	(4.825)	(4.657)	(5.264)	(4.673)	(4.830)	(4.595)	(5.232)
Covenants	1.672	0.338	1.787	1.074	1.779	0.465	1.812	1.175
	(4.372)	(3.979)	(4.450)	(4.515)	(4.297)	(3.920)	(4.408)	(4.451)
Performance Pricing	-8.678***	-6.522***	-8.511***	-8.578***	-8.639***	-6.447***	-8.571***	-8.535***
	(1.792)	(1.340)	(1.841)	(2.092)	(1.809)	(1.349)	(1.782)	(2.115)
			First Stage					
Latitude (LAT)	-1.303***				-1.337***			
	(0.366)				(0.367)			
Pronoun (PRO)		-47.28***				-47.09***		
		(4.296)				(4.426)		
Height (HEI)			-3.763***				-3.854***	
			(1.404)				(1.418)	
FST-Greece (GRE)				-0.175**				-0.171**
				(0.0772)				(0.0790)
IE_Patents*LAT	-2.141***							
	(0.592)							
IE_Patents*PRO		-48.57***						
		(2.511)						
IE_Patents*HEI			-7.048***					
			(1.792)					
IE_Patents*GRE				-0.310***				
				(0.0250)				
Patents*LAT					-1.510***			
					(0.182)			
Patents*PRO						-47.53***		
						(2.818)		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Patents*HEI							-1.236	
							(1.678)	
Patents*GRE								-0.285***
								(0.00975)
Cragg-Donald Wald F statistic (WIT)	2924.140	1.9e+04	1132.674	4499.733	2967.784	1.8e+04	95.677	4256.058
Stock-Yogo weak ID test 10% critical values	7.03	7.03	7.03	7.03	7.03	7.03	7.03	7.03
Observations	11,997	11,421	11,997	10,603	11,997	11,421	11,997	10,603
R-squared	0.078	0.065	0.075	0.081	0.079	0.065	0.076	0.082
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table reports results from the instrumental variable regressions of loan spread on measures of culture as well as firm, bank, CEO, time, and loan-level controls. The dependent variable is Loan Spread defined as the loan interest payment in basis points over LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our innovation measures. We calculate IE_Patents as the patent counts are scaled by cumulative R&D expense over the previous five years, assuming an annual depreciation rate of 20%. Patents is calculated as ln(1+Patents) where patents have been adjusted for truncation. Our instruments are (1) Latitude (LAT) (2) Pronouns (PRO) (3) Average Male Height (HEI) (4) Genetic Distance Greece (GRE) for PDI, INV, MAS, and UAI respectively. WIT is the Wald F-statistic of the weak identification test by Cragg-Donald, which must be higher than its critical value to reject the null hypothesis. All regressions use firm, bank, year, month, firm, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 6b: Instrumental Variable Estimations (citation-based measures of innovation)

Second Stage	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Citations	13.50	-19.22	-38.52	22.68				
	(18.69)	(21.11)	(29.76)	(22.05)				
IE_Citations*PDI	-0.544							
	(0.471)							
IE_Citations*INV		0.177						
		(0.274)						
IE_Citations*MAS			0.521					
			(0.509)					
IE_Citations*UAI				-0.666				
				(0.490)				
Citations					1.318	-4.097***	-27.21	0.825
					(1.862)	(1.253)	(39.27)	(1.820)
IE_Citations*PDI					-0.0809***			
					(0.0299)			
IE_Citations*INV						0.0393**		
						(0.0171)		
IE_Citations*MAS							0.402	
							(0.637)	
IE_Citations*UAI								-0.0586*
								(0.0314)
PDI	0.898***				0.934***			
	(0.222)				(0.235)			
INV		-0.182*				-0.211*		
		(0.106)				(0.115)		
MAS			-1.746				-1.990	
			(1.293)				(1.342)	
UAI				0.307***				0.337***
				(0.101)				(0.113)
Firm Size	-16.26***	-15.53***	-15.99***	-16.51***	-16.20***	-15.55***	-15.73***	-16.58***
	(3.303)	(4.111)	(3.558)	(4.609)	(3.448)	(4.208)	(3.914)	(4.761)
Firm ROA	-51.59***	-46.77***	-52.81***	-33.62**	-50.26***	-45.73***	-50.45***	-31.39*
	(15.06)	(14.40)	(15.27)	(16.19)	(15.26)	(14.60)	(16.55)	(16.30)
Firm Z-Score	-8.255*	-7.663*	-8.063*	-15.15***	-8.351*	-7.728*	-8.114*	-15.29***
	(4.313)	(4.399)	(4.304)	(2.944)	(4.363)	(4.437)	(4.467)	(3.054)
Firm Liquidity	-50.38***	-52.89***	-49.36***	-33.99**	-50.26***	-53.01***	-48.79***	-34.21**
	(10.89)	(11.42)	(10.65)	(14.81)	(10.85)	(11.30)	(10.68)	(14.57)
Firm Tangibility	-19.03	-21.76*	-20.03*	-12.19	-19.18	-22.19*	-19.71	-12.99
	(11.95)	(12.56)	(11.82)	(15.54)	(12.19)	(12.74)	(12.25)	(15.86)
Distance	-0.573	-0.721	-0.418	-1.388	-0.527	-0.711	-0.562	-1.319
	(1.403)	(1.181)	(1.515)	(1.314)	(1.418)	(1.177)	(1.650)	(1.306)

Relationship Dummy	0.888	-0.431	1.473	1.094	0.962	-0.351	1.539	1.336
	(2.609)	(2.737)	(2.566)	(2.683)	(2.539)	(2.682)	(2.549)	(2.636)
Bank Size	-10.95	-17.05	-13.67	10.95	-10.90	-17.40	-14.92	10.43
	(10.97)	(11.86)	(14.81)	(13.53)	(11.05)	(11.91)	(14.72)	(13.63)
Bank Tier 1 Capital Ratio	-3.908	-1.317	-3.703	-3.278	-3.796	-1.258	-3.679	-3.041
	(2.898)	(1.732)	(2.962)	(2.749)	(2.891)	(1.737)	(2.932)	(2.736)
Bank Provisions (Loan Losses) / Assets	212.5	1,246*	398.5	480.5	206.2	1,244*	385.7	466.7
	(1,010)	(712.7)	(970.6)	(1,186)	(1,015)	(714.5)	(984.6)	(1,201)
Vega	0.0369	-0.161	0.0205	0.798***	0.0397	-0.158	0.0177	0.771***
	(0.175)	(0.155)	(0.180)	(0.280)	(0.174)	(0.152)	(0.186)	(0.276)
Delta	-8.314***	-1.669	-5.731	-5.386**	-8.207***	-1.633	-5.554	-5.269**
	(2.794)	(1.773)	(4.353)	(2.139)	(2.739)	(1.752)	(4.119)	(2.070)
Loan Size	-7.751***	-7.350***	-7.739***	-7.833***	-7.744***	-7.347***	-7.666***	-7.842***
	(1.134)	(1.221)	(1.149)	(0.982)	(1.135)	(1.213)	(1.215)	(0.968)
Loan Maturity	-8.910***	-7.957***	-8.738***	-8.447***	-8.898***	-7.991***	-8.713***	-8.462***
	(1.916)	(2.043)	(1.995)	(1.960)	(1.934)	(2.060)	(2.007)	(1.996)
Syndicate Size	-0.310***	-0.317***	-0.328***	-0.265***	-0.315***	-0.321***	-0.335***	-0.275***
	(0.0915)	(0.0983)	(0.0943)	(0.0885)	(0.0921)	(0.0983)	(0.0908)	(0.0897)
Secured	30.26***	29.59***	29.86***	29.55***	30.44***	29.66***	29.92***	30.01***
	(4.728)	(4.826)	(4.667)	(5.186)	(4.703)	(4.819)	(4.558)	(5.236)
Covenants	1.729	0.392	1.815	1.206	1.647	0.343	1.842	1.014
	(4.325)	(3.901)	(4.434)	(4.422)	(4.367)	(3.949)	(4.367)	(4.485)
Performance Pricing	-8.633***	-6.471***	-8.485***	-8.482***	-8.723***	-6.510***	-8.661***	-8.602***
	(1.789)	(1.350)	(1.846)	(2.093)	(1.815)	(1.349)	(1.771)	(2.118)
First Stage								
Latitude (LAT)	-1.313***				-1.334***			
	(0.364)				(0.365)			
Pronoun (PRO)		-47.31***				-47.08***		
		(4.255)				(4.414)		
Height (HEI)			-3.897***				-3.856***	
			(1.461)				(1.429)	
FST_Greece (GRE)				-0.177**				-0.172**
				(0.0763)				(0.0783)
IE_Citations*LAT	-1.701***							
	(0.205)							
IE_Citations*PRO		-47.10***						
		(2.808)						
IE_Citations*HEI			-8.714***					
			(1.477)					
IE_Citations*GRE				-0.190***				
				(0.0726)				
Citations*LAT					-1.502***			
					(0.198)			
Citations*PRO						-47.39***		
						(2.591)		

Citations*HEI							-1.817	
							(1.605)	
Citations*GRE								-0.263***
								(0.0314)
Cragg-Donald Wald F statistic (WIT)	2969.899	1.8e+04	1205.127	4596.988	2975.038	1.8e+04	230.645	4287.458
Stock-Yogo weak ID test 10% critical values	7.03	7.03	7.03	7.03	7.03	7.03	7.03	7.03
Observations	11,997	11,421	11,997	10,603	11,997	11,421	11,997	10,603
R-squared	0.078	0.065	0.075	0.081	0.078	0.065	0.076	0.081
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table reports results from the instrumental variable regressions of loan spread on measures of culture as well as firm, bank, CEO, time, and loan-level controls. The dependent variable is Loan Spread defined as the loan interest payment in basis points over LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our innovation measures. We calculate IE_Citations as the adjusted patent citations over the previous five years, scaled by the sum of 5-year R&D expense. Citations is calculated as ln(1+Citations) where citations have been adjusted for truncation. Our instruments are (1) Latitude (LAT) (2) Pronouns (PRO) (3) Average Male Height (HEI) (4) Genetic Distance Greece (GRE) for PDI, INV, MAS, and UAI respectively. WIT is the Wald F-statistic of the weak identification test by Cragg-Donald, which must be higher than its critical value to reject the null hypothesis. All regressions use firm, bank, year, month, firm, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 7a: Matched Sample Regressions (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
					Panel A: Patents firm			
IE_Patents	96.22*	-28.66***	-45.27	8.410				
	(48.10)	(10.10)	(70.95)	(20.27)				
IE_Patents*PDI	-2.798**							
	(1.242)							
IE_Patents*INV		0.411***						
		(0.142)						
IE_Patents*MAS			0.808					
			(1.240)					
IE_Patents*UAI				-0.315				
				(0.221)				
Patents					5.382	-7.096***	-29.55***	2.928
					(4.178)	(1.971)	(6.443)	(2.114)
Patents*PDI					-0.108***			
					(0.0373)			
Patents*INV						0.106***		
						(0.0266)		
Patents*MAS							0.453***	
							(0.112)	
Patents*UAI								-0.0730***
								(0.0101)
PDI	1.271***				0.619*			
	(0.279)				(0.309)			
INV		-0.420***				-0.482***		
		(0.135)				(0.154)		
MAS			-1.220**				-1.533***	
			(0.494)				(0.448)	
UAI				0.410***				0.399***
				(0.130)				(0.129)
Constant	375.6*	921.2***	912.8***	938.1***	613.9***	922.2***	912.8***	916.3***
	(215.9)	(98.81)	(164.7)	(150.2)	(175.3)	(112.6)	(195.1)	(131.1)
Observations	3,157	7,984	6,746	8,681	3,176	7,995	6,773	8,593
R-squared	0.823	0.746	0.752	0.745	0.825	0.742	0.754	0.743
					Panel B: Patents bank			
IE_Patents	111.0*	-52.66***	-64.17	31.70				
	(64.64)	(7.747)	(67.54)	(20.80)				
IE_Patents*PDI	-2.930*							
	(1.491)							
IE_Patents*INV		0.906***						

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		(0.114)						
IE_Patents*MAS			0.998					
			(1.187)					
IE_Patents*UAI				-0.561**				
				(0.216)				
Patents					7.940	-9.786***	-39.45***	5.955***
					(6.830)	(1.935)	(8.003)	(1.770)
Patents*PDI					-0.160			
					(0.114)			
Patents*INV						0.179***		
						(0.0376)		
Patents*MAS							0.620***	
							(0.167)	
Patents*UAI								-0.104***
								(0.0146)
PDI	0.547				0.535			
	(0.493)				(0.511)			
INV		-0.386***				-0.480***		
		(0.118)				(0.132)		
MAS			-1.684***				-2.159***	
			(0.591)				(0.460)	
UAI				0.363**				0.422***
				(0.152)				(0.153)
Constant	570.9*	953.7***	681.1***	970.6***	597.3*	950.7***	718.9***	966.1***
	(298.4)	(94.68)	(193.1)	(120.1)	(296.9)	(95.79)	(187.0)	(117.7)
Observations	2,827	7,133	6,436	8,211	2,827	7,133	6,436	8,211
R-squared	0.802	0.753	0.753	0.751	0.802	0.754	0.754	0.751
Variables and FE included in all Panels								
Controls Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

In the above Table, we control for omitted variable bias concerns with regards to our Patent-Based innovation measures. In Panel A, we control for the potential selection bias between borrowing firm characteristics and bank CEO cultural traits. In Panel B, we control for potential selection bias between bank characteristics including the propensity for the formation of lending strategies related to innovation. In the lower part of the table, we indicate the control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 7b: Matched Sample Regressions (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
					Panel A: Citations firm			
IE_Citations	53.16***	-40.56	-25.52	24.73				
	(16.40)	(29.07)	(28.75)	(16.88)				
IE_Citations*PDI	-1.578**							
	(0.582)							
IE_Citations*INV		0.546						
		(0.450)						
IE_Citations*MAS			0.426					
			(0.555)					
IE_Citations*UAI				-0.460*				
				(0.243)				
Citations					4.053	-5.612***	-19.35***	1.628
					(3.208)	(2.071)	(5.375)	(1.421)
Citations*PDI					-0.220***			
					(0.0619)			
Citations*INV						0.0752***		
						(0.0255)		
Citations*MAS							0.290***	
							(0.0757)	
Citations*UAI								-0.0453***
								(0.0120)
PDI	0.569				0.905*			
	(0.344)				(0.489)			
INV		-0.395**				-0.433***		
		(0.157)				(0.143)		
MAS			-1.049**				-1.507***	
			(0.406)				(0.436)	
UAI				0.416***				0.356***
				(0.114)				(0.103)
Constant	510.0**	900.6***	836.0***	943.1***	362.0	874.1***	927.6***	925.3***
	(243.9)	(101.6)	(178.5)	(119.8)	(215.2)	(119.0)	(170.6)	(115.9)
Observations	3,174	7,982	6,740	8,638	3,169	7,996	6,780	8,557
R-squared	0.819	0.744	0.750	0.747	0.822	0.742	0.754	0.745
					Panel B: Citations bank			
IE_Citations	57.52	-49.37	-29.64	12.74				
	(73.54)	(33.14)	(30.00)	(14.64)				
IE_Citations*PDI	-1.607							
	(1.215)							
IE_Citations*INV		0.779*						

		(0.446)						
IE_Citations*MAS			0.227					
			(0.613)					
IE_Citations*UAI				-0.378*				
				(0.218)				
Citations					2.854	-7.893***	-29.58***	2.410
					(6.734)	(2.594)	(6.199)	(2.084)
Citations*PDI					-0.0773			
					(0.110)			
Citations*INV						0.126***		
						(0.0396)		
Citations*MAS							0.454***	
							(0.135)	
Citations*UAI								-0.0659***
								(0.0139)
PDI	0.490				0.501			
	(0.520)				(0.524)			
INV		-0.359***				-0.423***		
		(0.128)				(0.135)		
MAS			-1.609**				-2.011***	
			(0.596)				(0.506)	
UAI				0.341**				0.380**
				(0.159)				(0.156)
Constant	593.3*	958.1***	673.1***	969.1***	593.2*	956.8***	718.7***	968.1***
	(299.9)	(95.08)	(198.9)	(121.0)	(296.8)	(94.84)	(194.7)	(118.9)
Observations	2,827	7,133	6,436	8,211	2,827	7,133	6,436	8,211
R-squared	0.802	0.753	0.753	0.751	0.802	0.753	0.753	0.751
Variables and FE included in all Panels								
Controls Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

In the above Table, we control for omitted variable bias concerns with regards to our Citation-Based innovation measures. In Panel A, we control for the potential selection bias between borrowing firm characteristics and bank CEO cultural traits. In Panel B, we control for potential selection bias between bank characteristics including the propensity for the formation of lending strategies related to innovation. In the lower part of the table, we indicate the control variables and FE included in all Panels. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 8: Alternative Measures of Innovation

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread	(9) Loan Spread	(10) Loan Spread	(11) Loan Spread	(12) Loan Spread
Patent/Employee	11.80**	-7.402***	-15.94	3.669								
	(5.202)	(2.594)	(11.81)	(4.749)								
Patent/Employee*PDI	-0.274***											
	(0.0640)											
Patent/Employee*INV		0.107**										
		(0.0503)										
Patent/Employee*MAS			0.263									
			(0.206)									
Patent/Employee*UAI				-0.0661*								
				(0.0389)								
Patent Dollar Value					2.241*	-5.368***	-19.60***	-0.243				
					(1.118)	(1.387)	(2.985)	(1.047)				
Patent Dollar Value*PDI					-0.107***							
					(0.0271)							
Patent Dollar Value*INV						0.0465**						
						(0.0189)						
Patent Dollar Value*MAS							0.275***					
							(0.0470)					
Patent Dollar Value*UAI								-0.0348***				
								(0.0126)				
Alternative IE_Citations									0.474**	-0.719***	-0.289	0.300*
									(0.200)	(0.194)	(0.554)	(0.172)
Alternative IE_Citations*PDI									-0.0118***			
									(0.00424)			
Alternative IE_Citations*INV										0.00935***		
										(0.00252)		
Alternative IE_Citations*MAS											0.00473	
											(0.00955)	
Alternative IE_Citations*UAI												-0.00650***
												(0.00222)
PDI	0.867***				0.894***				0.815***			
	(0.166)				(0.183)				(0.175)			
INV		-0.440***				-0.471***				-0.437***		
		(0.124)				(0.146)				(0.125)		
MAS			-1.223**				-1.481***				-1.092**	
			(0.486)				(0.410)				(0.466)	
UAI				0.397***				0.426***				0.398***
				(0.115)				(0.131)				(0.118)
Firm Size	-16.57***	-16.52***	-16.26***	-16.45***	-16.03***	-15.88***	-15.45***	-15.82***	-16.25***	-16.12***	-16.30***	-16.17***
	(3.387)	(3.444)	(3.347)	(3.466)	(3.480)	(3.446)	(3.555)	(3.508)	(3.258)	(3.390)	(3.313)	(3.347)
Firm ROA	-49.58***	-49.83***	-50.79***	-50.33***	-50.66***	-50.25***	-51.36***	-50.61***	-50.96***	-50.48***	-51.59***	-50.59***

	(14.98)	(14.73)	(15.04)	(14.90)	(15.52)	(14.85)	(15.61)	(14.95)	(15.31)	(14.98)	(15.18)	(14.89)
Firm Z-Score	-8.353*	-8.345*	-8.240*	-8.357*	-8.310*	-8.309*	-8.107*	-8.322*	-8.322*	-8.363*	-8.196*	-8.398*
	(4.289)	(4.274)	(4.281)	(4.276)	(4.313)	(4.269)	(4.241)	(4.265)	(4.311)	(4.290)	(4.291)	(4.292)
Firm Liquidity	-51.11***	-52.63***	-49.61***	-53.01***	-49.86***	-51.37***	-49.17***	-51.93***	-50.61***	-52.24***	-50.34***	-52.57***
	(10.54)	(10.94)	(10.99)	(10.97)	(10.91)	(11.29)	(10.82)	(11.31)	(10.84)	(11.08)	(10.91)	(11.20)
Firm Tangibility	-19.41	-20.33	-19.92*	-20.07	-19.77	-20.22*	-19.69	-19.93	-18.97	-19.20	-20.14*	-19.33
	(12.36)	(12.27)	(11.77)	(12.29)	(12.33)	(11.93)	(12.07)	(12.10)	(11.82)	(11.96)	(11.66)	(11.88)
Distance	-0.590	-0.617	-0.611	-0.709	-0.589	-0.602	-0.695	-0.673	-0.656	-0.733	-0.655	-0.762
	(1.375)	(1.391)	(1.377)	(1.370)	(1.334)	(1.362)	(1.367)	(1.342)	(1.390)	(1.393)	(1.377)	(1.385)
Relationship Dummy	1.070	1.055	1.458	1.108	1.101	1.064	1.553	1.146	0.971	0.989	1.401	1.053
	(2.514)	(2.516)	(2.504)	(2.521)	(2.537)	(2.510)	(2.517)	(2.532)	(2.536)	(2.527)	(2.507)	(2.531)
Bank Size	-13.85	-23.59**	-19.44*	-25.76***	-13.30	-23.30**	-19.94*	-25.76***	-13.52	-23.65**	-19.48*	-25.88***
	(10.28)	(10.06)	(10.04)	(8.922)	(10.43)	(10.16)	(10.07)	(8.922)	(10.50)	(9.990)	(10.17)	(8.894)
Bank Tier 1 Capital Ratio	-3.518	-3.514	-3.094	-3.245	-3.524	-3.527	-3.157	-3.232	-3.607	-3.570	-3.065	-3.263
	(2.705)	(2.660)	(2.633)	(2.551)	(2.747)	(2.693)	(2.705)	(2.571)	(2.712)	(2.632)	(2.626)	(2.523)
Bank Provisions (Loan Losses) / Assets	295.0	722.2	546.5	497.0	309.8	737.4	542.8	512.1	269.2	718.5	541.3	486.7
	(968.4)	(894.1)	(943.6)	(933.4)	(962.6)	(888.4)	(949.1)	(925.7)	(969.5)	(894.1)	(941.8)	(930.2)
Vega	0.0464	-0.00633	0.00882	-0.0910	0.0293	-0.0148	0.00460	-0.102	0.0309	-0.0159	0.000669	-0.104
	(0.164)	(0.146)	(0.169)	(0.119)	(0.163)	(0.144)	(0.167)	(0.118)	(0.165)	(0.144)	(0.169)	(0.123)
Delta	-7.451***	-3.826*	-4.196	-6.303**	-6.929***	-3.626*	-3.895	-6.115**	-7.606***	-3.940*	-4.008	-6.481**
	(2.363)	(2.213)	(2.837)	(2.915)	(2.216)	(2.116)	(2.676)	(2.826)	(2.346)	(2.198)	(2.894)	(2.914)
Loan Amount	-7.771***	-7.814***	-7.765***	-7.869***	-7.736***	-7.791***	-7.692***	-7.847***	-7.763***	-7.809***	-7.780***	-7.862***
	(1.162)	(1.163)	(1.175)	(1.176)	(1.134)	(1.137)	(1.151)	(1.150)	(1.147)	(1.161)	(1.168)	(1.171)
Loan Maturity	-9.000***	-8.916***	-8.798***	-8.885***	-8.883***	-8.868***	-8.708***	-8.828***	-8.994***	-8.975***	-8.769***	-8.916***
	(1.968)	(1.991)	(2.034)	(1.986)	(1.910)	(1.927)	(1.956)	(1.933)	(1.930)	(1.959)	(1.995)	(1.957)
Syndicate Size	-0.322***	-0.312***	-0.340***	-0.311***	-0.329***	-0.319***	-0.354***	-0.318***	-0.321***	-0.308***	-0.340***	-0.309***
	(0.0911)	(0.0939)	(0.0911)	(0.0922)	(0.0926)	(0.0944)	(0.0917)	(0.0921)	(0.0929)	(0.0954)	(0.0929)	(0.0932)
Secured	30.33***	30.22***	29.91***	30.38***	30.46***	30.26***	29.98***	30.48***	30.15***	30.10***	29.93***	30.25***
	(4.665)	(4.673)	(4.652)	(4.704)	(4.641)	(4.701)	(4.562)	(4.700)	(4.686)	(4.712)	(4.698)	(4.723)
Covenants	1.763	2.018	1.868	2.034	1.814	2.017	1.764	2.016	1.745	1.964	1.803	1.993
	(4.258)	(4.404)	(4.337)	(4.418)	(4.344)	(4.537)	(4.391)	(4.517)	(4.367)	(4.481)	(4.405)	(4.494)
Performance Pricing	-8.649***	-8.649***	-8.597***	-8.711***	-8.663***	-8.687***	-8.663***	-8.754***	-8.561***	-8.554***	-8.533***	-8.659***
	(1.803)	(1.819)	(1.824)	(1.820)	(1.797)	(1.814)	(1.828)	(1.819)	(1.787)	(1.796)	(1.829)	(1.805)
Constant	648.4***	817.1***	803.8***	808.0***	635.3***	812.0***	822.6***	802.8***	646.2***	816.6***	795.6***	809.2***
	(133.0)	(132.3)	(120.1)	(120.9)	(133.9)	(132.3)	(121.9)	(119.4)	(134.9)	(131.6)	(120.9)	(120.6)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.745	0.745	0.745	0.746	0.746	0.746	0.746	0.746	0.746	0.745	0.745
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Rated FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text using alternative variables to capture firm innovation. In Panel A, we use a measure of innovation based on the number of employees calculated as the natural logarithm of one plus the number of annual number of patents granted per 1,000 firm employees (ln(1+Patents/Employees)). In Panel B, we use the dollar value of the patent calculated as the natural logarithm of one plus the number of annual dollar value of patents granted deflated to 1992 dollars (ln(1+Dollar Value)). In Panel C we use an alternative measure of innovation efficiency based on citations calculated as the total number of citations received in a given year (t) by patents granted in the previous five years (t – 1 to t – 5), divided by the average number of citations occurring in year (t) to all patents granted in the five years prior scaled by the scaled by the sum of 5-year R&D expense. In the lower part of the table, we indicate the control variables and FE included in all Panels. Standard errors are clustered at bank and year level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 9a: Alternative Measures of Culture (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Patents	-357.2***	-205.4*	80.00	120.2				
	(82.34)	(105.1)	(137.2)	(181.5)				
IE_Patents*Egalitarianism	72.25***							
	(17.57)							
IE_Patents*Autonomy		48.33*						
		(26.67)						
IE_Patents*Harmony			-21.05					
			(33.21)					
IE_Patents*Embeddedness				-37.32				
				(54.67)				
Patents					-125.1***	-36.53***	1.393	45.22
					(35.33)	(11.11)	(20.18)	(35.31)
Patents*Egalitarianism					25.21***			
					(7.324)			
Patents*Autonomy						8.573***		
						(2.922)		
Patents*Harmony							-0.848	
							(4.869)	
Patents*Embeddedness								-14.03
								(10.39)
Egalitarianism	-44.46**				-53.99**			
	(19.05)				(21.30)			
Autonomy		-36.67***				-40.28***		
		(13.47)				(13.72)		
Harmony			13.44				13.09	
			(9.245)				(9.808)	
Embeddedness				24.29				29.37
				(21.74)				(24.02)
Firm Size	-16.65***	-16.70***	-16.80***	-16.78***	-16.80***	-16.89***	-16.56***	-16.77***
	(3.277)	(3.343)	(3.293)	(3.238)	(3.342)	(3.462)	(3.517)	(3.237)
Firm ROA	-51.82***	-51.13***	-51.02***	-51.48***	-50.92***	-49.94***	-51.14***	-51.00***
	(15.20)	(14.86)	(15.03)	(15.10)	(15.44)	(15.34)	(15.64)	(15.12)
Firm Z-Score	-8.313*	-8.354*	-8.455*	-8.393*	-8.415*	-8.431*	-8.480*	-8.437*
	(4.316)	(4.293)	(4.296)	(4.346)	(4.371)	(4.338)	(4.343)	(4.354)
Firm Liquidity	-51.95***	-52.81***	-52.78***	-51.76***	-51.32***	-52.96***	-52.54***	-51.09***
	(11.05)	(11.06)	(11.42)	(11.22)	(10.91)	(10.98)	(10.99)	(11.07)
Firm Tangibility	-19.86*	-20.25*	-20.50*	-20.15*	-20.37*	-21.16*	-20.45*	-20.43*
	(11.69)	(11.75)	(11.64)	(11.57)	(11.82)	(12.07)	(11.83)	(11.55)
Distance	-0.863	-0.795	-1.013	-0.970	-0.836	-0.766	-1.025	-0.928
	(1.368)	(1.375)	(1.318)	(1.367)	(1.392)	(1.369)	(1.344)	(1.406)
Relationship Dummy	1.368	1.179	1.195	1.354	1.413	1.179	1.216	1.390

	(2.571)	(2.546)	(2.525)	(2.581)	(2.510)	(2.515)	(2.499)	(2.523)
Bank Size	-16.86	-23.09**	-32.81***	-22.48*	-17.29	-22.77**	-32.99***	-23.03*
	(12.28)	(9.757)	(10.10)	(12.16)	(12.33)	(9.896)	(10.01)	(12.16)
Bank Tier 1 Capital Ratio	-2.485	-2.796	-2.345	-2.180	-2.324	-2.684	-2.315	-2.093
	(2.587)	(2.547)	(2.138)	(2.427)	(2.577)	(2.577)	(2.210)	(2.396)
Bank Provisions (Loan Losses) / Assets	618.6	705.7	792.8	740.9	625.7	699.2	779.3	731.3
	(932.0)	(892.8)	(879.0)	(917.4)	(934.6)	(899.5)	(879.5)	(915.2)
Vega	0.103	-0.0296	-0.166	0.103	0.109	-0.0209	-0.168	0.103
	(0.205)	(0.151)	(0.180)	(0.234)	(0.208)	(0.150)	(0.183)	(0.238)
Delta	-1.651	-1.339	-2.785	-0.935	-1.475	-1.206	-2.787	-0.938
	(2.551)	(2.215)	(2.869)	(2.667)	(2.560)	(2.221)	(3.006)	(2.682)
Loan Amount	-7.765***	-7.832***	-7.895***	-7.780***	-7.755***	-7.808***	-7.881***	-7.773***
	(1.160)	(1.171)	(1.176)	(1.168)	(1.164)	(1.162)	(1.180)	(1.164)
Loan Maturity	-8.819***	-8.825***	-8.682***	-8.765***	-8.810***	-8.859***	-8.683***	-8.766***
	(1.925)	(1.943)	(1.959)	(1.952)	(1.907)	(1.943)	(1.947)	(1.934)
Syndicate Size	-0.354***	-0.336***	-0.343***	-0.358***	-0.356***	-0.338***	-0.343***	-0.358***
	(0.0919)	(0.0926)	(0.0923)	(0.0923)	(0.0920)	(0.0935)	(0.0919)	(0.0920)
Secured	29.87***	30.03***	30.14***	29.89***	29.87***	30.07***	30.16***	29.85***
	(4.698)	(4.732)	(4.737)	(4.706)	(4.699)	(4.712)	(4.745)	(4.741)
Covenants	1.672	1.827	1.715	1.666	1.737	1.878	1.729	1.719
	(4.329)	(4.455)	(4.404)	(4.326)	(4.329)	(4.433)	(4.408)	(4.369)
Performance Pricing	-8.541***	-8.624***	-8.712***	-8.590***	-8.516***	-8.586***	-8.729***	-8.558***
	(1.801)	(1.801)	(1.766)	(1.781)	(1.800)	(1.801)	(1.794)	(1.745)
Constant	894.2***	910.4***	839.3***	662.0***	945.6***	921.4***	842.3***	652.1***
	(141.9)	(148.0)	(138.4)	(210.3)	(141.5)	(147.4)	(140.1)	(216.0)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.745	0.745	0.745	0.745	0.745	0.745	0.745	0.745
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text with respect to our patent-based innovation measures. The dependent variable is represented by the "all-in-spread drawn" (AISD). We replace the four main Hofstede dimensions with those that are analogous in Schwartz framework. The alternative measures for power distance, individualism, masculinity, and uncertainty avoidance are egalitarianism, autonomy, harmony, and embeddedness, respectively. All regressions use firm, bank, year, month, S&P quality rating, rating (bank-dependence), loan type, and purpose, fixed effects. Standard errors are clustered at bank-level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 9b: Alternative Measures of Culture (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Citations	-475.9*	-163.4	38.13	48.71				
	(261.5)	(143.7)	(73.61)	(187.5)				
IE_Citations *Egalitarianism	95.15*							
	(53.06)							
IE_Citations*Autonomy		37.45						
		(34.68)						
IE_Citations*Harmony			-11.43					
			(18.32)					
IE_Citations*Embeddedness				-16.93				
				(56.43)				
Citations					-77.02**	-17.78*	-6.865	28.88
					(32.08)	(9.636)	(15.66)	(29.97)
Citations *Egalitarianism					15.27**			
					(6.617)			
Citations*Autonomy						3.801		
						(2.503)		
Citations*Harmony							1.061	
							(3.776)	
Citations*Embeddedness								-9.329
								(8.863)
Egalitarianism	-44.77**				-48.94**			
	(19.25)				(20.88)			
Autonomy		-35.68**				-36.52**		
		(13.66)				(13.85)		
Harmony			12.80				11.91	
			(9.200)				(9.751)	
Embeddedness				23.63				27.20
				(21.48)				(23.22)
Firm Size	-16.62***	-16.64***	-16.81***	-16.82***	-16.54***	-16.46***	-16.36***	-16.56***
	(3.276)	(3.271)	(3.190)	(3.207)	(3.319)	(3.385)	(3.417)	(3.273)
Firm ROA	-52.20***	-51.30***	-51.17***	-51.64***	-50.99***	-50.52***	-51.39***	-50.95***
	(15.41)	(14.79)	(14.96)	(15.03)	(15.29)	(15.06)	(15.39)	(15.09)
Firm Z-Score	-8.282*	-8.380*	-8.447*	-8.389*	-8.427*	-8.439*	-8.454*	-8.454*
	(4.349)	(4.304)	(4.315)	(4.355)	(4.376)	(4.341)	(4.351)	(4.356)
Firm Liquidity	-51.57***	-52.48***	-52.69***	-51.67***	-50.83***	-52.36***	-51.94***	-50.71***
	(10.96)	(11.11)	(11.63)	(11.23)	(10.86)	(11.13)	(11.18)	(10.95)
Firm Tangibility	-20.02*	-20.10*	-20.40*	-20.23*	-19.98*	-20.21*	-19.91*	-20.07*
	(11.73)	(11.86)	(11.58)	(11.63)	(11.72)	(11.89)	(11.56)	(11.54)
Distance	-0.874	-0.806	-1.053	-0.963	-0.794	-0.747	-1.003	-0.904
	(1.363)	(1.369)	(1.342)	(1.377)	(1.395)	(1.379)	(1.372)	(1.407)
Relationship Dummy	1.346	1.114	1.199	1.339	1.368	1.174	1.238	1.378

	(2.635)	(2.614)	(2.585)	(2.631)	(2.545)	(2.548)	(2.519)	(2.559)
Bank Size	-16.52	-22.74**	-32.70***	-21.94*	-16.90	-22.96**	-32.94***	-22.58*
	(12.01)	(9.690)	(9.906)	(12.00)	(12.18)	(9.784)	(9.992)	(12.07)
Bank Tier 1 Capital Ratio	-2.506	-2.808	-2.346	-2.196	-2.374	-2.707	-2.301	-2.101
	(2.600)	(2.566)	(2.153)	(2.447)	(2.561)	(2.556)	(2.180)	(2.393)
Bank Provisions (Loan Losses) / Assets	639.9	714.6	786.8	768.4	624.6	698.1	762.5	739.2
	(932.4)	(891.6)	(860.8)	(908.3)	(936.1)	(899.2)	(871.7)	(913.7)
Vega	0.105	-0.0284	-0.171	0.110	0.114	-0.0239	-0.167	0.110
	(0.205)	(0.152)	(0.186)	(0.234)	(0.209)	(0.151)	(0.187)	(0.237)
Delta	-1.638	-1.357	-2.778	-0.942	-1.604	-1.309	-2.855	-0.949
	(2.528)	(2.206)	(2.856)	(2.661)	(2.534)	(2.195)	(2.925)	(2.656)
Loan Amount	-7.742***	-7.816***	-7.885***	-7.768***	-7.742***	-7.814***	-7.900***	-7.779***
	(1.159)	(1.175)	(1.185)	(1.169)	(1.161)	(1.168)	(1.192)	(1.170)
Loan Maturity	-8.814***	-8.835***	-8.672***	-8.748***	-8.780***	-8.823***	-8.665***	-8.740***
	(1.913)	(1.940)	(1.938)	(1.934)	(1.914)	(1.946)	(1.941)	(1.937)
Syndicate Size	-0.347***	-0.327***	-0.337***	-0.352***	-0.351***	-0.333***	-0.340***	-0.355***
	(0.0928)	(0.0932)	(0.0939)	(0.0922)	(0.0916)	(0.0933)	(0.0930)	(0.0914)
Secured	29.87***	30.04***	30.11***	29.90***	29.94***	30.10***	30.14***	29.90***
	(4.716)	(4.742)	(4.741)	(4.727)	(4.712)	(4.714)	(4.754)	(4.736)
Covenants	1.697	1.896	1.772	1.691	1.661	1.783	1.660	1.643
	(4.301)	(4.418)	(4.351)	(4.311)	(4.366)	(4.459)	(4.435)	(4.383)
Performance Pricing	-8.484***	-8.578***	-8.669***	-8.561***	-8.579***	-8.656***	-8.758***	-8.617***
	(1.785)	(1.809)	(1.791)	(1.780)	(1.821)	(1.809)	(1.789)	(1.774)
Constant	890.8***	901.2***	840.5***	657.2***	914.8***	906.0***	845.0***	651.9***
	(140.5)	(146.7)	(134.1)	(207.9)	(143.2)	(148.7)	(138.0)	(212.0)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.745	0.745	0.745	0.745	0.745	0.745	0.745	0.745
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text with respect to our citation-based innovation measures. The dependent variable is represented by the "all-in-spread drawn" (AISD). We replace the four main Hofstede dimensions with those that are analogous in Schwartz framework. The alternative measures for power distance, individualism, masculinity, and uncertainty avoidance are egalitarianism, autonomy, harmony, and embeddedness, respectively. All regressions use firm, bank, year, month, S&P quality rating, rating (bank-dependence), loan type, and purpose, fixed effects. Standard errors are clustered at bank-level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 10a: Controlling for all Cultural Dimensions (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Patents	38.40**	-48.07***	-60.32	20.15				
	(17.28)	(11.42)	(50.15)	(14.63)				
IE_Patents*PDI	-1.009***							
	(0.326)							
IE_Patents*INV		0.584***						
		(0.184)						
IE_Patents*MAS			0.951					
			(0.875)					
IE_Patents*UAI				-0.487***				
				(0.181)				
Patents					6.599***	-6.568***	-30.53***	2.366
					(2.044)	(1.380)	(4.748)	(1.576)
Patents*PDI					-0.185***			
					(0.0284)			
Patents*INV						0.0822***		
						(0.0152)		
Patents*MAS							0.471***	
							(0.0790)	
Patents*UAI								-0.0613***
								(0.0112)
PDI	0.665***	0.617**	0.586**	0.611**	0.720***	0.595**	0.516**	0.589**
	(0.245)	(0.243)	(0.245)	(0.243)	(0.237)	(0.248)	(0.243)	(0.247)
INV	0.111	0.0801	0.137	0.114	0.103	0.0542	0.118	0.103
	(0.265)	(0.268)	(0.264)	(0.265)	(0.258)	(0.263)	(0.249)	(0.261)
MAS	-0.191	-0.188	-0.346	-0.203	-0.151	-0.172	-0.632*	-0.186
	(0.359)	(0.353)	(0.431)	(0.355)	(0.348)	(0.357)	(0.328)	(0.357)
UAI	0.182	0.176	0.196	0.204	0.193	0.200	0.223	0.232
	(0.282)	(0.280)	(0.278)	(0.277)	(0.279)	(0.279)	(0.272)	(0.280)
Firm Size	-16.26***	-16.42***	-16.32***	-16.34***	-16.63***	-16.73***	-16.22***	-16.56***
	(3.489)	(3.480)	(3.405)	(3.502)	(3.682)	(3.569)	(3.649)	(3.645)
Firm ROA	-51.33***	-51.17***	-51.72***	-51.16***	-49.34***	-49.39***	-49.80***	-49.65***
	(15.03)	(15.01)	(14.96)	(15.03)	(15.64)	(15.49)	(15.45)	(15.62)
Firm Z-Score	-8.200*	-8.209*	-8.303*	-8.233*	-8.368*	-8.327*	-8.349*	-8.315*
	(4.261)	(4.258)	(4.295)	(4.255)	(4.330)	(4.315)	(4.306)	(4.303)
Firm Liquidity	-51.15***	-51.05***	-50.99***	-51.05***	-51.55***	-51.57***	-50.64***	-51.63***
	(10.87)	(10.86)	(11.01)	(10.86)	(10.81)	(10.88)	(10.92)	(10.82)
Firm Tangibility	-19.04	-19.62	-19.19	-19.42	-20.34	-20.89*	-19.41	-20.37
	(12.14)	(11.86)	(12.02)	(12.03)	(12.79)	(12.21)	(12.66)	(12.47)
Distance	-0.586	-0.575	-0.504	-0.563	-0.614	-0.572	-0.665	-0.583
	(1.382)	(1.390)	(1.403)	(1.387)	(1.364)	(1.379)	(1.416)	(1.372)
Relationship Dummy	1.097	1.074	1.051	1.048	1.131	1.075	1.105	1.080

	(2.529)	(2.520)	(2.539)	(2.519)	(2.514)	(2.504)	(2.538)	(2.517)
Bank Size	-14.92	-14.67	-14.43	-14.60	-15.19	-14.83	-16.04	-14.94
	(10.92)	(10.91)	(10.72)	(10.89)	(10.82)	(10.88)	(10.51)	(10.83)
Bank Tier 1 Capital Ratio	-3.682	-3.740	-3.665	-3.717	-3.505	-3.571	-3.643	-3.582
	(2.705)	(2.706)	(2.715)	(2.710)	(2.745)	(2.746)	(2.767)	(2.749)
Bank Provisions (Loan Losses) / Assets	222.2	238.7	235.2	243.4	259.7	248.7	258.6	256.2
	(1,015)	(1,021)	(1,015)	(1,021)	(1,015)	(1,020)	(1,022)	(1,021)
Vega	-0.0179	-0.0119	-0.0124	-0.0102	-0.0126	-0.0112	-0.0170	-0.0116
	(0.158)	(0.159)	(0.158)	(0.158)	(0.155)	(0.157)	(0.153)	(0.155)
Delta	-8.403***	-8.357***	-8.594***	-8.372***	-7.869***	-8.174***	-8.166***	-8.027***
	(2.753)	(2.742)	(2.710)	(2.751)	(2.714)	(2.723)	(2.759)	(2.738)
Loan Size	-7.831***	-7.830***	-7.793***	-7.819***	-7.781***	-7.796***	-7.735***	-7.788***
	(1.139)	(1.138)	(1.140)	(1.135)	(1.136)	(1.125)	(1.144)	(1.127)
Loan Maturity	-8.873***	-8.856***	-8.906***	-8.858***	-8.907***	-8.907***	-8.894***	-8.888***
	(1.922)	(1.924)	(1.930)	(1.928)	(1.931)	(1.926)	(1.927)	(1.938)
Syndicate Size	-0.319***	-0.321***	-0.316***	-0.321***	-0.321***	-0.321***	-0.323***	-0.322***
	(0.0925)	(0.0924)	(0.0933)	(0.0926)	(0.0927)	(0.0928)	(0.0926)	(0.0926)
Secured	30.30***	30.28***	30.33***	30.33***	30.51***	30.41***	30.41***	30.48***
	(4.729)	(4.766)	(4.755)	(4.751)	(4.691)	(4.730)	(4.631)	(4.717)
Covenants	1.761	1.756	1.770	1.734	1.899	1.883	1.873	1.827
	(4.430)	(4.465)	(4.424)	(4.453)	(4.349)	(4.408)	(4.362)	(4.388)
Performance Pricing	-8.687***	-8.725***	-8.688***	-8.722***	-8.644***	-8.671***	-8.766***	-8.668***
	(1.789)	(1.798)	(1.808)	(1.794)	(1.808)	(1.806)	(1.811)	(1.812)
Constant	671.0***	673.7***	675.8***	669.2***	668.3***	676.6***	715.1***	671.7***
	(135.3)	(135.4)	(133.8)	(135.1)	(134.6)	(135.2)	(133.0)	(134.8)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.746	0.746	0.746	0.746	0.747	0.746
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) with regards to patent-based innovation measures. Models 1-8 control for all cultural heritage dimensions of bank CEOs, within the same specification. The dependent variable is represented by the "all-in-spread drawn" (AISD). All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 10b: Controlling for all Cultural Dimensions (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Citations	35.68***	-44.98**	-35.84	6.348				
	(11.17)	(17.77)	(26.24)	(8.551)				
IE_Citations*PDI	-1.147***							
	(0.318)							
IE_Citations*INV		0.492**						
		(0.218)						
IE_Citations*MAS			0.500					
			(0.428)					
IE_Citations*UAI				-0.291*				
				(0.157)				
Citations					3.203*	-5.120***	-25.64***	-0.272
					(1.592)	(1.517)	(4.356)	(1.371)
Citations*PDI					-0.125***			
					(0.0272)			
Citations*INV						0.0459***		
						(0.0151)		
Citations*MAS							0.381***	
							(0.0619)	
Citations*UAI								-0.0319***
								(0.0116)
PDI	0.653***	0.611**	0.593**	0.604**	0.684***	0.605**	0.547**	0.601**
	(0.239)	(0.244)	(0.247)	(0.245)	(0.240)	(0.247)	(0.242)	(0.247)
INV	0.104	0.0814	0.119	0.109	0.0986	0.0841	0.102	0.109
	(0.270)	(0.263)	(0.265)	(0.265)	(0.262)	(0.265)	(0.255)	(0.263)
MAS	-0.199	-0.196	-0.266	-0.200	-0.169	-0.184	-0.527	-0.189
	(0.351)	(0.354)	(0.388)	(0.351)	(0.349)	(0.355)	(0.323)	(0.354)
UAI	0.170	0.163	0.182	0.184	0.177	0.187	0.197	0.203
	(0.284)	(0.274)	(0.279)	(0.278)	(0.277)	(0.278)	(0.273)	(0.279)
Firm Size	-16.16***	-16.27***	-16.31***	-16.26***	-16.29***	-16.25***	-16.06***	-16.17***
	(3.423)	(3.396)	(3.341)	(3.362)	(3.557)	(3.484)	(3.590)	(3.526)
Firm ROA	-51.74***	-51.20***	-52.31***	-51.38***	-49.75***	-50.14***	-50.11***	-50.37***
	(15.27)	(15.01)	(14.88)	(14.99)	(15.40)	(15.19)	(15.29)	(15.35)
Firm Z-Score	-8.246*	-8.260*	-8.329*	-8.270*	-8.379*	-8.345*	-8.364*	-8.328*
	(4.300)	(4.275)	(4.312)	(4.271)	(4.347)	(4.324)	(4.342)	(4.319)
Firm Liquidity	-50.60***	-50.64***	-50.72***	-50.78***	-50.82***	-50.82***	-50.26***	-50.92***
	(10.93)	(10.93)	(11.13)	(11.05)	(10.91)	(11.01)	(10.89)	(11.00)
Firm Tangibility	-19.18	-19.36	-19.31	-19.34	-19.61	-19.80	-19.02	-19.54
	(11.92)	(11.90)	(11.96)	(11.91)	(12.36)	(11.98)	(12.43)	(12.11)
Distance	-0.664	-0.636	-0.568	-0.606	-0.595	-0.563	-0.695	-0.567
	(1.365)	(1.373)	(1.404)	(1.391)	(1.389)	(1.396)	(1.436)	(1.398)
Relationship Dummy	0.990	0.950	1.007	0.959	1.095	1.061	1.072	1.065

	(2.629)	(2.592)	(2.567)	(2.596)	(2.530)	(2.527)	(2.546)	(2.534)
Bank Size	-15.07	-14.43	-14.43	-14.63	-15.09	-14.75	-15.94	-14.84
	(10.83)	(10.75)	(10.74)	(10.77)	(10.79)	(10.81)	(10.64)	(10.80)
Bank Tier 1 Capital Ratio	-3.739	-3.757	-3.672	-3.718	-3.552	-3.598	-3.695	-3.601
	(2.738)	(2.739)	(2.722)	(2.733)	(2.723)	(2.727)	(2.752)	(2.729)
Bank Provisions (Loan Losses) / Assets	226.9	239.7	235.1	236.4	233.7	226.9	232.1	229.3
	(1,015)	(1,015)	(1,015)	(1,016)	(1,018)	(1,021)	(1,022)	(1,022)
Vega	-0.0178	-0.0100	-0.0104	-0.0135	-0.0166	-0.0121	-0.0185	-0.0145
	(0.163)	(0.162)	(0.159)	(0.162)	(0.161)	(0.159)	(0.160)	(0.159)
Delta	-8.331***	-8.280***	-8.403***	-8.291***	-8.080***	-8.281***	-8.251***	-8.203***
	(2.770)	(2.727)	(2.742)	(2.749)	(2.711)	(2.731)	(2.756)	(2.737)
Loan Size	-7.761***	-7.796***	-7.784***	-7.792***	-7.764***	-7.798***	-7.718***	-7.791***
	(1.133)	(1.140)	(1.139)	(1.137)	(1.136)	(1.130)	(1.145)	(1.133)
Loan Maturity	-8.879***	-8.875***	-8.904***	-8.852***	-8.860***	-8.866***	-8.876***	-8.853***
	(1.911)	(1.917)	(1.918)	(1.918)	(1.936)	(1.931)	(1.926)	(1.937)
Syndicate Size	-0.307***	-0.308***	-0.313***	-0.310***	-0.315***	-0.315***	-0.317***	-0.316***
	(0.0917)	(0.0922)	(0.0937)	(0.0925)	(0.0927)	(0.0932)	(0.0924)	(0.0931)
Secured	30.09***	30.20***	30.28***	30.23***	30.45***	30.38***	30.34***	30.41***
	(4.683)	(4.773)	(4.759)	(4.754)	(4.718)	(4.741)	(4.647)	(4.735)
Covenants	1.870	1.878	1.789	1.831	1.765	1.749	1.842	1.710
	(4.363)	(4.411)	(4.411)	(4.388)	(4.415)	(4.449)	(4.420)	(4.436)
Performance Pricing	-8.600***	-8.656***	-8.667***	-8.659***	-8.724***	-8.739***	-8.828***	-8.737***
	(1.773)	(1.805)	(1.812)	(1.805)	(1.820)	(1.813)	(1.819)	(1.812)
Constant	674.7***	670.3***	671.7***	669.9***	670.0***	671.9***	708.8***	669.8***
	(134.7)	(133.8)	(134.0)	(134.7)	(134.4)	(134.8)	(135.5)	(134.8)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) with regards to citation-based innovation measures. Models 1-8 control for all cultural heritage dimensions of bank CEOs, within the same specification. The dependent variable is represented by the "all-in-spread drawn" (AISD). All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 10c: Horserace Model

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread
IE_Patents	-1.923			
	(6.103)			
Patents		-1.335		
		(1.034)		
IE_Citations			-7.628	
			(4.746)	
Citations				-2.166**
				(0.903)
IE_Patents*PDI Residuals	-3.802**			
	(1.647)			
IE_Patents*INV Residuals	3.627			
	(2.253)			
IE_Patents*MAS Residuals	2.007			
	(1.198)			
IE_Patents*UAI Residuals	-3.463			
	(2.279)			
Patents*PDI Residuals		-0.973***		
		(0.152)		
Patents*INV Residuals		0.869***		
		(0.134)		
Patents*MAS Residuals		0.842***		
		(0.188)		
Patents*UAI Residuals		-0.722***		
		(0.128)		
IE_Citations*PDI Residuals			-5.131***	
			(1.220)	
IE_Citations*INV Residuals			4.220***	
			(1.446)	
IE_Citations*MAS Residuals			2.434***	
			(0.717)	
IE_Citations*UAI Residuals			-3.042**	
			(1.392)	
Citations*PDI Residuals				-0.665***
				(0.163)
Citations*INV Residuals				0.513***
				(0.149)
Citations*MAS Residuals				0.680***
				(0.174)
Citations*UAI Residuals				-0.415***
				(0.143)

PDI Residuals	3.538***	3.983***	3.538***	3.754***
	(0.654)	(0.684)	(0.668)	(0.698)
INV Residuals	-3.695***	-4.144***	-3.668***	-3.858***
	(0.823)	(0.869)	(0.844)	(0.895)
MAS Residuals	-1.660***	-2.125***	-1.634***	-1.998***
	(0.468)	(0.412)	(0.413)	(0.398)
UAI Residuals	3.886***	4.275***	3.793***	3.996***
	(0.858)	(0.902)	(0.889)	(0.918)
Firm Size	-16.29***	-16.34***	-16.17***	-15.90***
	(3.465)	(3.516)	(3.417)	(3.428)
Firm ROA	-51.58***	-49.96***	-53.10***	-50.93***
	(14.99)	(15.47)	(15.08)	(14.96)
Firm Z-Score	-8.229*	-8.415*	-8.234*	-8.375*
	(4.298)	(4.377)	(4.370)	(4.381)
Firm Liquidity	-51.13***	-49.95***	-50.26***	-48.93***
	(10.90)	(11.03)	(10.94)	(11.02)
Firm Tangibility	-18.99	-19.75	-19.08	-18.70
	(11.98)	(12.32)	(12.01)	(12.00)
Distance	-0.553	-0.668	-0.705	-0.687
	(1.381)	(1.458)	(1.369)	(1.484)
Relationship Dummy	1.115	1.125	1.139	1.084
	(2.534)	(2.505)	(2.592)	(2.527)
Bank Size	-14.79	-16.10	-14.72	-15.99
	(10.83)	(10.64)	(10.90)	(10.69)
Bank Tier 1 Capital Ratio	-3.678	-3.563	-3.709	-3.667
	(2.686)	(2.760)	(2.709)	(2.738)
Bank Provisions (Loan Losses) / Assets	223.9	228.3	218.4	205.3
	(1,027)	(1,021)	(1,015)	(1,020)
Vega	-0.0189	-0.0163	-0.0102	-0.00580
	(0.157)	(0.159)	(0.160)	(0.164)
Delta	-8.545***	-8.398***	-8.418***	-8.489***
	(2.698)	(2.789)	(2.705)	(2.790)
Loan Size	-7.821***	-7.746***	-7.748***	-7.719***
	(1.146)	(1.159)	(1.149)	(1.169)
Loan Maturity	-8.896***	-8.940***	-9.010***	-8.899***
	(1.919)	(1.892)	(1.891)	(1.891)
Syndicate Size	-0.317***	-0.319***	-0.307***	-0.313***
	(0.0929)	(0.0927)	(0.0940)	(0.0930)
Secured	30.27***	30.24***	30.08***	30.25***
	(4.756)	(4.688)	(4.730)	(4.710)
Covenants	1.782	2.017	1.876	1.955
	(4.436)	(4.370)	(4.389)	(4.435)
Performance Pricing	-8.675***	-8.771***	-8.568***	-8.862***
	(1.796)	(1.808)	(1.799)	(1.826)
Constant	704.2***	721.2***	702.6***	717.7***
	(144.2)	(140.8)	(145.4)	(141.8)

Observations	11,997	11,997	11,997	11,997
R-squared	0.746	0.747	0.746	0.747
Firm FE	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO
Month FE	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank

This table present the results of the horserace models 1-4 that comprises of the interactions of all cultural heritage attributes of bank CEOs with our innovation measures. In order to reduce the collinearity issues common in such tests, we replace the cultural heritage values with the residuals from regressions that use as dependent variable, a cultural heritage characteristic and as explanatory variables the remaining cultural heritage characteristics. The dependent variable is represented by the "all-in-spread drawn" (AISD). All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 11a: Alternative Clustering of Standard Errors (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
					Panel A: Bank and firm level clustering			
IE_Patents	38.12*	-47.38**	-70.35*	18.31				
	(21.39)	(22.11)	(35.93)	(14.66)				
IE_Patents*PDI	-0.997**							
	(0.499)							
IE_Patents*INV		0.566**						
		(0.285)						
IE_Patents*MAS			1.096*					
			(0.586)					
IE_Patents*UAI				-0.464*				
				(0.248)				
Patents					6.502	-6.820**	-31.86***	2.473
					(4.271)	(3.288)	(8.754)	(3.491)
Patents*PDI					-0.182**			
					(0.0745)			
Patents*INV						0.0853*		
						(0.0482)		
Patents*MAS							0.486***	
							(0.142)	
Patents*UAI								-0.0647*
								(0.0364)
PDI	0.831***				0.893***			
	(0.204)				(0.213)			
INV		-0.437***				-0.478***		
		(0.120)				(0.129)		
MAS			-1.203***				-1.481***	
			(0.349)				(0.382)	
UAI				0.403***				0.433***
				(0.104)				(0.110)
Constant	641.4***	815.4***	796.2***	806.8***	636.7***	813.8***	821.4***	804.1***
	(133.9)	(134.6)	(134.1)	(132.9)	(133.8)	(134.4)	(133.7)	(132.6)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.745	0.746	0.746	0.746	0.746	0.746
					Panel B: CEO clustering			
IE_Patents	38.12**	-47.38***	-70.35*	18.31				
	(19.01)	(14.40)	(42.32)	(12.49)				
IE_Patents*PDI	-0.997**							
	(0.427)							

IE_Patents*INV		0.566***						
		(0.195)						
IE_Patents*MAS			1.096					
			(0.712)					
IE_Patents*UAI				-0.464***				
				(0.157)				
Patents					6.502**	-6.820***	-31.86***	2.473
					(2.697)	(1.783)	(4.663)	(2.514)
Patents*PDI					-0.182***			
					(0.0314)			
Patents*INV						0.0853***		
						(0.0217)		
Patents*MAS							0.486***	
							(0.0884)	
Patents*UAI								-0.0647***
								(0.0172)
PDI	0.831***				0.893***			
	(0.144)				(0.141)			
INV		-0.437***				-0.478***		
		(0.108)				(0.110)		
MAS			-1.203***				-1.481***	
			(0.363)				(0.306)	
UAI				0.403***				0.433***
				(0.105)				(0.106)
Constant	641.4***	815.4***	796.2***	806.8***	636.7***	813.8***	821.4***	804.1***
	(137.8)	(129.9)	(122.4)	(125.4)	(136.9)	(129.9)	(124.6)	(125.0)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.745	0.746	0.746	0.746	0.746	0.746
Panel C: CEO ancestral country of origin clustering								
IE_Patents	38.12**	-47.38***	-70.35	18.31**				
	(15.35)	(13.91)	(47.38)	(7.508)				
IE_Patents*PDI	-0.997**							
	(0.407)							
IE_Patents*INV		0.566***						
		(0.154)						
IE_Patents*MAS			1.096					
			(0.779)					
IE_Patents*UAI				-0.464***				
				(0.136)				
Patents					6.502**	-6.820***	-31.86***	2.473
					(2.650)	(1.290)	(5.322)	(2.720)
Patents*PDI					-0.182***			
					(0.0335)			

Patents*INV						0.0853***		
						(0.0266)		
Patents*MAS							0.486***	
							(0.0989)	
Patents*UAI								-0.0647**
								(0.0234)
PDI	0.831***				0.893***			
	(0.147)				(0.143)			
INV		-0.437***				-0.478***		
		(0.0873)				(0.0955)		
MAS			-1.203***				-1.481***	
			(0.361)				(0.289)	
UAI				0.403***				0.433***
				(0.0978)				(0.108)
Constant	641.4***	815.4***	796.2***	806.8***	636.7***	813.8***	821.4***	804.1***
	(175.3)	(173.2)	(159.7)	(172.8)	(171.5)	(171.3)	(161.9)	(170.0)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.745	0.746	0.746	0.746	0.746	0.746
Variables and FE included in all Panels								
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our patent-based innovation measures. All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Panel A includes estimations with bank and firm-level clustering. Panel B includes estimations with CEO-level clustering and Panel C estimations with CEO country of origin-level clustering. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 11b: Alternative Clustering of Standard Errors (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
Panel A: Bank and firm level clustering								
IE_Citations	35.72**	-44.42**	-40.58*	5.765				
	(15.42)	(18.24)	(20.89)	(11.00)				
IE_Citations*PDI	-1.144***							
	(0.389)							
IE_Citations*INV		0.478*						
		(0.248)						
IE_Citations*MAS			0.562*					
			(0.338)					
IE_Citations*UAI				-0.284				
				(0.186)				
Citations					3.181	-5.247*	-26.61***	-0.0935
					(3.813)	(3.087)	(7.931)	(3.133)
Citations*PDI					-0.124*			
					(0.0703)			
Citations*INV						0.0479		
						(0.0468)		
Citations*MAS							0.393***	
							(0.128)	
Citations*UAI								-0.0350
								(0.0358)
PDI	0.816***				0.850***			
	(0.203)				(0.214)			
INV		-0.423***				-0.441***		
		(0.119)				(0.128)		
MAS			-1.125***				-1.389***	
			(0.336)				(0.374)	
UAI				0.386***				0.403***
				(0.102)				(0.108)
Constant	645.9***	810.7***	792.8***	805.7***	640.2***	811.5***	820.9***	804.9***
	(134.4)	(134.7)	(134.1)	(133.3)	(134.1)	(134.7)	(134.1)	(133.0)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.745	0.745	0.745	0.746	0.745	0.746	0.746
Panel B: CEO clustering								
IE_Citations	35.72***	-44.42**	-40.58	5.765				
	(12.47)	(19.72)	(27.64)	(9.980)				

IE_Citations*PDI	-1.144***							
	(0.346)							
IE_Citations*INV		0.478*						
		(0.250)						
IE_Citations*MAS			0.562					
			(0.447)					
IE_Citations*UAI				-0.284				
				(0.186)				
Citations					3.181	-5.247**	-26.61***	-0.0935
					(1.925)	(2.169)	(4.387)	(1.853)
Citations*PDI					-0.124***			
					(0.0332)			
Citations*INV						0.0479***		
						(0.0162)		
Citations*MAS							0.393***	
							(0.0700)	
Citations*UAI								-0.0350**
								(0.0151)
PDI	0.816***				0.850***			
	(0.142)				(0.149)			
INV		-0.423***				-0.441***		
		(0.110)				(0.112)		
MAS			-1.125***				-1.389***	
			(0.343)				(0.306)	
UAI				0.386***				0.403***
				(0.106)				(0.109)
Constant	645.9***	810.7***	792.8***	805.7***	640.2***	811.5***	820.9***	804.9***
	(136.1)	(128.0)	(121.7)	(124.5)	(137.2)	(130.1)	(125.2)	(125.6)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.745	0.745	0.745	0.746	0.745	0.746	0.746
Panel C: CEO ancestral country of origin clustering								
IE_Citations	35.72***	-44.42*	-40.58	5.765				
	(10.95)	(22.16)	(31.90)	(6.644)				
IE_Citations*PDI	-1.144***							
	(0.367)							
IE_Citations*INV		0.478*						
		(0.252)						
IE_Citations*MAS			0.562					
			(0.508)					
IE_Citations*UAI				-0.284				
				(0.173)				
Citations					3.181	-5.247**	-26.61***	-0.0935
					(2.547)	(2.105)	(4.443)	(2.495)

Citations*PDI					-0.124***			
					(0.0347)			
Citations*INV						0.0479**		
						(0.0189)		
Citations*MAS							0.393***	
							(0.0776)	
Citations*UAI								-0.0350*
								(0.0194)
PDI	0.816***				0.850***			
	(0.144)				(0.149)			
INV		-0.423***				-0.441***		
		(0.0915)				(0.0953)		
MAS			-1.125***				-1.389***	
			(0.330)				(0.289)	
UAI				0.386***				0.403***
				(0.0976)				(0.107)
Constant	645.9***	810.7***	792.8***	805.7***	640.2***	811.5***	820.9***	804.9***
	(174.6)	(171.7)	(160.0)	(172.2)	(173.6)	(171.9)	(163.1)	(171.5)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.745	0.745	0.745	0.746	0.745	0.746	0.746
Variables and FE included in all Panels								
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our citation-based innovation measures. All regressions use firm, bank, year, month, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Panel A includes estimations with bank and firm-level clustering. Panel B includes estimations with CEO-level clustering and Panel C estimations with CEO country of origin-level clustering. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 12a: CEO Ancestral Origin Fixed Effects (patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Patents	38.98**	-47.28***	-54.48	20.25				
	(17.78)	(11.28)	(52.61)	(14.81)				
IE_Patents*PDI	-1.011***							
	(0.338)							
IE_Patents*INV		0.580***						
		(0.185)						
IE_Patents*MAS			0.862					
			(0.915)					
IE_Patents*UAI				-0.478**				
				(0.183)				
Patents					6.559***	-6.261***	-29.78***	2.301
					(2.088)	(1.246)	(4.992)	(1.605)
Patents*PDI					-0.182***			
					(0.0298)			
Patents*INV						0.0792***		
						(0.0137)		
Patents*MAS							0.461***	
							(0.0842)	
Patents*UAI								-0.0584***
								(0.0107)
Firm Size	-16.08***	-16.24***	-16.15***	-16.16***	-16.44***	-16.53***	-16.09***	-16.36***
	(3.453)	(3.445)	(3.358)	(3.465)	(3.656)	(3.550)	(3.615)	(3.623)
Firm ROA	-50.92***	-50.76***	-51.28***	-50.75***	-48.88***	-49.03***	-49.39***	-49.28***
	(15.09)	(15.08)	(15.03)	(15.08)	(15.67)	(15.54)	(15.51)	(15.68)
Firm Z-Score	-8.289*	-8.296*	-8.367*	-8.319*	-8.448*	-8.411*	-8.405*	-8.399*
	(4.334)	(4.331)	(4.353)	(4.328)	(4.396)	(4.385)	(4.368)	(4.373)
Firm Liquidity	-50.48***	-50.41***	-50.50***	-50.41***	-50.86***	-50.85***	-50.28***	-50.91***
	(11.01)	(10.98)	(11.13)	(10.99)	(10.96)	(11.01)	(10.96)	(10.95)
Firm Tangibility	-19.09	-19.67	-19.29	-19.47	-20.33	-20.85*	-19.50	-20.34
	(12.08)	(11.80)	(11.95)	(11.97)	(12.73)	(12.18)	(12.58)	(12.42)
Distance	-0.620	-0.606	-0.527	-0.595	-0.661	-0.611	-0.690	-0.626
	(1.400)	(1.407)	(1.422)	(1.404)	(1.386)	(1.399)	(1.434)	(1.394)
Relationship Dummy	1.074	1.049	1.022	1.022	1.090	1.046	1.090	1.049
	(2.472)	(2.462)	(2.482)	(2.462)	(2.467)	(2.454)	(2.484)	(2.466)
Bank Size	-18.32*	-18.19*	-17.72*	-18.12*	-18.81*	-18.49*	-18.47*	-18.50*
	(10.26)	(10.23)	(10.29)	(10.23)	(10.17)	(10.20)	(10.04)	(10.18)
Bank Tier 1 Capital Ratio	-3.781	-3.847	-3.760	-3.825	-3.628	-3.686	-3.655	-3.689
	(2.941)	(2.940)	(2.954)	(2.944)	(2.976)	(2.981)	(3.001)	(2.985)
Bank Provisions (Loan Losses) / Assets	243.2	257.2	244.6	263.0	292.0	273.5	253.3	279.3
	(1,043)	(1,048)	(1,042)	(1,049)	(1,043)	(1,048)	(1,056)	(1,050)
Vega	-0.276	-0.273	-0.267	-0.268	-0.248	-0.252	-0.234	-0.248

	(0.315)	(0.312)	(0.314)	(0.311)	(0.312)	(0.311)	(0.312)	(0.309)
Delta	-7.561***	-7.424**	-7.562***	-7.466**	-7.219**	-7.323**	-7.265**	-7.228**
	(2.813)	(2.820)	(2.791)	(2.820)	(2.809)	(2.807)	(2.882)	(2.818)
Loan Size	-7.774***	-7.775***	-7.748***	-7.764***	-7.731***	-7.743***	-7.684***	-7.735***
	(1.156)	(1.154)	(1.155)	(1.151)	(1.153)	(1.141)	(1.160)	(1.144)
Loan Maturity	-8.876***	-8.858***	-8.906***	-8.860***	-8.897***	-8.903***	-8.901***	-8.884***
	(1.927)	(1.930)	(1.939)	(1.934)	(1.941)	(1.935)	(1.934)	(1.945)
Syndicate Size	-0.321***	-0.323***	-0.318***	-0.324***	-0.323***	-0.323***	-0.327***	-0.324***
	(0.0921)	(0.0920)	(0.0927)	(0.0922)	(0.0921)	(0.0924)	(0.0921)	(0.0922)
Secured	30.11***	30.10***	30.18***	30.15***	30.35***	30.22***	30.28***	30.30***
	(4.705)	(4.744)	(4.732)	(4.729)	(4.675)	(4.707)	(4.622)	(4.698)
Covenants	1.988	1.981	1.970	1.958	2.106	2.100	2.065	2.044
	(4.402)	(4.437)	(4.409)	(4.425)	(4.320)	(4.377)	(4.344)	(4.359)
Performance Pricing	-8.739***	-8.776***	-8.734***	-8.773***	-8.690***	-8.725***	-8.800***	-8.721***
	(1.825)	(1.833)	(1.846)	(1.830)	(1.840)	(1.840)	(1.848)	(1.845)
Constant	744.6***	744.0***	736.5***	742.4***	750.9***	748.7***	744.3***	746.9***
	(131.9)	(131.0)	(132.0)	(131.0)	(130.8)	(130.8)	(128.9)	(130.6)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.746	0.746	0.747	0.746	0.747	0.746
CEO country of origin FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our patent-based innovation measure. All regressions use firm, bank, year, month, CEO country of origin FE, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 12b: CEO Ancestral Origin Fixed Effects (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Citations	38.32***	-44.24**	-33.54	7.954				
	(10.49)	(17.65)	(26.53)	(8.757)				
IE_Citations*PDI	-1.186***							
	(0.302)							
IE_Citations*INV		0.497**						
		(0.212)						
IE_Citations*MAS			0.479					
			(0.433)					
IE_Citations*UAI				-0.301*				
				(0.158)				
Citations					3.274**	-4.825***	-24.94***	-0.240
					(1.612)	(1.332)	(4.295)	(1.375)
Citations*PDI					-0.123***			
					(0.0273)			
Citations*INV						0.0440***		
						(0.0130)		
Citations*MAS							0.372***	
							(0.0638)	
Citations*UAI								-0.0296***
								(0.0104)
Firm Size	-15.97***	-16.09***	-16.14***	-16.08***	-16.12***	-16.08***	-15.93***	-16.00***
	(3.383)	(3.356)	(3.295)	(3.320)	(3.529)	(3.459)	(3.554)	(3.498)
Firm ROA	-51.30***	-50.74***	-51.83***	-50.91***	-49.33***	-49.77***	-49.72***	-50.01***
	(15.37)	(15.10)	(14.96)	(15.07)	(15.44)	(15.25)	(15.35)	(15.40)
Firm Z-Score	-8.336*	-8.349*	-8.405*	-8.358*	-8.459*	-8.427*	-8.429*	-8.408*
	(4.375)	(4.349)	(4.378)	(4.345)	(4.414)	(4.393)	(4.407)	(4.388)
Firm Liquidity	-49.97***	-49.99***	-50.17***	-50.15***	-50.18***	-50.17***	-49.85***	-50.26***
	(11.07)	(11.04)	(11.24)	(11.16)	(11.05)	(11.13)	(10.95)	(11.12)
Firm Tangibility	-19.24	-19.40	-19.38	-19.39	-19.65	-19.83	-19.14	-19.56
	(11.86)	(11.84)	(11.89)	(11.85)	(12.30)	(11.94)	(12.35)	(12.06)
Distance	-0.696	-0.667	-0.591	-0.636	-0.635	-0.599	-0.720	-0.603
	(1.382)	(1.392)	(1.421)	(1.409)	(1.409)	(1.415)	(1.454)	(1.419)
Relationship Dummy	0.961	0.921	0.980	0.927	1.059	1.030	1.055	1.033
	(2.565)	(2.533)	(2.503)	(2.534)	(2.479)	(2.474)	(2.489)	(2.481)
Bank Size	-18.54*	-18.07*	-17.87*	-18.25*	-18.66*	-18.44*	-18.61*	-18.48*
	(10.21)	(10.11)	(10.20)	(10.14)	(10.15)	(10.15)	(10.04)	(10.14)
Bank Tier 1 Capital Ratio	-3.847	-3.860	-3.770	-3.826	-3.671	-3.713	-3.724	-3.715
	(2.966)	(2.965)	(2.957)	(2.962)	(2.955)	(2.961)	(2.987)	(2.963)
Bank Provisions (Loan Losses) / Assets	240.9	259.8	246.6	254.3	260.1	252.0	231.4	252.7
	(1,044)	(1,043)	(1,043)	(1,045)	(1,046)	(1,049)	(1,055)	(1,050)
Vega	-0.285	-0.262	-0.266	-0.270	-0.263	-0.259	-0.251	-0.260

	(0.319)	(0.311)	(0.316)	(0.315)	(0.313)	(0.311)	(0.314)	(0.311)
Delta	-7.472**	-7.316**	-7.417**	-7.339**	-7.308**	-7.345**	-7.300**	-7.292**
	(2.864)	(2.835)	(2.830)	(2.835)	(2.819)	(2.817)	(2.880)	(2.822)
Loan Size	-7.707***	-7.743***	-7.735***	-7.738***	-7.714***	-7.745***	-7.667***	-7.739***
	(1.150)	(1.156)	(1.154)	(1.154)	(1.153)	(1.147)	(1.162)	(1.150)
Loan Maturity	-8.886***	-8.882***	-8.908***	-8.858***	-8.856***	-8.866***	-8.883***	-8.853***
	(1.915)	(1.923)	(1.924)	(1.924)	(1.944)	(1.939)	(1.932)	(1.944)
Syndicate Size	-0.310***	-0.310***	-0.316***	-0.313***	-0.317***	-0.317***	-0.320***	-0.318***
	(0.0910)	(0.0914)	(0.0929)	(0.0916)	(0.0922)	(0.0927)	(0.0919)	(0.0926)
Secured	29.90***	30.02***	30.11***	30.05***	30.27***	30.20***	30.18***	30.22***
	(4.658)	(4.745)	(4.737)	(4.728)	(4.698)	(4.718)	(4.632)	(4.714)
Covenants	2.095	2.101	1.999	2.054	1.982	1.973	2.047	1.933
	(4.335)	(4.384)	(4.394)	(4.362)	(4.384)	(4.416)	(4.396)	(4.406)
Performance Pricing	-8.650***	-8.712***	-8.718***	-8.713***	-8.770***	-8.790***	-8.864***	-8.787***
	(1.807)	(1.837)	(1.846)	(1.838)	(1.855)	(1.848)	(1.856)	(1.848)
Constant	747.1***	740.6***	737.8***	742.5***	747.6***	745.1***	746.2***	744.6***
	(131.3)	(129.0)	(130.7)	(130.0)	(130.0)	(129.9)	(128.8)	(129.9)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.746	0.746	0.746	0.746	0.747	0.746
CEO country of origin FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension to our citation-based innovation measure. All regressions use firm, bank, year, month, CEO country of origin FE, S&P quality rating, rated (bank-dependence), loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 13a: Baseline Estimations (contemporaneous patent-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Patents	40.04***	-45.03**	-98.44*	13.84***				
	(8.026)	(20.57)	(52.22)	(4.536)				
IE_Patents*PDI	-1.074***							
	(0.253)							
IE_Patents*INV		0.535**						
		(0.219)						
IE_Patents*MAS			1.521*					
			(0.806)					
IE_Patents*UAI				-0.337***				
				(0.122)				
Patents					7.587**	-5.578***	-28.31***	4.397*
					(3.025)	(1.799)	(4.397)	(2.455)
Patents*PDI					-0.166***			
					(0.0312)			
Patents*INV						0.0979***		
						(0.0152)		
Patents*MAS							0.456***	
							(0.0777)	
Patents*UAI								-0.0645***
								(0.0138)
PDI	0.823***				0.884***			
	(0.174)				(0.158)			
INV		-0.431***				-0.493***		
		(0.135)				(0.129)		
MAS			-1.207***				-1.465***	
			(0.447)				(0.376)	
UAI				0.393***				0.435***
				(0.125)				(0.115)
Firm Size	-16.39***	-16.40***	-16.35***	-16.37***	-16.89***	-17.06***	-16.41***	-16.83***
	(3.455)	(3.451)	(3.411)	(3.458)	(3.681)	(3.669)	(3.683)	(3.759)
Firm ROA	-50.99***	-50.53***	-51.23***	-50.84***	-49.42***	-48.49***	-50.35***	-49.23***
	(15.04)	(14.53)	(15.26)	(14.63)	(15.81)	(15.30)	(15.67)	(15.48)
Firm Z-Score	-8.280*	-8.312*	-8.180*	-8.333*	-8.333*	-8.375*	-8.180*	-8.372*
	(4.259)	(4.252)	(4.241)	(4.254)	(4.329)	(4.310)	(4.275)	(4.292)
Firm Liquidity	-50.97***	-52.15***	-51.51***	-52.64***	-51.41***	-52.80***	-51.36***	-53.35***
	(10.88)	(11.16)	(10.73)	(11.18)	(10.75)	(11.01)	(10.44)	(10.94)
Firm Tangibility	-19.20	-19.76	-20.18*	-19.66	-20.30	-21.46*	-20.62	-20.78
	(12.06)	(11.87)	(11.74)	(11.99)	(12.84)	(12.41)	(12.42)	(12.71)
Distance	-0.607	-0.634	-0.564	-0.718	-0.699	-0.693	-0.771	-0.778
	(1.374)	(1.402)	(1.373)	(1.379)	(1.369)	(1.387)	(1.392)	(1.369)
Relationship Dummy	1.024	1.076	1.530	1.123	1.045	1.003	1.455	1.101

	(2.516)	(2.517)	(2.486)	(2.521)	(2.551)	(2.544)	(2.531)	(2.560)
Bank Size	-13.00	-23.20**	-18.83*	-25.47***	-13.03	-22.82**	-19.35*	-25.45***
	(10.43)	(10.01)	(10.13)	(8.916)	(10.47)	(10.27)	(10.13)	(8.982)
Bank Tier 1 Capital Ratio	-3.598	-3.594	-3.120	-3.285	-3.495	-3.481	-3.082	-3.193
	(2.692)	(2.664)	(2.623)	(2.545)	(2.776)	(2.716)	(2.714)	(2.596)
Bank Provisions (Loan Losses) / Assets	315.2	739.8	599.4	514.6	307.2	732.3	575.0	504.5
	(970.1)	(895.6)	(938.3)	(936.0)	(967.5)	(895.4)	(935.9)	(931.2)
Vega	0.0270	-0.0171	0.00250	-0.0991	0.0491	-0.00485	0.0195	-0.0907
	(0.163)	(0.147)	(0.169)	(0.121)	(0.159)	(0.141)	(0.162)	(0.114)
Delta	-7.358***	-3.787*	-4.171	-6.284**	-6.976***	-3.574	-3.785	-6.111**
	(2.317)	(2.196)	(2.787)	(2.916)	(2.316)	(2.134)	(2.732)	(2.866)
Loan Amount	-7.795***	-7.849***	-7.767***	-7.892***	-7.752***	-7.810***	-7.703***	-7.861***
	(1.143)	(1.164)	(1.164)	(1.171)	(1.144)	(1.147)	(1.171)	(1.161)
Loan Maturity	-8.878***	-8.849***	-8.712***	-8.848***	-8.935***	-8.927***	-8.780***	-8.880***
	(1.928)	(1.966)	(1.985)	(1.957)	(1.945)	(1.970)	(1.990)	(1.970)
Syndicate Size	-0.325***	-0.315***	-0.342***	-0.313***	-0.326***	-0.315***	-0.350***	-0.315***
	(0.0929)	(0.0942)	(0.0922)	(0.0926)	(0.0919)	(0.0933)	(0.0907)	(0.0916)
Secured	30.29***	30.19***	29.94***	30.37***	30.49***	30.33***	29.97***	30.54***
	(4.671)	(4.717)	(4.663)	(4.727)	(4.651)	(4.661)	(4.544)	(4.691)
Covenants	1.674	1.886	1.687	1.937	1.817	2.057	1.876	2.056
	(4.377)	(4.505)	(4.420)	(4.501)	(4.253)	(4.415)	(4.332)	(4.414)
Performance Pricing	-8.690***	-8.706***	-8.505***	-8.753***	-8.585***	-8.559***	-8.541***	-8.643***
	(1.819)	(1.846)	(1.838)	(1.836)	(1.844)	(1.851)	(1.869)	(1.856)
Constant	638.0***	811.0***	795.8***	804.1***	636.2***	812.8***	817.5***	802.9***
	(135.1)	(132.3)	(121.9)	(120.8)	(134.4)	(134.1)	(123.4)	(120.5)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.745	0.745	0.746	0.746	0.746	0.746
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension (PDI, INV, MAS, and UAI) to our innovation proxies. In this version, we use the contemporaneous innovation variables where the time placer is the grant date, and the loan inception is time (t0). We calculate IE_Patents as the patent counts are scaled by cumulative R&D expense over the previous five years, assuming an annual depreciation rate of 20%. Patents is calculated as ln(1+Patents) where patents have been adjusted for truncation. Regressions 1-8 include firm, bank, year, month, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 13b: : Baseline Estimations (contemporaneous citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
IE_Citations	32.93***	-43.30***	-88.33*	11.93				
	(10.98)	(15.91)	(46.38)	(12.25)				
IE_Citations*PDI	-0.965***							
	(0.242)							
IE_Citations*INV		0.524**						
		(0.242)						
IE_Citations*MAS			1.322*					
			(0.745)					
IE_Citations*UAI				-0.312*				
				(0.164)				
Citations					4.774***	-7.073***	-29.84***	1.219
					(1.347)	(1.675)	(4.097)	(1.086)
Citations*PDI					-0.159***			
					(0.0245)			
Citations*INV						0.0788***		
						(0.0198)		
Citations*MAS							0.444***	
							(0.0630)	
Citations*UAI								-0.0535***
								(0.0121)
PDI	0.810***				0.874***			
	(0.176)				(0.173)			
INV		-0.425***				-0.468***		
		(0.134)				(0.137)		
MAS			-1.200**				-1.423***	
			(0.447)				(0.400)	
UAI				0.387***				0.419***
				(0.123)				(0.122)
Firm Size	-16.30***	-16.27***	-16.26***	-16.33***	-16.49***	-16.41***	-16.05***	-16.35***
	(3.341)	(3.394)	(3.342)	(3.364)	(3.470)	(3.501)	(3.530)	(3.537)
Firm ROA	-50.87***	-50.18***	-51.42***	-50.61***	-49.54***	-49.06***	-50.48***	-49.57***
	(15.15)	(14.48)	(15.25)	(14.58)	(15.78)	(15.15)	(15.73)	(15.34)
Firm Z-Score	-8.288*	-8.329*	-8.215*	-8.350*	-8.399*	-8.424*	-8.240*	-8.422*
	(4.287)	(4.265)	(4.273)	(4.266)	(4.385)	(4.351)	(4.334)	(4.338)
Firm Liquidity	-50.51***	-52.06***	-51.15***	-52.67***	-51.02***	-52.40***	-51.01***	-52.99***
	(10.91)	(11.19)	(10.78)	(11.24)	(10.97)	(11.25)	(10.66)	(11.24)
Firm Tangibility	-18.87	-19.27	-19.92*	-19.43	-19.55	-20.26*	-19.91	-19.94
	(11.86)	(11.96)	(11.67)	(11.95)	(12.39)	(12.07)	(12.12)	(12.25)
Distance	-0.666	-0.677	-0.643	-0.715	-0.667	-0.665	-0.803	-0.743
	(1.369)	(1.374)	(1.363)	(1.372)	(1.369)	(1.385)	(1.405)	(1.373)
Relationship Dummy	0.854	0.887	1.404	0.978	1.046	1.033	1.451	1.119

	(2.632)	(2.616)	(2.559)	(2.607)	(2.542)	(2.534)	(2.513)	(2.549)
Bank Size	-13.60	-23.51**	-18.97*	-25.65***	-13.41	-23.24**	-20.28*	-25.72***
	(10.36)	(10.06)	(9.940)	(8.960)	(10.38)	(10.14)	(10.11)	(8.910)
Bank Tier 1 Capital Ratio	-3.659	-3.625	-3.162	-3.303	-3.554	-3.545	-3.124	-3.249
	(2.686)	(2.652)	(2.619)	(2.535)	(2.745)	(2.692)	(2.679)	(2.568)
Bank Provisions (Loan Losses) / Assets	281.4	699.6	595.0	482.3	286.3	720.1	541.8	494.4
	(963.3)	(891.8)	(921.6)	(930.4)	(970.9)	(894.5)	(942.8)	(930.8)
Vega	0.0229	-0.0216	0.000958	-0.103	0.0246	-0.0173	-0.00406	-0.107
	(0.167)	(0.149)	(0.172)	(0.124)	(0.168)	(0.147)	(0.174)	(0.123)
Delta	-7.471***	-3.852*	-4.235	-6.325**	-7.190***	-3.713*	-3.916	-6.213**
	(2.376)	(2.260)	(2.855)	(2.977)	(2.287)	(2.158)	(2.776)	(2.866)
Loan Size	-7.751***	-7.822***	-7.743***	-7.871***	-7.700***	-7.784***	-7.646***	-7.828***
	(1.141)	(1.166)	(1.160)	(1.170)	(1.151)	(1.161)	(1.180)	(1.173)
Loan Maturity	-8.886***	-8.847***	-8.736***	-8.825***	-8.897***	-8.873***	-8.764***	-8.840***
	(1.917)	(1.944)	(1.963)	(1.939)	(1.912)	(1.939)	(1.946)	(1.937)
Syndicate Size	-0.305***	-0.294***	-0.329***	-0.298***	-0.319***	-0.308***	-0.342***	-0.309***
	(0.0895)	(0.0942)	(0.0899)	(0.0919)	(0.0915)	(0.0939)	(0.0907)	(0.0921)
Secured	29.94***	29.87***	29.69***	30.11***	30.35***	30.21***	29.80***	30.40***
	(4.616)	(4.709)	(4.622)	(4.724)	(4.660)	(4.681)	(4.561)	(4.706)
Covenants	1.854	2.095	1.822	2.084	1.721	1.934	1.837	1.940
	(4.273)	(4.440)	(4.350)	(4.440)	(4.383)	(4.525)	(4.449)	(4.521)
Performance Pricing	-8.576***	-8.577***	-8.489***	-8.666***	-8.624***	-8.617***	-8.582***	-8.695***
	(1.803)	(1.821)	(1.827)	(1.821)	(1.831)	(1.842)	(1.849)	(1.844)
Constant	647.1***	814.4***	797.8***	806.8***	641.9***	814.7***	827.3***	806.4***
	(133.9)	(133.3)	(121.3)	(121.6)	(133.2)	(132.9)	(122.8)	(119.9)
Observations	11,997	11,997	11,997	11,997	11,997	11,997	11,997	11,997
R-squared	0.746	0.746	0.746	0.746	0.746	0.746	0.746	0.746
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	NO	NO	NO	NO	NO	NO	NO	NO
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table presents the results of the multivariate linear regression model shown in Equation (3) of the main text. The dependent variable is represented by the "all-in-spread drawn" (AISD) calculated as the loan interest payment in basis points over the LIBOR plus the annual fee for the loan facility that the borrower obtained. The key variables of interest in each model relate to the interaction effect of a cultural dimension (PDI, INV, MAS, and UAI) to our innovation proxies. In this version, we use the contemporaneous innovation variables where the time placer is the grant date, and the loan inception is time (t0). We calculate IE_Citations as the adjusted patent citations over the previous five years, scaled by the sum of 5-year R&D expense. Citations is calculated as ln(1+Citations) where citations have been adjusted for truncation. Regressions 1-8 include firm, bank, year, month, S&P quality rating, rating (bank-dependence), and loan type fixed effects. Standard errors are clustered at the bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 14a: Non-Price Loan Contract Terms (patent-based measures of innovation)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: Secured by collateral or not				
IE_Patents	-0.0562	-0.0342	-0.812**	-0.149				
	(0.446)	(0.177)	(0.380)	(0.372)				
IE_Patents*PDI	-0.000535							
	(0.00744)							
IE_Patents*INV		-0.00114						
		(0.00461)						
IE_Patents*MAS			0.0126*					
			(0.00707)					
IE_Patents*UAI				0.000728				
				(0.00379)				
Patents					-0.0709	-0.168***	-0.244*	-0.0635
					(0.0718)	(0.0312)	(0.125)	(0.0560)
Patents*PDI					-0.000751			
					(0.00141)			
Patents*INV						0.00104*		
						(0.000611)		
Patents*MAS							0.00226	
							(0.00217)	
Patents*UAI								-0.000634
								(0.000644)
PDI	0.00135				0.00208			
	(0.00200)				(0.00223)			
INV		0.000488				-0.000560		
		(0.00125)				(0.00135)		
MAS			-0.00368				-0.00480	
			(0.00493)				(0.00521)	
UAI				-0.00101				-0.000359
				(0.00125)				(0.00123)
Constant	1.834	2.090	2.085	2.170*	1.469	1.853	1.838	1.830
	(1.414)	(1.287)	(1.307)	(1.314)	(1.445)	(1.314)	(1.285)	(1.360)
Observations	12,135	12,135	12,135	12,135	12,135	12,135	12,135	12,135
				Panel B: Covenant restrictions or not				
IE_Patents	-0.106	0.243	0.590	-0.106				
	(0.331)	(0.168)	(0.553)	(0.270)				
IE_Patents*PDI	0.00299							
	(0.00496)							
IE_Patents*INV		-0.00364						
		(0.00309)						

IE_Patents*MAS			-0.00921					
			(0.00981)					
IE_Patents*UAI				0.00197				
				(0.00245)				
Patents					-0.0548	0.0223	-0.0260	-0.0452
					(0.0626)	(0.0252)	(0.0912)	(0.0541)
Patents*PDI					0.000667			
					(0.000808)			
Patents*INV						-0.000785*		
						(0.000419)		
Patents*MAS							7.06e-06	
							(0.00175)	
Patents*UAI								0.000311
								(0.000391)
PDI	-0.00144				-0.00165			
	(0.00232)				(0.00222)			
INV		0.000679				0.00111		
		(0.00115)				(0.00113)		
MAS			-0.00255				-0.00365	
			(0.00297)				(0.00334)	
UAI				-0.00136				-0.00147
				(0.00126)				(0.00118)
Constant	0.295	-0.0259	-0.243	0.0692	0.239	-0.0883	-0.282	0.0221
	(1.931)	(1.893)	(1.793)	(1.883)	(1.969)	(1.906)	(1.780)	(1.905)
Observations	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922
Variables and FE included in all Panels								
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table depicts the results from probit models that explore conditioning effect of the cultural heritage of bank CEOs on the association between firm innovation captured using patent-based measures and two key non-price loan contract terms. Panel A uses as a dependent variable a secured dummy variable (which takes the value of 1 when a loan facility has a collateral and 0 otherwise). Panel B uses as dependent variable a covenant dummy (which takes the value of 1 when a loan has covenants and 0 otherwise) as a dependent variable. All probit regressions use bank, year, month, S&P quality rating, rating (bank-dependence), state and industry of the borrowing firm, and loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Table 14b: Non-Price Loan Contract Terms (citation-based measures of innovation)

Variables	(1) Loan Spread	(2) Loan Spread	(3) Loan Spread	(4) Loan Spread	(5) Loan Spread	(6) Loan Spread	(7) Loan Spread	(8) Loan Spread
				Panel A: Secured by collateral or not				
IE_Citations	0.691**	-0.554	-1.032***	0.452*				
	(0.317)	(0.417)	(0.250)	(0.261)				
IE_Citations *PDI	-0.0206***							
	(0.00537)							
IE_Citations *INV		0.00652						
		(0.00558)						
IE_Citations *MAS			0.0164***					
			(0.00535)					
IE_Citations *UAI				-0.0113***				
				(0.00353)				
Citations					-0.0600	-0.149***	-0.258**	-0.0446
					(0.0690)	(0.0384)	(0.113)	(0.0513)
Citations*PDI					-0.000649			
					(0.00143)			
Citations*INV						0.000958		
						(0.000637)		
Citations*MAS							0.00275	
							(0.00194)	
Citations*UAI								-0.000699
								(0.000613)
PDI	0.00236				0.00199			
	(0.00194)				(0.00208)			
INV		0.000114				-0.000446		
		(0.00135)				(0.00122)		
MAS			-0.00399				-0.00524	
			(0.00521)				(0.00486)	
UAI				-0.000484				-0.000364
				(0.00131)				(0.00118)
Constant	1.911	2.150*	2.046	2.211*	1.562	1.937	1.974	1.922
	(1.400)	(1.293)	(1.279)	(1.311)	(1.446)	(1.308)	(1.297)	(1.359)
Observations	12,135	12,135	12,135	12,135	12,135	12,135	12,135	12,135
				Panel B: Covenant restrictions or not				
IE_Citations	0.582**	-0.460	-0.0746	0.232				
	(0.292)	(0.346)	(0.539)	(0.285)				
IE_Citations *PDI	-0.0152***							
	(0.00470)							
IE_Citations *INV		0.00577						
		(0.00529)						

IE_Citations *MAS			0.000720					
			(0.00832)					
IE_Citations *UAI				-0.00519				
				(0.00374)				
Citations					-0.0498	0.00637	-0.0414	-0.0389
					(0.0677)	(0.0351)	(0.0833)	(0.0583)
Citations*PDI					0.000400			
					(0.000891)			
Citations*INV						-0.000626		
						(0.000429)		
Citations*MAS							0.000140	
							(0.00158)	
Citations*UAI								0.000111
								(0.000406)
PDI	-0.000406				-0.00141			
	(0.00225)				(0.00205)			
INV		0.000155				0.000913		
		(0.00116)				(0.00106)		
MAS			-0.00345				-0.00385	
			(0.00282)				(0.00317)	
UAI				-0.000988				-0.00125
				(0.00125)				(0.00112)
Constant	0.257	0.0223	-0.216	0.0636	0.205	-0.0929	-0.283	-0.00187
	(1.914)	(1.881)	(1.757)	(1.869)	(1.961)	(1.890)	(1.748)	(1.897)
Observations	11,922	11,922	11,922	11,922	11,922	11,922	11,922	11,922
Variables and FE included in all Panels								
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	NO	NO	NO	NO
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
CEO FE	NO	NO	NO	NO	NO	NO	NO	NO
Month FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm State FE	YES	YES	YES	YES	YES	YES	YES	YES
Bank State FE	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
S&P Quality FE	YES	YES	YES	YES	YES	YES	YES	YES
Rated FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Purpose FE	YES	YES	YES	YES	YES	YES	YES	YES
Tranche Type FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustering	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

This table depicts the results from probit models that explore conditioning effect of the cultural heritage of bank CEOs on the association between firm innovation captured using citation-based measures and two key non-price loan contract terms. Panel A uses as a dependent variable a secured dummy variable (which takes the value of 1 when a loan facility has a collateral and 0 otherwise). Panel B uses as dependent variable a covenant dummy (which takes the value of 1 when a loan has covenants and 0 otherwise) as a dependent variable. All probit regressions use bank, year, month, S&P quality rating, rating (bank-dependence), state and industry of the borrowing firm, and loan type, and purpose fixed effects. Standard errors are clustered at bank level. Significance at the 10%, 5% and 1% level is represented by *, ** and ***, respectively.

Chapter 5 Thesis Conclusion

5.1 Summary

The final chapter provides overall concluding remarks for each of the preceding core chapters. This thesis focuses on the importance of culture, specifically the bank Chief Executive Officer (CEO) cultural heritage, in the banking landscape. Existing studies that attempt to isolate national culture's effects on financial contracts in a cross-country framework face a significant challenge. National culture correlates with several country-level factors that could exert an independent effect on financial elements (Aghion et al., 2010). To alleviate concerns regarding such confounding factors, we examine the variation in the national cultural heritage of bank CEOs in a single country context. The multicultural nature of the U.S. provides a reliable testing ground for our research and due to its long immigration history. We are better able to capture the spill-over effects of culture due to the homogeneity in regulatory framework and financial market. This is particularly notable for the purpose of our study as we exploit the cultural diversity in the United States. Cultural heritage variations prompt differences in values and preferences on a national scale. These values are imported with immigration to the host country and display strong intergenerational persistence (Guiso et al., 2006; Giannetti and Yafeh, 2012; DeBacker et al., 2015; Pan et al., 2020).

We investigate three key areas of the literature to understand how they are influenced by culture. Chapter two examines how the cultural heritage of a bank CEO influences the relationship between compensation risk-taking incentives and bank risk. In chapter three, we explore how bank CEOs' cultural heritage shapes the nexus between lending relationships and the cost of bank loans in the syndicated loan market. Finally, chapter four examines the impact of CEOs' cultural heritage on the cost of bank loans to innovative firms.

First, we find that the risk-taking compensation incentive vega, has a negative association with bank risk however, this is association is weakened by bank CEOs' who originate highly masculine cultures. Second, we show that banks led by CEOs that trace their origin in more individualistic and masculine societies are less inclined to share with their borrowers the savings stemming from strong lending relationships. In contrast, banks led by CEOs that originate from societies where uncertainty avoidance and power distance are higher, exhibit a stronger propensity to reward their relationship borrowers with lower loan prices. Third, we provide evidence to show that bank CEO cultural heritage conditions the relationship between the cost of bank loans and innovative firms. Our most compelling results are found in banks led by CEOs that trace their origin in more power distant, and uncertainty avoidant societies. Such CEOs are more inclined to reduce the cost of borrowing to innovative firms. In contrast, banks led by CEOs that originate from individualistic societies are less likely to value innovation and more likely to exploit the borrowing firm by charging higher loan costs. These findings are consistent with the view that cultural attributes affect the degree to which risk-taking compensation incentives, lending relationships, and borrower innovation are valued in the societal and business contexts

5.2 Contribution

Whilst economists have previously been hesitant to rely on culture as a possible determining factor of economic outcomes, we now possess the tools to quantify previously immeasurable social dynamics, values, and characteristics due to the improvement of data collection and methodologies. The contribution of this thesis is to explore traditional issues in finance such as compensation practices, relationship-lending, and borrower innovation under a new cultural lens. The value added of this thesis is the following:

We exploit the cultural diversity in the U.S. and create a unique dataset that comprises of the ancestral origins of bank CEOs. This entailed a very laborious process and several verification methods to create an 'ancestral scorecard' for each CEO based on over 3.8 million on hand-collect ancestral records. We start by manually conducting a background check on each CEO name to check for any spelling errors and name changes (i.e., Americanising an immigrant family name or changes due to marriages). In addition, we use a variety of sources including obituaries, news articles, biographies, and State digital archives of marriage certificates to determine the maiden names, or country of origin. Once our CEO list of names has been finalised, we use Forebears, a database that brings together a range of genealogical sources that have been geographically indexed and cross-referenced. This is our starting point to give us an indication of the country of origin based on surname prevalence and density. Next, we verify our initial findings using the 1940 United States Federal Census as it is the largest and most recent census available for public access. Using this information, we find the most frequent place of birth and the oldest record to determine the country of origin for each unique surname. For example, the surname Cappelli shows that those who bear that name are most frequently born in Italy as well as showing Italy being the oldest record in the census for that name search. We then use immigration and travel records, specifically the New York, Passenger and Crew Lists (including Castle Garden and Ellis Island) between 1820-1957 which provide the passenger lists of ships arriving from foreign ports at the port of New York. This information includes passenger name, arrival date, birth year, port of departure, ethnicity, and ship name to cross reference this with our records so far. As a final step, we use Origins Info Ltd, a is a recognised commercial entity of name classification services, to verify our existing sample collection methods.

In chapter two, we examine the influence of bank CEO cultural heritage on the association between risk-taking compensation incentive vega. This contributes to the steam of literature that studies the influence of compensation incentives on bank risk-taking (Fahlenbrach and Stulz, 2011; Minhat and Abdullah, 2016; Gande and Kalpathy, 2017; Ongena et al., 2018). In chapter three, we investigate whether the bank CEOs' cultural heritage shapes the nexus between lending relationships and the cost of bank loans. This contributes to the stream of literature which investigates the factors that influence banks' decision to share the benefits of lending relationships with their borrowers (Bharath et al., 2011; Sette and Gobbi, 2015; Bolton et al., 2016; López-Espinosa et al., 2017; Prilmeier, 2017; Beatriz et al., 2018; Beck et al., 2018; Schwert, 2018; Hasan et al., 2019; Schäfer, 2019). In chapter four, we explore how bank CEOs' cultural heritage shapes the nexus between borrowing firm innovation and the cost of bank loans. This contributes to the stream of literature which investigates the economic outcomes for innovating firms (Francis et al., 2012; Hochberg et al., 2014; Chava et al., 2017; Mann, 2018).

Overall, chapter two, three, and four contribute to the emerging literature that examines the effect of culture and CEO heritage on the economic outcomes of corporations (Guiso et al., 2006; Pan et al., 2015; Liu, 2016; Nguyen et al., 2018; Bedendo et al., 2020; Hagendorff et al., 2021). More specifically, the effects of cultural heritage in banking (Giannetti and Yafeh, 2012; Ashraf et al., 2016; Hagendorff et al., 2019; Mourouzidou-Damtsa et al., 2019; Álvarez-Botas and González, 2021). This thesis aims to fuse together each of these elements under the cultural/behavioural finance literature. We believe this is increasingly important in an ever-growing globalised society.

5.3 Governance, Bank-Level Policy Considerations and Future work

Our world is becoming increasingly globalised, with the movement of labour meaning different cultures interacting and being transported to their new home through the host. The U.S. is a prime example of such a cosmopolitan evolution, especially financial centres like New York. This highlights the importance of change in governance practices and bank-level policies. Chapter one demonstrates that the 'one shoe fits all' approach may no longer be the most efficient remuneration mechanism. It is becoming increasingly important to address whether the incentives given are compatible with the cultural preferences of the recipient, and if this dictates how effective these 'tools' are. The third chapter highlights how CEOs from different cultural origins value relationships, and how this is ultimately reflected in the loan policies. Finally, chapter four demonstrates how CEOs from different cultural origins value innovation, and the loan implications in response to this. Our research gives rise to additional questions, and therefore a number of valuable avenues and scope for future research. How can banks better tailor rewards to suit the embedded, intrinsic preferences of key people? Can we standardise lending practices to the extent where our own bias does not influence economic outcomes? Can we, as researchers create an all-encompassing risk-profile questionnaire to better understand CEOs?

Appendices

Appendix 1: Sample of Banks

AHMANSON (H F) & CO
AMERICAN FINANCIAL HLDGS INC
AMERIS BANCORP
AMSOUTH BANCORPORATION
ANCHOR BANCORP INC/NY
ANCHOR BANCORP WISCONSIN INC
ASSOCIATED BANC-CORP
ASTORIA FINANCIAL CORP
BANC OF CALIFORNIA INC
BANCORPSOUTH BANK
BANCWEST CORP
BANK MUTUAL CORP
BANK OF AMERICA CORP
BANK OF HAWAII CORP
BANK OF NEW YORK MELLON CORP
BANK ONE CORP
BANKAMERICA CORP-OLD
BANKBOSTON CORP
BANKERS TRUST CORP
BANKNORTH GROUP INC-OLD
BANKUNITED FINANCIAL CORP
BARNETT BANKS INC
BB&T CORP
BOATMENS BANCSHARES INC
BOSTON PRIVATE FINL HOLDINGS
BROOKLINE BANCORP INC
COMMUNITY FIRST BANKSHARES
CONTINENTAL BANK CORP
CORESTATES FINANCIAL CORP
CORUS BANKSHARES INC
CRESTAR FINANCIAL CORP
CULLEN/FROST BANKERS INC
CUSTOMERS BANCORP INC
CVB FINANCIAL CORP
DAUPHIN DEPOSIT CORP
DEPOSIT GUARANTY CORP
DIME BANCORP INC
DIME COMMUNITY BANCSHARES
DOWNEY FINANCIAL CORP
EAST WEST BANCORP INC
F N B CORP/FL
FIFTH THIRD BANCORP
FIRST AMERICAN CORP/TN
FIRST BANCORP P R
FIRST CHICAGO CORP
FIRST CHICAGO NBD CORP
FIRST COMMERCIAL CORP
FIRST COMMONWLTH FINL CP/PA
FIRST FIDELITY BANCORP
FIRST FINL BANCORP INC/OH
FIRST FINL BANKSHARES INC
FIRST HORIZON NATIONAL CORP
GREAT WESTERN FINANCIAL
GREATER BAY BANCORP
GREEN BANCORP INC
HANCOCK WHITNEY CORP
HANMI FINANCIAL CORP
HIBERNIA CORP -CL A
HOME BANCSHARES INC
HOMESTREET INC
HOPE BANCORP INC
HUDSON CITY BANCORP INC
HUDSON UNITED BANCORP
HUNTINGTON BANCSHARES
IMPERIAL BANCORP
INDEPENDENCE CMNTY BK CORP
INDEPENDENT BANK CORP/MA
INDEPENDENT BANK CORP/MI
INVESTORS FINANCIAL SVCS CP
IRWIN FINANCIAL CORP
JPMORGAN CHASE & CO
JSB FINANCIAL INC
KEYCORP
KEYSTONE FINANCIAL INC
LEGACY TEX FINANCIAL GRP INC
LIBERTY BANCORP INC/OK
LIBERTY NATIONAL BANCORP/KY
LOYOLA CAPITAL CORP
NORTH FORK BANCORPORATION
NORTHERN TRUST CORP
NORTHFIELD BANCORP INC
NORTHWEST BANCSHARES INC
OFG BANCORP
OLD KENT FINANCIAL CORP
OLD NATIONAL BANCORP
OPUS BANK
ORITANI FINANCIAL CORP
PACIFIC PREMIER BANCORP INC
PEOPLE'S UNITED FINL INC
PINNACLE FINL PARTNERS INC
PNC FINANCIAL SVCS GROUP INC
PREMIER BANCORP
PREMIER BANCSHARES INC
PRIVATEBANCORP INC
PROSPERITY BANCSHARES INC
PROVIDENT BANKSHARES CORP
PROVIDENT FINANCIAL GRP INC
PROVIDENT FINANCIAL SVCS INC
RCSB FINANCIAL INC
REGIONS FINANCIAL CORP
REPUBLIC BANCORP INC
RIGGS NATIONAL CORP
ROOSEVELT FINANCIAL GROUP
ROSLYN BANCORP INC
TCF FINANCIAL CORP
TD BANKNORTH INC
TEXAS CAPITAL BANCSHARES INC
TEXAS REGL BCSHS INC -CL A
TOMPKINS FINANCIAL CORP
TRUSTCO BANK CORP/NY
TRUSTMARK CORP
U S BANCORP
U S TRUST CORP
UCBH HOLDINGS INC
UMB FINANCIAL CORP
UMPQUA HOLDINGS CORP
UNION PLANTERS CORP
UNITED BANKSHARES INC/WV
UNITED COMMUNITY BANKS INC
UST CORP
VALLEY NATIONAL BANCORP
VERITEX HOLDINGS INC
WACHOVIA CORP
WACHOVIA CORP-OLD
WASHINGTON FEDERAL INC
WASHINGTON MUTUAL INC
WAYPOINT FINANCIAL CORP
WEBSTER FINANCIAL CORP
WELLS FARGO & CO
WELLS FARGO & CO -OLD

CARDINAL FINANCIAL CORP
CASCADE BANCORP
CATHAY GENERAL BANCORP
CCB FINANCIAL CORP
CENTER FINANCIAL CORP
CENTRAL FIDELITY BANKS INC
CENTRAL PACIFIC FINANCIAL CP
CENTURA BANKS INC
CHARTER ONE FINANCIAL INC
CHASE MANHATTAN CORP -OLD
CHITTENDEN CORP
CITICORP
CITY HOLDING CO
CITY NATIONAL CORP
COAST SAVINGS FINANCIAL INC
COLLECTIVE BANCORP INC
COLONIAL BANCGROUP
COLUMBIA BANKING SYSTEM INC
COMERICA INC
COMMERCE BANCORP INC/NJ
COMMERCE BANCSHARES INC
COMMERCIAL FEDERAL CORP
COMMUNITY BANK SYSTEM INC
FIRST INDIANA CORP
FIRST INTERSTATE BNCP
FIRST MICHIGAN BANK CORP
FIRST MIDWEST BANCORP INC
FIRST NIAGARA FINANCIAL GRP
FIRST OF AMERICA BANK CORP
FIRST SECURITY CORP/DE
FIRST VIRGINIA BANKS INC
FIRSTAR CORP-OLD
FIRSTFED FINANCIAL CORP/CA
FIRSTFED MICH CORP
FIRSTMERIT CORP
FLAGSTAR BANCORP INC
FLEETBOSTON FINANCIAL CORP
FRANKLIN BANK CORP
FRANKLIN FINL NETWORK INC
FRONTIER FINANCIAL CORP/WA
FULTON FINANCIAL CORP
GBC BANCORP/CA
GLACIER BANCORP INC
GOLD BANC CORP INC
GOLDEN STATE BANCORP INC
GOLDEN WEST FINANCIAL CORP
M & T BANK CORP
MAF BANCORP INC
MAGNA GROUP INC
MARK TWAIN BANCSHARES
MARSHALL & ILSLEY CORP
MB FINANCIAL INC/MD
MBNA CORP
MELLON FINANCIAL CORP
MERCANTILE BANCORPORATION
MERCANTILE BANKSHARES CORP
MERIDIAN BANCORP INC
META FINANCIAL GROUP INC
METROPOLITAN FINL CORP/DE
MORGAN (J P) & CO
N B T BANCORP INC
N S BANCORP INC
NATIONAL BANK HLDGS CORP
NATIONAL CITY CORP
NATIONAL COMMERCE FINANCIAL
NATIONAL PENN BANCSHARES INC
NBB BANCORP INC
NEW YORK CMNTY BANCORP INC
NEWALLIANCE BANCSHARES INC
S & T BANCORP INC
SEACOAST BANKING CORP/FL
SEACOAST FINANCIAL SERVICES
SERVISFIRST BANCSHARES INC
SHAWMUT NATIONAL CORP
SIMMONS FIRST NATL CP -CL A
SOUTH FINANCIAL GROUP INC
SOUTHSIDE BANCSHARES INC
SOUTHTRUST CORP
STATE STREET CORP
STATEN ISLAND BANCORP INC
STERLING BANCORP
STERLING BANCORP/NY -OLD
STERLING BANCSHARES INC/TX
STERLING FINANCIAL CORP/WA
SUMMIT BANCORP
SUMMIT BANCORPORATION
SUNTRUST BANKS INC
SUSQUEHANNA BANCSHARES INC
SVB FINANCIAL GROUP
SYNOVUS FINANCIAL CORP
TALMER BANCORP INC
TAYLOR CAPITAL GROUP INC
WEST ONE BANCORP
WESTAMERICA BANCORPORATION
WHITNEY HOLDING CORP
WILMINGTON TRUST CORP
WILSHIRE BANCORP INC
WINTRUST FINANCIAL CORP
ZIONS BANCORPORATION NA

Sample of 229 used in chapter two.

Appendix 2: Methodology Comparison Table

No.	Study	Description	Method of Collecting Ethnic Origin Data
1	Lauderdale and Kestenbaum (2000)	The study describes the development of surname lists based on Social Security Administration records, for six large Asian American ethnic groups including: Chinese, Japanese, Filipino, Korean, Asian Indian, and Vietnamese.	➢ Uses the Social Security Administration (SSA) surname list to derived lists for each of the six main Asian American ethnic groups. The record content includes surname, maiden name, race in broad categories, and country of birth. Although ethnicity is not on the record, country of birth is a viable proxy for ethnicity for Asian Americans. ➢ 1990 census (Census Bureau) for frequency of surnames names. ➢ Females have their maiden name substituted for married surname.
2	Kerr and Lincoln (2010)	The study assesses the influence of high-skilled immigrants i.e., scientists and engineers, on formation and innovation in the U.S. technology sector.	➢ Uses the records of all patents granted by United States Patent and Trademark Office (USPTO). This provides information of inventors including their name. ➢ To estimate ethnicities, the Melissa commercial database of ethnic first names and surnames is mapped into inventor records.
3	Gompers et al. (2016)	The study investigates how personal characteristics affects venture capitalists desire to collaborate and whether this desirability enhances or detracts from performance.	➢ Uses VentureSource, a database that contains detailed information on VC investments and individual VCs such as name. ➢ For ethnic background, the name-matching algorithm developed by Kerr and Lincoln (2010) to determine the most likely ethnicities of venture capitalists based on their last names. Although the limitation of the name-matching algorithm does not allow identification of all possible ethnicities such as African American.
4	Pan et al. (2015)	The study examines corporate risk culture, defined as the preferences towards risk and uncertainty shared by a firm's leader and the effect on corporate policies.	➢ Uses S&P Execucomp and Capital IQ for executives' names. ➢ For each individual in the sample, they estimate the likelihood that an individual's ancestors are from a given country, using the individual's last name together with passenger lists of ships arriving in New York City from foreign ports and based on the citizenship of arriving passengers with a given last name (available through Ancestry.com), they obtain a distribution of countries of origin for each last name.
5	Liu (2016)	The study uses cultural background information on key company insiders, to construct a measure of corporate corruption culture and use this to capture a firm's attitude toward opportunistic behaviour.	➢ Surname data with the list of officers and directors are collected from Compact Disclosure from 1988 to 2006. ➢ Two main sources to identify the country of origin of surnames. ➢ U.S. Census records from 1850 to 1940. These records represent the complete set of Census records available to the public in which the respondents' names are disclosed - acquired through the Minnesota Population Centre. ➢ The study restricts the dataset to first- and second-generation immigrants whose country of birth or father's country of birth is outside of the United States. Then links each unique surname from the Census records to its most frequently associated country of birth or father's country of birth. ➢ Use of the surname-ancestry country matching list from a commercial database - Origins Info Ltd., a well-known commercial vendor of name classification services.

			➢ Surnames with different census and Origin Info country of origin are hand-check with their country of origin using sources such as ancestry.com, which provides a distribution of U.S. immigrants based on port entry records. ➢ The remaining unmatched surnames are hand-check for their country of origin using ancestry.com for 3,000 of the most common surnames associated country of origin.
6	Nguyen et al. (2018)	The study uses cultural heritage across U.S. CEOs who come from an immigrant background to show that the cultural origins of CEOs matter for corporate outcomes under competitive pressure.	➢ ExecuComp, BoardEx, and Edgar DEF14A forms to retrieve a range of information on CEOs. ➢ Construct family trees of U.S. CEOs i.e., CEOs who are the children or grandchildren of immigrants. ➢ Hand-collect data on the country of origin of a CEO's ancestors from Ancestry.com. ➢ The main approach is to search for census records, birth and marriage certificates, and other publicly available information to track a CEO's ancestral history, as well as whether he or she is a Gen2-3 CEO. ➢ Census Bureau records are used to obtain data on the ancestry of CEOs, accessed via ancestry.com. The first approach relies on all the parents of sample CEOs are born before 1940 (their census records are accessible). If names of CEO parents are known (via ancestry.com or other public sources), the parents family tree can be mapped and locate their ancestors using the same technique we use for CEOs born before 1940. ➢ Where a CEOs parents cannot be identified this way, the study uses a CEO's biographies, interviews, or obituaries for information on their parents. ➢ When no identification can be made on the parents of a CEO, an alternative approach is used that allows the study to infer ancestry information where this information cannot be directly sourced from census records. For example, one can infer a CEO's heritage if all families with the same surname as the CEO and live in the birth county of the CEO have immigrated to the United States from the same country and the same number of generations ago.
7	Delis et al. (2016)	The study uses genetic diversity in the country of origin of the firms' board members to demonstrate the effect on corporate performance.	➢ Uses BoardEx to obtain information on the nationality of board members for firms. ➢ To construct genetic diversity related measure of board heterogeneity, they attach the country-specific values of intra-population genetic diversity using Ashraf and Galor (2013) 'Out of Africa' hypothesis, to each board member.

Continued on next page.

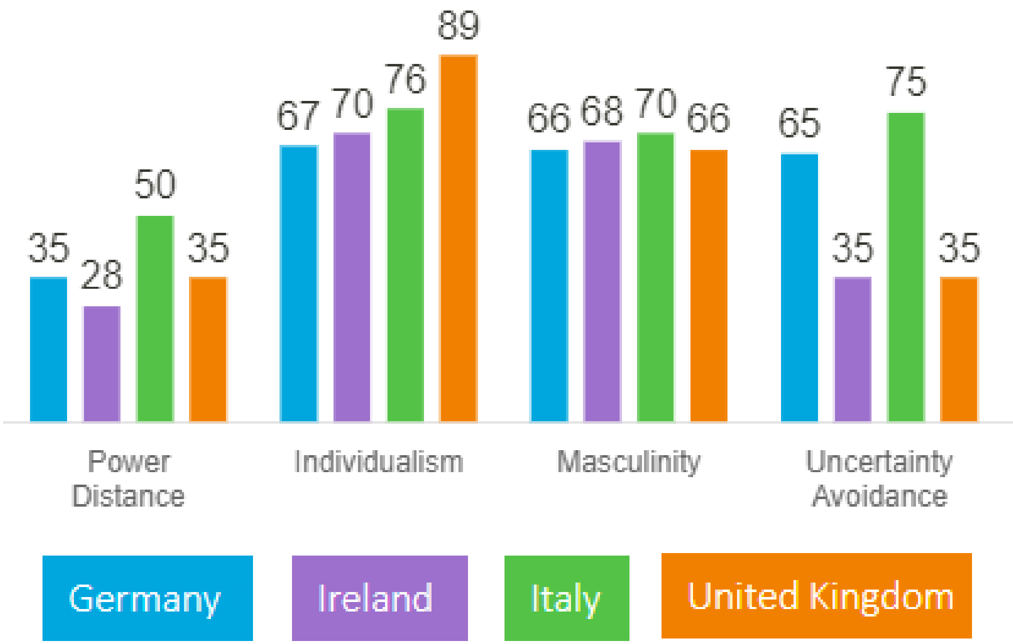
Appendix 2. Continued

Checklist	Lauderdale & Kestenbaum, (2000)	Kerr & William (2010)	Gompers et al. (2016)	Pan et al. (2015)	Liu (2016)	Nguyen et al. (2018)	Delis et al. (2018)	Our Study
Surname-inferred ethnic identification	√	√	√	√	√	√	X	√
Social Security Administration (SSA)	√	X	X	X	X	X	X	X
Female maiden name used (not married name)	X	X	X	X	X	√	X	√
Melissa commercial database	X	√	√	X	X	X	X	X
Origins Info Ltd. commercial database	X	X	X	X	√	X	X	√
U.S. Census records from 1850 to 1940 (Minnesota Population Centre)	X	X	X	X	√	X	X	X
Marriage certificates, biographies, interviews, obituaries and other publicly available information	X	X	X	X	X	√	X	√
Genetic level based on values provided by Ashraf & Galor (2013) 'Out of Africa' hypothesis	X	X	X	X	X	X	√	X
Forebears (2012-2019) - genealogy portal	X	X	X	X	X	X	X	√
1940 United States Federal Census and/or other Census records via Ancestry.com	√	X	X	X	√	√	X	√
Immigration & Travel Records: New York, Passenger and Crew Lists (including Castle Garden and Ellis Island), 1820-1957 via Ancestry.com	X	X	X	√	√	√	X	√
BoardEx (for nationality information)	X	X	X	X	X	X	√	X
Family tree (fully or partly) constructed	X	X	X	X	√	√	X	X

Appendix 3. Map of Countries in Sample

Key: Included | Not Included

Appendix 4. Country Comparison Tool



An adapted figure of the country comparison tool provided by Hofstede Insights (2021) to illustrate the difference in the most common cultural origins in our study.

Appendix 5. Sample of Marriage Certificate

(1) Is there any evidence of a previous name or marriage?

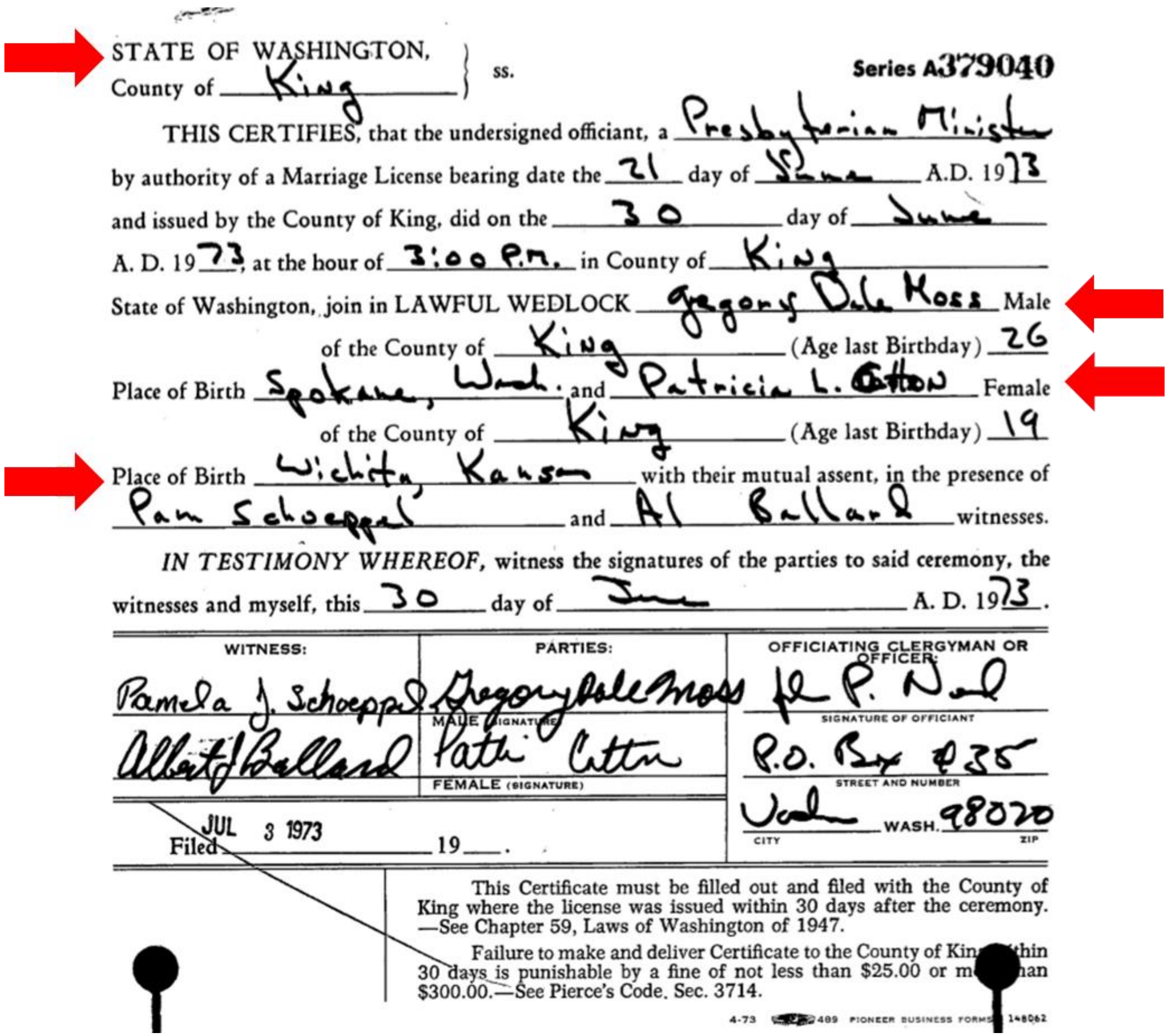
(2) Search for interviews or biographies.

"**Born in Wichita**, Kan., Moss grew up on Vashon Island in **Washington**, according to The Bulletin's archives, and moved to Central Oregon when her **husband**, **Greg**, took a job in Redmond."

https://www.bendbulletin.com/news/1600218-151/bend-bank-ceo-to-retire

(3) Now we know her husband's name, her place of birth and where she grew up, we can look through the **Washington** state archives and find a marriage certificate.

https://www.digitalarchives.wa.gov/Record/View/4D9C574C0D879C3A0C14D63CD413A717


STATE OF WASHINGTON, County of King } ss.

Series A379040

THIS CERTIFIES, that the undersigned officiant, a Presbyterian Minister by authority of a Marriage License bearing date the 21 day of June A.D. 1973 and issued by the County of King, did on the 30 day of June A. D. 1973 at the hour of 3:00 P.M. in County of King State of Washington, join in LAWFUL WEDLOCK Gregory Dale Moss Male of the County of King (Age last Birthday) 26 Place of Birth Spokane, Wash. and Patricia L. Cotton Female of the County of King (Age last Birthday) 19 Place of Birth Wichita, Kansas with their mutual assent, in the presence of Pam Schoeppel and Al Ballard witnesses.

IN TESTIMONY WHEREOF, witness the signatures of the parties to said ceremony, the witnesses and myself, this 30 day of June A. D. 1973.

WITNESS:	PARTIES:	OFFICIATING CLERGYMAN OR OFFICER:
Pamela J. Schoeppel	Gregory Dale Moss (MALE SIGNATURE)	[illegible] P. Noel (SIGNATURE OF OFFICIANT)
Albert J Ballard	Patti Cotton (FEMALE (SIGNATURE))	P.O. Box 835 (STREET AND NUMBER)
		Vashon (CITY) WASH. 98070 (ZIP)

Filed JUL 3 1973 19__.

This Certificate must be filled out and filed with the County of King where the license was issued within 30 days after the ceremony. —See Chapter 59, Laws of Washington of 1947.

Failure to make and deliver Certificate to the County of King within 30 days is punishable by a fine of not less than $25.00 or more than $300.00.—See Pierce's Code. Sec. 3714.

4-73 489 PIONEER BUSINESS FORMS 148062

Appendix 6. Vega Across Time

Average bank CEO vega ($000s) across time varies hence, in our robustness tests we use CEO fixed effects and bank*year to account for the variation in risk-taking compensation incentives that could influence risk and lending decisions. We find this pattern similar to the comparable time period in (Iqbal and Vähämaa, 2019)

Appendix 7. Breakdown of Syndicate Size

Number of Lenders	Frequency	Percent
1	2,976	18.7
2	1,475	9.27
3	1,218	7.66
4	1,149	7.22
5	1,131	7.11
6	1,019	6.4
7	930	5.85
8	752	4.73
9	676	4.25
10+	4,585	28.81
Total	**15,911**	**100.00**

This table shows a breakdown of syndicate size that contain 10 lenders or less. The high proportion of syndicated loans (81.30%) reflects the bias towards larger loans in the DealScan database. This is in line with prior literature i.e., (Schwert, 2018).

Appendix 8. Most Active Banks in the Sample

Rank	Bank	# Loans	% Loans
1	JPMORGAN CHASE & CO	4,420	27.78
2	BANK OF AMERICA CORP	3,697	23.24
3	WELLS FARGO & CO	1,568	9.85
4	WACHOVIA CORP	814	5.12
5	FLEETBOSTON FINANCIAL CORP	767	4.82
6	BANK ONE CORP	607	3.81
7	SVB FINANCIAL GROUP	383	2.41
8	PNC FINANCIAL SVCS GROUP INC	379	2.38
9	KEYCORP	339	2.13
10	SUNTRUST BANKS INC	316	1.99
11	COMERICA INC	307	1.93
12	BANKAMERICA CORP-OLD	277	1.74
13	BANKERS TRUST CORP	265	1.67
14	CITICORP	250	1.57
15	U S BANCORP	216	1.36
16	NATIONAL CITY CORP	202	1.27
17	MORGAN (J P) & CO	151	0.95
18	BANK OF NEW YORK MELLON CORP	147	0.92
19	BANKBOSTON CORP	122	0.77
20	MELLON FINANCIAL CORP	109	0.69
21	FIRST CHICAGO NBD CORP	66	0.41
22	FIFTH THIRD BANCORP	60	0.38

This table reports the 22 top banks with more than 50 loans in our sample. In the full sample, there are 53 banks. The names are reported as in Compustat, with (Old) denoting the pre-merger form of the bank. The number of loans for which the bank serves as lead arranger is shown in the '# Loans' column. Lastly, the percentage of all loans in the sample for which the bank serves as lead arranger is shown in the '% Loans' column. We obtain a similar list to that of Schwert (2018).

Appendix 9. Regression Diagnostic Tests

Diagnostic Test 1a: Autocorrelation

Chapter 2					
Table 4: Baseline Estimations (risk-taking compensation incentives)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000
Reject H0	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	No	No	No

We use the Wooldridge test for autocorrelation in our panel data for Chapter 2. The null hypothesis (H0) is that there is no autocorrelation. According to our results, we reject the null hypothesis of no autocorrelation. Therefore, we cluster the standard errors at the bank level variable. This allows for arbitrary correlation within banks, which mitigates to some extent the autocorrelation. Clustering by panel gives us standard error estimates robust to serial correlation. In further robustness tests, we also cluster at CEO and CEO origin level. We present our results for the baseline models but have done this for all of our regression models for the avoidance of doubt. The results of the diagnostic tests are shown in the above table.

Diagnostic Test 1b: Heteroscedasticity

Chapter 2					
Table 4: Baseline Estimations (risk-taking compensation incentives)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Breusch-Pagan Prob > chi2	0.0002	0.0003	0.0002	0.0002	0.0002
Reject H0	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	No	No	No

Chapter 3					
Table 4: Baseline Estimations (relationship-lending)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Breusch-Pagan Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Reject H0	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	No	No	No

Chapter 4										
Table 4a: Baseline Estimations (patent-based measures of innovation)										
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
Breusch-Pagan Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Reject H0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	No	No	No	No	No	No	No	No
Table 4b: Baseline Estimations (citation-based measures of innovation)										
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
Breusch-Pagan Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Reject H0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	No	No	No	No	No	No	No	No	No	No

We use the Breusch-Pagan test to detect heteroscedasticity. The null hypothesis (H0) is that variance is homoscedastic. Our results from this test indicate that in the absence of clustering, we do detect heteroscedasticity and reject the null hypothesis that the variance is homoscedastic. However, we follow the literature and cluster standard errors at different levels in our robustness tests for example, bank, firm, CEO etc. in each chapter. Clustered standard errors allow us to account for heteroscedasticity across "clusters" of observations (such as those in our sample). The results of the diagnostic tests for each chapter are shown in the above tables.

Diagnostic Test 2: Estimator Appropriateness

Chapter 2					
Table 4: Baseline Estimations (risk-taking compensation incentives)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Hausman Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Reject H0	Yes	Yes	Yes	Yes	Yes
Appropriate model	FE	FE	FE	FE	FE

In our analysis we opt for a fixed effects rather than a random effects estimator as determined by the Hausman test where H0: random effect model is appropriate. As the Prob>chi2 = 0.0000 we reject the null hypothesis, and we cannot say that random effects is an appropriate model estimator. The results of the diagnostic tests are shown in the above table. Hence, we reject H0 in favour of fixed effects model.

Diagnostic Tests 3: Distribution of Residuals

Chapter 2					
Table 4: Baseline Estimations (risk-taking compensation incentives)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Jarque-Bera Chi(2)	0.0000	0.0000	0.0000	0.0000	0.0000
Shapiro-Wilk W p-val	0.0000	0.0000	0.0000	0.0000	0.0000
DoF >30	Yes	Yes	Yes	Yes	Yes

Chapter 3					
Table 4: Baseline Estimations (relationship-lending)					
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Jarque-Bera Chi(2)	0.0000	0.0000	0.0000	0.0000	0.0000
Shapiro-Wilk W p-val	0.0000	0.0000	0.0000	0.0000	0.0000
DoF >30	Yes	Yes	Yes	Yes	Yes

Chapter 4										
Table 4a: Baseline Estimations (patent-based measures of innovation)										
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
Jarque-Bera Chi(2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Shapiro-Wilk W p-val	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DoF >30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Table 4b: Baseline Estimations (citation-based measures of innovation)										
Test	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
Jarque-Bera Chi(2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Shapiro-Wilk W p-val	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DoF>30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

We use the Jarque-Bera and Shapiro-Wilk tests to test whether the residuals are normally distributed. Our tests show that our residuals are not normally distributed (i.e., test statistics do not follow the assumed t-Student distribution). Note, H0: normally distributed residuals. As per the above, chi(2) is 0.000 which is less than 0.05. Therefore, the null hypothesis is rejected. However, our sample is sufficiently large enough to depend on asymptotic theory, with degrees of freedom being greater than 30. According to which, these test statistics will be normally distributed. The results of the diagnostic tests for each chapter are shown in the above tables.

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