Three Studies on the Effects of National Culture on Bank Risk-Taking, Deposits and Profitability

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This thesis contains 50,287 words including title page, tables, and footnotes.

Abstract

The University of Manchester
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These three studies on the effect of national culture on banking aim at advancing knowledge and understanding of bank risk-taking, deposits and profitability by adding culture to their determining factors. Banking is a highly regulated industry, and one would expect informal institutions such as national culture not to influence management decisions. However, it seems that bank managers but also bank customers are susceptible to cultural biases making their influence on risk taking, deposit and profitability levels statistically and economically significant.

In the first study, I find that national culture is an important bank-risk determinant. Specifically, I find a positive (negative) association between the cultural values of individualism and hierarchy (trust) and domestic bank risk-taking. This relation weakened during the recent financial crisis and does not hold for global banks, regardless of the period under investigation.

In the second study, I report a positive association between trust and deposits which holds for domestic as well as global banks, supporting the popular view that banking is based on trust. Motivated by two relatively new regulations (Net Stability Funding Ratio and Liquidity Coverage Ratio), enforced to safeguard stable liquidity, I use interaction effects to find that high deposit volatility mitigates the positive impact of trust on deposit levels.

In the third study, I identify national culture as an important determinant of bank profitability. Looking separately into global and domestic banks, the former are less prone to cultural influences compared to the latter. Furthermore, domestic banks with foreign ownership/management are less susceptible to cultural biases compared to domestic banks with local ownership/management. Finally, banks operating in conservative, hierarchical societies are expected to face more challenges with fintech disturbance, compared to banks operating in egalitarian societies.

My results are statistically and economically significant and robust to endogeneity tests mitigating reverse causality and confounding effect concerns.

Declaration

I, Stella Mourouzidou Damtsa, declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Copyright Statement

Acknowledgements

Firstly, I would like to offer my sincere gratitude to my main supervisor Prof. Konstantinos Stathopoulos. He was my academic rock during the four DBA years, offering advice, encouragement, support, and mentoring me to produce work of academic and publishable standard. Dr. Stathopoulos provided timely feedback to my work, speeding up the completion of the three chapters. I believe this is one of the reasons I was able to complete the DBA in four years, instead of five.

I am grateful to my second supervisor Dr. Andreas Milidonis who was my MSc supervisor. Dr. Milidonis inspired me to aim higher, towards a doctorate at The University of Manchester. I feel extremely proud and fortunate to have had two such talented supervisors who facilitated my academic journey but also made it more challenging!

Special thanks to my fellow students, Haruka, Thomas, Craig, Sundar, Monsurat and Ahmad, the seven stars of the 2013 cohort. We stayed close and supported each other even at a distance.

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*Dedicated to my husband, **Konstantinos Damtsas***

Chapter 1 - Introduction

1.1   Preface

The Alliance Manchester Business School, Doctorate in Business Administration (DBA) is research in action to gain a doctoral degree while working and becoming an expert in one's field. I have been working in the financial sector for the last 27 years. In 2014, when it was time to decide the first topic, my supervisor gave me a paper by Ahern et al. (2015), which associates national culture with mergers and acquisitions. I was fascinated by the subject of national culture and how it influences decisions. The topic for the first study is 'National culture and bank risk-taking'. In 2015, I was promoted to Head of Premier Banking, mandated to collect deposits. Inspired by my new position, the topic of the second chapter is 'National culture, deposits and regulation'. A year later, I was promoted to Head of Strategy. As a strategist, profitability became my main concern. This led to the topic of my third and final chapter, 'National culture, bank profitability and financial technology'. I have presented my research at the following academic conferences:

1.   International Finance and Banking Society (IFABS) 2016 at Barcelona

2.   Ioannina Meeting on Applied Economics and Finance (IMAEF) 2016 at Corfu

3.   International Finance and Banking Society (IFABS) 2017 at Oxford

The paper 'National culture and bank risk-taking' has been accepted for publication in the Journal of Financial Stability, a three-star academic journal (Mourouzidou-Damtsa et al., 2017). The paper 'National culture, deposits and regulation' won the best paper award at the 2017 DBA Research conference.

In 2016 I took part in the 3-minute thesis contest organised by The University of Manchester and was amongst the 12 finalists. I enjoyed the experience enormously. It trained me to present my research in three minutes, a skill I am using today when meeting with my bank's CEO.

The thesis is my own contribution, and the two co-authors (Konstantinos Stathopoulos and Andreas Milidonis) are my DBA supervisors and mentors who provided valuable advice, guidance and support throughout the writing of the three chapters.

The rationale for submitting the thesis in a journal format was mainly to follow my career path. This approach had many benefits:

1. Enriched my specialisation in three separate aspects of banking;

2. Made the DBA more structured in having to complete three pieces of work gradually, instead of one for the program's duration;

3. The conferences and journal submission helped improve the research;

4. At the conferences, I have met many banking experts, both academics and professionals. The professionals were mainly from the European Central Bank (ECB) which is the regulator for European banks, including the one I work for. Getting their insights during informal discussions was a valuable experience.

1.2   Motivation

After the publication of the seminal article by Clark (1987) explaining differences between countries in the cotton mill worker productivity with national culture, literature on cultural influences is growing. Recent studies associate national culture with people's

propensity to complain (Luria et al., 2016), safety management (Noort et al., 2016), the success rate of new products (Eisend et al., 2016), cycling level differences between countries (Oosterhuis, 2016), women's success in leading SMEs (Naidu and Chand, 2017), corporate innovation (Chen et al., 2017), stakeholder's engagement with firms (Dal Maso et al., 2017) and consumer's trust in e-commerce (Hallikainen and Laukkanen, 2017).

Culture is often the missing link in explaining differences between countries (Chui et al., 2002; Chen et al., 2015) and one of the reasons managers and consumers behave differently under similar settings (Zheng et al., 2012; Li et al., 2013; Manos et al., 2015; Petersen et al., 2015).

These studies motivated me to assess whether cultural norms influence the highly regulated financial services sector. In the heavily transnational-level regulated banking industry, it is reasonable to expect cultural characteristics to have little or no effect on bank decision-making. However, according to my findings, regulation is not able to fully capture the complex dynamics of bank management decision-making. Managers have some flexibility to formulate strategies according to their needs and preferences, making them susceptible to cultural influences.

In this trilogy, I assess whether national culture dimensions, influence firstly bank risk-taking, secondly the level of deposits and thirdly profitability. The strategy employed during the research was to explore the extant literature on bank-risk, the level of bank deposits and bank profitability and contribute to it by adding national culture as one of the factors associated with these three topics. In all three studies, I use the Guiso et al. (2006) national

culture definition: *'customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation.'* I measure national culture using three dimensions singled-out by sociology and economics (Hofstede, 1980; Fiske, 1991; Schwartz, 1994; Guiso et al., 2006; Trompenaars, 2012; Ahern et al., 2015) as important dimensions of culture, namely, individualism, trust and hierarchy.

I find a statistically and economically significant association between national culture and bank risk-taking, deposit levels as well as profitability. This association confirms that even one of the strictest regulatory frameworks cannot fully capture the complex managerial decision-making dynamics, exposing the financial sector to cultural stimuli.

Financial institution vulnerability to cultural biases is noteworthy because banks differ from other firms in four ways. First, their intermediary function facilitates economic growth converting short-term deposits to long-term loans (Allen and Santomero, 2001). Second, the interbank market links banks together exposing them to contagion risk (Iori et al., 2006; Mistrulli, 2011; Upper, 2011), which is transmitted to their corresponding sovereigns (Acharya et al., 2014). Third, national Central Banks apply their monetary policies to maintain financial stability via the banking sector (Molnár and Santoro, 2014). Finally, banks differ from other firms in terms of their governance with the interests of non-shareholder stakeholders such as uninsured depositors, not always aligned with the interests of shareholders. These four factors highlight the banking sector significance as an economic prosperity facilitator.

In all three chapters, I take advantage of significant heterogeneity in the data and find that for certain subsamples the relationship between culture and bank decision-making is weaker. Specifically, global[1] banks, with multicultural management and clientele, are less susceptible to cultural predispositions. Systemic global banks are subject to additional regulatory requirements, including capital, risk management and compliance requirements reducing their flexibility and exposure to national culture influences. This is particularly true for European systemic global banks which are monitored and supervised directly by the ECB as opposed to domestic banks where the national regulators are allowed appropriate discretion to accommodate the structural characteristics of their country's domestic financial sector.

I also find that during crises, national culture influences weaken. During the 2007-2010 financial crisis, sovereigns bailed out banks and consequently depended more on debt markets, increasing the regulator's supervision. Increased monitoring from regulatory authorities such as the ECB limited national autonomy and consequently cultural inclinations.

Further, my findings indicate banks with foreign ownership or management are less prone to cultural effects compared to domestically owned or managed banks, consistent with the conjecture that in a multicultural setting the dominance of a single culture is less probable. Appointing foreign managers can be used as a strategy to mitigate cultural influences. An alternative option is to embrace cultural diversity, as cultural values are deeply embedded in societies and remain relatively unchanged from generation to generation (Guiso et al., 2006).

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[1] The Financial Stability Board (FSB) maintains and updates a list of global banks. I use the list published in 2015: http://www.fsb.org/wp-content/uploads/2015-update-of-list-of-global-systemically-important-banks-G-SIBs.pdf

All three chapters use a common dataset and methodology. To mitigate the impact of unobserved heterogeneity to my conclusions, I select a relatively homogeneous sample focusing on systemic European banks. Specifically, I include banks selected by the European Banking Authority (EBA) for the 2014 stress tests[2] which operate under a uniform regulatory environment, share common regulators including the EBA and the European Stability Mechanism (ESM), as well as the same policymaker in the ECB. The EBA stress tests evaluate the resilience of the banking sector to systemic risk.

I obtain cultural value data from the World Values Survey (WVS)[3] and follow Ahern et al. (2015) in selecting the cultural variables and the proxy survey questions for each of them. I test my findings for robustness by replacing the WVS cultural set with the Hofstede (2001) values. WVS scores change as surveys are repeated in waves[4] whereas Hofstede values remain static.

My data is nested in three levels: countries, banks, and observations. To explore these multilevel data and account for the clustered structure of the dataset I employ a hierarchically nested form of the general linear model; see Goldstein (2011) and Raudenbush and Bryk (2002). Multilevel models take into account the sample size within a country, and accurately

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[2] https://www.eba.europa.eu/documents/10180/563711/31012014+EU-wide+stress+Test+2014+%28List+of+sample+banks+%29.xlsx

[3] WVS is the largest, non-commercial academic study covering the world's major cultural zones; conducted in almost 100 countries, it covers about 90% of the world's population using a common questionnaire. This survey is run by an association headquartered in Sweden and comprises of a network of social scientists. Researchers utilize WVS data extensively, with more than 400 publications making use of them.

[4] WVS conducted surveys over the following periods: 1981-1984, 1990-1994, 1995-1998, 1999-2004, 2005-2009 and 2010-2014. I use the last four waves since they correspond to our sample period, that is, 1995 to 2014.

include cross-level interactions between the bank- and country-level variables (Li et al., 2013). According to Field (2013), errors in these models need not be independent, and inputting or deleting missing data is not necessary. Multilevel linear models can correctly group bank-level effects across countries while also examining country-level relations.

1.3   Thesis overview and contributions

1.3.1   First paper – National culture and bank risk-taking

The first paper contributes to research by examining the role of national culture as a determinant of bank risk-taking. Excessive bank risk-taking has led to financial crises (European Commission report, 2014);[5] thus, studying factors associated with risk is important to academics and bank stakeholders including customers, employees and regulators.

I find a positive (negative) association between individualism, hierarchy, (trust) and bank risk-taking. Despite the rigid regulation, I find that banks, especially domestic[6] are prone to cultural biases. Individualistic people, both bank managers and their customers, value personal gain and advancement above the group's benefit. Banks operating in individualistic societies should increase risk, in line with the managers and stakeholders (including shareholders, bondholders, customers and employee) preferences. I find a positive association between individualism and bank risk-taking.

Trust is necessary for banks to attract new customers as well as maintain and expand existing customers' co-operation. When banks assume high risks, customer trust declines, and we

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[5] http://ec.europa.eu/research/social-sciences/pdf/policy_reviews/KI-NA-26554_EN-C.pdf
[6] Failure of a global bank would potentially disrupt the financial system worldwide whereas failure of a domestic bank would have consequences on the financial system domestically.

observe the phenomenon of mattress cash where people store their cash at home, instead of their bank accounts (Coupé, 2011). I find a negative relation between trust and bank risk-taking.

In hierarchical societies, lower rank employees abide by management instructions without questioning them in contrast to egalitarian societies where supervisors and subordinates view themselves as equals. Another egalitarian characteristic is to cater for the welfare of low-ranked employees who have the potential to affect the firm (Gibson, 2000). In addition to low-level employee interests, egalitarian societies consider the interests of all stakeholders, including shareholders, customers and employees. As such, banks operating in egalitarian societies are more likely to be concerned about the stability of the domestic as well as the global financial sector. I find a positive association between hierarchy and bank risk-taking.

My first study contributes mainly to two literatures. First, it highlights the role of an informal institution, national culture, as an important determinant of domestic bank risk adding to literature identifying governance, institutional and financial factors as determinants of bank risk (see for example, La Porta et al., 1998; Laeven and Levine, 2009; Houston et al., 2010; Delis and Kouretas, 2011; Barth et al., 2013; Craig and Dinger, 2013, Barth et al., 2013). Second, it develops literature on the impact of national culture to financial decision-making (e.g., Giannetti and Yafeh, 2011; Ahern et al., 2015).

1.3.2 Second paper – National culture, bank deposits and regulation

The second study associates national culture with the level of deposits. According to the European Central Bank[7] when liquidity dries-up, even well-capitalised banks experience difficulties. New regulation, the Net Stable Funding Ratio (NSFR)[8], to be introduced in January 2018, emphases the importance of customer deposits. Also, the Liquidity Coverage Ratio (LCR),[9] a short-term liquidity resilience measure is in place since 2015. These two, relatively new, regulations stress the importance of liquidity and its management for the banking sector to be able to lend, support viable projects and facilitate economic growth (Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986).

The level of deposits is determined by supply (i.e., the customers) and demand (i.e., the bank management). Customers decide whether to place their excess wealth on deposits versus any other financial instruments or even spend it. Bank managers have the discretion to decide the amount of liquidity to draw from clients' deposits versus other sources (e.g., the interbank market or other marketable securities). I find that national culture influences these financial decisions.

Since the new regulation (NSFR) aims at shielding deposit stability, I interact deposit volatility with the cultural value of trust, which is positively associated with deposit levels. These interaction effects allow me to identify differences between the levels of deposits of

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[7] https://www.ecb.europa.eu/pub/pdf/mobu/mb201304en.pdf

[8] Basel III guidelines require banks to maintain a sustainable funding structure, and to this effect, they introduced the Net Stable Funding Ratio (NSFR) which will become a minimum standard by 1 January 2018 (http://www.bis.org/bcbs/publ/d295.pdf).

[9] http://www.bis.org/publ/bcbs238.pdf

banks considering their deposit volatility. I find a negative association for the interaction of deposit volatility with trust which implies that high deposit volatility weakens the positive effect of trust on the level of deposits. This suggests that high volatility in deposits mitigates the positive effects of trust on the levels of deposits. I, therefore, expect the new regulation, to be instigated in January 2018 called 'Net Stability Funding Ratio or NSFR', to have positive effects, thus resulting in both increasing funding from deposits as well as deposit stability (a potentially interesting topic for future research).

This paper builds on prior work examining bank funding stability (Schlueter et al., 2015) by adding national culture to the factors explaining the differences in deposit levels between countries. It also adds to literature associating national culture with corporate cash holdings (Chen et al., 2015) and consumer savings (Manos et al., 2015) by highlighting that bank managers are also prone to culture biases when deciding to gather funding via deposits versus other sources (e.g., wholesale funding).

1.3.3   Third paper – National culture, bank profitability and financial technology

This chapter was motivated by two factors. Firstly, the low European bank profitability since the latest financial crisis. Specifically, the average return on equity ranges from 3 to 5 percent while the cost of capital is between 10 to 12 percent (KPMG, 2016). Low profitability impairs the bank's financial intermediation function, limits growth and economic prosperity. Secondly, when working on the first paper, I observed that for the banks and countries in my sample, higher risk did not necessarily lead to higher profitability / expected returns. I was therefore interested in exploring the profitability subject further, by identifying

new determinants and establishing whether national culture is one of the factors explaining the different profitability levels between countries.

In the chapter 'National culture, bank profitability and financial technology', I identify national culture as an important determinant of bank profitability. I find that global banks are less prone to cultural influences compared to domestic banks. I then divide the domestic banks in my sample into those with local and foreign ownership. For domestic banks with local ownership, the statistical relationship between national culture and profitability remained. However, this was not the case for domestic banks with foreign ownership. This finding indicates that a disperse, multinational ownership structure is a possible action towards mitigating cultural biases.

Motivated by the popular debate regarding financial technology (fintech) companies and the threat they pose to traditional banks, I explore the effects of technological adoption to bank profitability. I am not able to assess the impact of financial technology directly, because fintech is a very new concept, and data is not available for my time series. The banking sector is amongst the leaders in technology adoption using mobile banking, internet banking as well as automated teller machines (Holden and El-Bannany, 2004). Consistent with my conjectures, I find that technological adoption reduces costs and is positively correlated to profitability.

National culture, however, influences strategic managerial decisions (Schneider and De Meyer, 1991; Moussetis et al., 2005) and as such the actions bank managers take towards fintech potential disturbance. In this chapter, I find a positive (negative) correlation between

individualism, trust, (hierarchy) and bank profitability. Hierarchy is positively associated with conservatism (Schwartz, 1994) and conservatism among senior managers is negatively associated with the company's financial performance (Sturdivant et al., 1985). Motivated by these findings, I evaluate the effects of interacting hierarchy with technological adoption on bank profitability. I find a negative association between the interaction regressor (hierarchy with technology) and bank profitability. Hierarchy mitigates the positive technological effects on profitability. Consequently, banks operating in hierarchical societies are at a disadvantage compared to banks operating in egalitarian societies to address the fintech disruption to the banking sector profitability.

1.4   Thesis structure

I follow the journal format thesis accepted by The University of Manchester which allows a doctoral student to incorporate sections that are in a format suitable for submission for publication in a peer-reviewed journal.

This thesis is a synthesis of three studies, containing original research in chapters 2, 3 and 4. The chapters are autonomous; each has a separate literature review, addresses different issues and makes original contributions. The dataset and methodology are the same for all three chapters. Because of the production timing, the first chapter data series is from 1995 to 2014 whereas for the second and third it extends by one year to 2015. The appendices, graphs, footnotes and tables are independent. The pagination is sequential.

Chapter 2 investigates the impact of national culture on bank risk-taking. Chapter 3 associates national culture with the level of bank deposits and elaborates on new regulation governing

bank funding. Chapter 4 discusses how national culture influences profitability and the emergence of a new threat to bank profits, that is, the financial technology companies. Chapter 5 concludes.

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Chapter 2 - National culture and bank risk-taking

2.1 Abstract

We investigate the relation between national cultural values and bank risk. Despite the rigid transnational regulatory oversight of systemic European banks, we find evidence of an economically significant association between cultural values and domestic bank risk. Specifically, we report a positive (negative) association between the cultural values of individualism and hierarchy (trust) and domestic bank risk-taking. Consistent with our predictions, this relation weakened during the recent financial crisis and does not hold for global banks, regardless of the period under investigation. Our findings are robust to endogeneity tests that mitigate concerns regarding reverse causality and confounding effects affecting our conclusions.

2.2 Introduction

Bank risk-taking is essential to bank performance but could become detrimental to the survival of the bank as well as the stability of a national financial system if it leads to financial crises (European Commission report, 2014).[10] Given that the banking sector transmits financial instability between sovereigns (Acharya et al., 2014a), identifying new factors associated with bank risk is not only academically relevant but also helps safeguard the global financial system. This paper contributes to this important line of research by examining the role of national culture as a determinant of bank risk-taking.

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[10] http://ec.europa.eu/research/social-sciences/pdf/policy_reviews/KI-NA-26554_EN-C.pdf

The banking industry is heavily regulated. Important legislation typically stands at a transnational level, for example, the Basel Accords; therefore, it is reasonable to expect country-specific characteristics, such as national cultural values, to have little or no effect on the risk assumed by banks. However, regulation is not able to fully capture the intricate dynamics affecting managerial decision-making mainly because of three reasons. Firstly, regulators do not impose on banks to take a particular level of risk. Instead, they set rules (e.g., capital requirements), that prevent banks from taking excessive risks aiming to maintain the stability in the financial system. Secondly, banks retain some flexibility and power over their loan granting and deposit accumulation strategies (Dothan and Williams, 1980). Thirdly, managerial perception of risk and predisposition to taking risk vary between individuals and societies (Delerue and Simon, 2009). Prior work highlights that national cultural values primarily influence risk preferences and attitude towards risk (Weber and Hsee, 1998; Husted and Allen, 2008). We argue that national culture not only influences the risk appetite of bank managers directly but also has an indirect effect since bankers should cater to the needs and risk preferences of their customers (Storey and Easingwood, 1993), who are bound to be influenced by national characteristics, especially for domestic banks.

Following prior studies, we identify three national cultural values, that is, individualism, trust and hierarchy, which we expect to be associated with bank risk-taking. Countries characterised by individualistic cultural norms are known for their emphasis on individual advancement, regardless of group goals. In contrast, countries with collectivist cultures give priority to societal and work group goals over individual gain and needs. Therefore, banks operating in individualistic societies should increase risk to cater to their customer and shareholder needs whose primary objective is wealth maximisation (Yahanpath, 2011) and

have little consideration about the impact of bank risk to the stability of the national financial system.

We note here that financial institutions face agency problems which occur when the stakeholders and managers interests are not aligned. As analytically discussed in Macey and O'Hara (2003), banks are susceptible to a higher degree of the moral hazard problem than, for example, manufacturing firms. Specifically, bank risk-taking is beneficial to shareholders and customers but not to debtholders (e.g., depositors). Shareholders benefit from increased risk-taking through its positive effect on the expected return on their investments. Customers benefit from increased bank risk-taking since such risk-taking is typically focused on non-interest banking activities. This diversification in bank activities helps banks to increase revenues from commissions on investments (Lepetit et al., 2008; Barth et al., 2013), thus allowing them to decrease spreads between lending and saving rates, helping customers gain easier and cheaper access to debt financing. On the other hand, excessive risk-taking goes against the interests of debtholders. For example, in the event of bankruptcy, shareholders have limited liability with the burden of risk shifting to the bank's creditors (John et al., 2016). Despite protections for certain kinds of debtholders, such as the depositors insurance scheme, recent developments (e.g., bail in) have demonstrated their fragility. Given the high leverage in banks as well as the opacity and complexity of their operations the risk-shifting problem is magnified in the banking sector. In sum, excessive risk-taking benefits certain categories of customers but may be detrimental to others.

In addition to the preferences of individualistic bank stakeholders, individualistic bank managers would also favour risk-taking since they value personal gain more than group

benefit. Bank risk positively affects the expected value of managerial compensation packages since bank executive remuneration relies heavily on equity-based pay schemes (Hagendorff and Vallascas, 2011; Vallascas and Hagendorff, 2013; Srivastav et al., 2014). Bank managers operating in societies characterised by higher individualism will optimally increase risk. This is because (a) they should cater to their shareholder preferences and (b) individualistic societies are more tolerant towards income inequality driven by risk-taking (Conyon and Murphy, 2000), thus are more likely to accept such utility maximising managerial behaviour.

Banks operate in a competitive environment, hence building and maintaining good relationships with customers is important (Mosad, 1996). A strong bank–customer relationship enhances customer loyalty (Dick and Basu, 1994), which can be attributed, to a considerable degree, to customer trust (Dwayne et al., 2004). Customer trust is necessary for banks (Ratnovski, 2013) to maintain and increase deposits. When trust in a country's financial institutions is low, we observe the phenomenon of 'mattress cash' (Coupé, 2011), that is, significant deposit withdrawals from the domestic banking system, which limits the ability of banks to execute their primary role as financial intermediaries. The extent to which individual banks are affected depends on depositor expectations regarding the banks' failure risk. Indeed, Knell and Stix (2010) find that in times of crises, trust declining and distrust rising, are the primary triggers behind bank runs. Given the positive relation between bank risk-taking and failure risk as well as the importance of trust in maintaining and increasing deposits, we anticipate lower bank risk-taking in societies that place a higher value to trust.

Finally, hierarchical societies form power ranks according to importance and social power. In such societies, lower rank managers (for example branch and other middle-management)

follow top-management (CEO, director and board-member) instructions without questioning them, even if managerial motives are not necessarily aligned with their own (or the firm's) interests. In contrast, in egalitarian societies management and employees view themselves as equals (Brett et al., 1998), thus, middle-management employees are more likely to challenge top-management decisions. Furthermore, egalitarian societies cater for all stakeholders and the society at large, thus are more likely to be concerned about the financial stability of the banking sector. In addition, in these societies, managers need to consider the interests of all stakeholders, including lower ranked employees, as they have the potential to affect the firm (Gibson, 2000). We, therefore, expect that in societies characterised by hierarchical values bank risk is likely to be higher compared to that in egalitarian societies.

Our paper argues that the anticipated relation between national culture and bank risk should weaken during global financial crises, like the recent one in 2007-2010. This happens primarily for two reasons: (a) crises increase dramatically banks' cost of borrowing, making high levels of managerial risk-taking unsustainable. In response, managers should rationally decrease bank risk-taking, irrespective of personal and national attributes or preferences; (b) we anticipate that the degrees of freedom, in which banks operate in, decrease as the sovereign entity in which they function gets externally constrained. At times of instability, sovereigns lose part of their autonomy as they become more dependent on the debt markets. This is particularly true for our sample of European banks since all banks operate in European Union member states, some of which experienced EU (externally) imposed macroeconomic and financial sector adjustment programmes. These programmes gave greater control and oversight of national financial sectors to European institutions such as the European Central Bank (ECB). As a consequence of the above listed reasons, we expect

national culture to have a lesser impact on banks' financial decisions, during the recent financial crisis.

We also expect national culture to affect the risk-taking of systemic domestic banks, but not that of global ones. By definition, global banks operate in global settings. They are primarily multinational and interconnected (Edwards, 2012), and their multi-country presence exposes management to different national cultures, hence very diverse customer needs. Furthermore, the importance of systemic global banks to the global economy means they are subject to additional regulatory requirements, including capital, risk management and compliance requirements (Walker, 2012) reducing their flexibility and exposure to national culture influences. This is particularly true for European systemic global banks which are monitored and supervised directly by the ECB as opposed to domestic banks where the national regulators are allowed appropriate discretion to accommodate the structural characteristics of their country's domestic financial sector.[11] Given that the national regulators are bound to be affected by and respond to national social norms, they act as an additional (to bank managers and customers) channel through which national culture affects domestic bank risk.

We empirically examine our conjectures using a sample of 99 banks in 19 European countries which we study for 20 years (1995-2014). These banks were included in the European Banking Authority (EBA) 2014 stress tests and have data in Bloomberg for at least five consecutive years. We follow prior literature (Jin et al., 2013; Craig and Dinger, 2013; García-Kuhnert et al., 2015) and use the bank's Return On Assets (ROA) volatility as our

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[11] http://www.bis.org/publ/bcbs233.pdf

primary risk proxy. After controlling for several country, bank and managerial characteristics, we find a strong positive association between domestic bank risk-taking and individualism as well as hierarchy. Consistent with our conjectures, we report a strong negative relation between domestic bank risk-taking and trust. As anticipated, we also find that financial crises weaken the relation between bank risk and national culture influences, whereas this relation exists only for domestic but not global banks, regardless of the period under investigation.

Arguing in favour of a causal effect of national culture on bank risk is admittedly difficult given significant endogeneity concerns, particularly about reverse causality and confounding effects. We note that national cultures evolve slowly over very long periods and perceptions over individualism, trust and hierarchy depend on personal attributes that are deeply rooted in societal characteristics. Still, one may argue that major prior events related to the country's financial sector risk could affect perceptions of social norms leading to reverse causality. A more important concern in our context relates to the impact of omitted variables to our conclusions. In particular, unobservable characteristics could be driving both national culture and bank risk, leading to spurious results. Key research design choices, for example, the use of a relatively homogeneous sample and hierarchical modelling allow us to mitigate these concerns. By controlling for a wide range of country-, bank- and manager-level determinants of bank risk, including year fixed effects and using alternative variable definitions, we further alleviate the impact of omitted variables to our conjectures. Importantly, we offer a more formal way of addressing endogeneity using instrumental variable regressions, where we instrument for national culture variables and run two-stage least squares (2SLS) regressions. Collectively, our results point towards a causal effect of national culture on bank risk. Still, we concur that one cannot completely mitigate endogeneity concerns in our setting.

This paper primarily contributes to two literatures. Prior work identifies governance, institutional and financial factors as determinants of bank risk (see for example, La Porta et al., 1998; Laeven and Levine, 2009; Houston et al., 2010; Delis and Kouretas, 2011; Barth et al., 2013; Craig and Dinger, 2013). Our paper highlights the role of an informal institution, that is, national culture, as an important determinant of domestic bank risk, thus contributing to the extant literature. Furthermore, we add new insights to the developing literature on the impact of national culture to financial decision-making (e.g., Giannetti and Yafeh, 2011; Ahern et al., 2015). There are two papers in this strand of literature that are closely related to ours (Li et al., 2013; Kanagaretnam et al., 2014). Li et al. (2013) find that culture is related to corporate risk using a sample of manufacturing firms. We are different from Li et al. in at least two ways. First, we focus on banks, which is a unique, highly regulated sector. The impact of regulation on the investigated relation leads to very different predictions ex-ante. Second, we study different dimensions of national culture, different countries and periods compared to Li et al. All these differences lead to new, interesting insights. Kanagaretnam et al. (2014) find that differences in national cultures affect both accounting conservatism and risk-taking in banks. Our paper differs from Kanagaretnam et al. in several important ways. First, they study a sample of banks from 70 countries covering all continents. We focus on systemic European banks, which helps us better alleviate concerns about the impact of unobservable heterogeneity affecting our conclusions. Second, we investigate the relation between culture and bank risk during the recent financial crisis and find a significant weakening of the effect. In contrast, they focus on failed banks (tail risk) and present different conclusions. Third, we showcase that the predicted relation is only valid for domestic banks but not global ones. Fourth, we formally address endogeneity concerns and show that our results are robust to dealing with spurious effects and reverse causality. Finally,

our analysis covers a much longer time-series (1995-2014 vs 2000-2009) and tests various specifications[12] as well as alternative constructs for national culture[13]. Overall, we believe our paper makes contributions to academic knowledge that are both new and interesting.

2.3   Context and prior work

2.3.1   Why are banks different and so important in our context?

The banking sector has four major differences compared to non-financial companies that influence our conjectures. First, banks are information specialists enabling them to match depositors with borrowers (Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986). Therefore, it is particularly important for financial institutions to operate within societal norms and respond to stakeholder (e.g., customers, shareholders) needs in order to remain competitive. Catering to stakeholder needs also allows banks to maintain and increase their liquidity, without which they cannot properly function.

Second, banks are linked together via the interbank market, exposing them to contagion risk (Iori et al., 2006; Mistrulli, 2011; Upper, 2011). Under the European deposit protection scheme, contagion risk expands to the banks' corresponding sovereigns. The bailouts of banks increase sovereign credit risk in developed economies (Acharya and Rajan, 2011), erode the value of government guarantees and ignite a loop between sovereign and bank risk (Acharya et al., 2014a). Because banks hold sovereign bonds, there is also feedback in the other direction (Attinasi et al., 2010). Given the importance of the financial sector to a

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[12] See Section 2.7.1 for a discussion on two alternative risk proxies (the z-score which measures the distance from insolvency in standard deviations and the loan loss provisions, a credit risk measure)

[13] See Section 2.7.2 for a discussion on alternative national culture constructs, namely, Hofstede's scores on 'individualism' and 'uncertainty-avoidance'

country's prosperity, societies have strong interest in bank risk-taking and apply intense pressure to bank managers to conform to societal norms.

Third, banks are the major vehicle through which a country's Central Bank applies its monetary policy, that is, inflation stability, regulatory application, and expectations management, for the benefit of society (Molnár and Santoro, 2014). Consequently, it is imperative for banks to have better risk management practices (Birge and Júdice, 2013) compared to non-financial firms. Regulation has limits in capturing the complex dynamics affecting managerial decision-making in banks (Dothan and Williams, 1980; Kane, 1981), which leaves room for informal institutions, such as national culture, to influence bank risk management.

Fourth, banks differ from other firms in terms of their governance problems. According to Macey and O'Hara (2003), fiduciary duties, especially for banks, extend to all stakeholders and not just shareholders. For example, the interests of non-shareholder constituents such as uninsured depositors may not always be aligned with the interests of shareholders. In fact, Macey and O'Hara go one step further stating that shareholders are residual claimants in all aspects including fiduciary rights. This conflict of interests between bank stakeholders complicates the management of bank risk-taking differentiating financial institutions from other business sectors.

2.3.2   Prior work on the determinants of bank risk

Prior work identifies several non-cultural (financial, governance, institutional) factors affecting bank risk. Breuer (2006) studies legal, political and other institutions within

countries and finds that they affect the level of non-performing bank loans. Boyd et al. (1993), Hakenes and Schnabel (2011), and Bhagat et al. (2015) find a negative correlation between risk-taking and bank size. Dell'Ariccia et al. (2014) and Bhagat et al. (2015) associate bank leverage, that is, the ratio of equity capital to total assets, with bank risk. Valencia (2014) also identifies capital adjustments as a potential source of increased risk via increased leverage. In addition, when interest rates decrease, the bank's net interest marginal revenue decreases motivating bank management to find alternative income sources of higher yield, thus higher risk (Delis and Kouretas, 2011). Furthermore, Craig and Dinger (2013) find that when the competition for deposits is high, banks offer higher interest rates to attract deposits resulting in increased liabilities cost which consequently raises the optimal risk choice of banks. Banks with increased cost of liabilities tend to increase lending, sometimes sacrificing quality over quantity, which could lead to instability and financial crises (Wagner, 2007; Jordà et al., 2011). A study by Kanagaretnam et al. (2010) find that auditor's independence in terms of fees is associated with earnings management through Loan Loss Provisions (LLP), one of our risk proxies. For small banks, Kanagaretnam et al. find greater earnings management via under-provisioning of LLP, by those banks that pay higher auditor's fees. In contrast, this association is not validated for large banks. Our results are consistent with these findings since we show that small (domestic) banks face different challenges compared to large (global) banks.

Extensive literature exists on the association between corporate governance and bank risk-taking. Certain studies highlight the failure of bank boards to monitor bank risk effectively (Bebchuk & Spamann, 2009; Kashyap et al., 2008; Kirkpatrick, 2009). Other studies focus on the role of governance in bank risk optimization allowing managers to maximize shareholder

value whilst considering the social costs of bank failures (Stulz, 2015). A literature review by Srivastav and Hagendorff (2016) highlights three future strands of research on bank governance, one of that being the risk management culture, which we expect will have dependencies on national culture. The second is the impact of board attributes, including personal characteristics, which again we expect to be, to some extent, defined by national culture. The third is the types of pay instruments that will incentivize managers' long-term stability. Finally, Srivastav and Hagendorff, posit that bank corporate governance should cater to the interests of all stakeholders, including large creditors, supporting our earlier discussion (see Section 2.3.1).

Moreover, Lepetit et al. (2008) and Barth et al. (2013) report a positive association between the level of income originating from non-traditional banking activities (i.e., commission based non-interest income) and risk-taking. Barth et al. (2013) also highlight the degree of transparency in financial statements as one of the factors linked to bank risk, whereas Houston et al. (2010) show that information sharing among creditors has a significant effect in increasing bank profitability and lowering risk. Barry et al. (2011) report differences in risk-taking between privately owned and public banks. Laeven and Levine (2009) highlight more subtle differences in ownership structure by showing that the cash flow rights of the largest shareholder and managerial ownership are important determinants of bank risk-taking.

Regarding the latter point, there is an extensive literature looking at the equity incentives of bank managers and how they affect bank risk-taking. For example, Hagendorff and Vallascas (2011) find that bank CEOs with higher pay-risk sensitivity (i.e., compensation vega) increase risk-taking by engaging in risk-inducing mergers. However, Fahlenbrach and Stulz

(2011) report that compensation vega had little effect on bank performance and risk during the recent financial crisis.

2.4   Data sources

Our sample consists of European banks selected by the EBA to perform the 2014 stress tests.[14] These tests evaluate the resilience of the banking sector to systemic risk, hence focus on systemically important banks. Our research design choice to focus on systemic European banks helps us develop a relatively homogeneous sample. These banks operate under a uniform regulatory environment and share common regulators including the EBA and the European Stability Mechanism (ESM), as well as the same policymaker in the ECB. Thus, our sample selection reduces unobservable heterogeneity significantly, which helps reduce the impact of confounding effects. We have included 99 out of a total of 123 banks for which data existed in Bloomberg for at least five consecutive years. The stress-test participating banks originate from 19 European countries and cover at least 50% of the national banking sector in each EU member state in terms of 2013 consolidated assets. Our sample consists of major global financial institutions, such as Barclays, Deutsche Bank and HSBC, as well as domestic systemic banks such as OTP Bank, SNS Bank and UBI Banca. Collectively, the banks in our sample represent more than 70% of total EU banking assets (approximately €29,000bn).

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[14] https://www.eba.europa.eu/documents/10180/563711/31012014+EU-wide+stress+Test+2014+%28List+of+sample+banks+%29.xlsx

We study a 20-year period (1995-2014). We collect all the bank financial data from Bloomberg,[15] whereas the World Values Survey provides information on national cultural values. We describe this survey and our culture constructs in detail in the next section. Finally, we use a variety of additional sources to construct control variables that prior work has identified as important determinants of bank risk. For example, we use BoardEx to collect information on bank CEO nationality. All variables used in this study are defined in Appendix 2.1. Given the unbalanced nature of our panel and missing values for some variables, there is some variation in the number of observations we report across specifications. The maximum number of bank-years under investigation is 1,345.[16]

2.4.1   National culture variables

To measure national cultural values, we use the World Values Survey (WVS).[17] It takes place in waves.[18] We follow Ahern et al. (2015) in selecting the proxy survey questions for each of the three cultural variables under investigation, that is, individualism, hierarchy,

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[15] Bloomberg is an integrated platform for financial data used by 250,000 companies (including investment firms and banks) worldwide for their own as well as their client's portfolio allocation decisions. Existing academic literature also uses it; see for example Thiripalraju and Acharya (2010); Acharya et al. (2011); De Bruyckere et al. (2013); Thanassoulis, (2014); Acharya and Steffen (2015).

[16] A possible criticism with investigating the impact of national culture on bank risk-taking for all current EU member states is that Cyprus, Hungary, Malta, and Poland were not members of the European Union since the beginning of our assessment period (1995). We note that these four countries account for less than 1% of our sample. Also, countries that apply for European Union membership prepare and conform to EU standards and regulations before their EU entry application. Cyprus and Malta applied for EU membership in 1990 whereas Hungary and Poland applied in 1994. Hence, all four countries applied for EU membership before 1995, that is, the starting year of our sample. In any case, our results are not sensitive to the decision to include in our analyses the banks from these countries.

[17] WVS is the largest, non-commercial academic study covering the world's major cultural zones; conducted in almost 100 countries, it covers about 90% of the world's population using a common questionnaire. This survey is run by an association headquartered in Sweden and comprises of a network of social scientists. Researchers utilize WVS data extensively, with more than 400 publications making use of them.

[18] WVS conducted surveys over the following periods: 1981-1984, 1990-1994, 1995-1998, 1999-2004, 2005-2009 and 2010-2014. We use the last four waves since they correspond to our sample period, that is, 1995 to 2014.

and trust. Ahern et al. (2015) comment extensively on the validity of the three cultural constructs from WVS, which have been validated by other studies as well; see for example Glaeser et al. (2000), Fehr et al. (2003) and Holm and Danielson (2005). We present in Appendix 2.1 the survey questions relating to these variables as well as details on variable construction.

Following prior literature, we rescale the survey scores so that our cultural variables range between zero and one. The three cultural variables (individualism, trust and hierarchy) do not show any statistically significant correlation[19], which implies that each variable captures a different dimension of national culture. Figure 2.1 shows the average value of individualism, trust and hierarchy by country. We observe significant variation between the values of the three cultural variables from one country to another. It is evident that the European club where all nineteen countries in our sample belong to is primarily a politico-economic union with its members maintaining their cultural identity. Trust is lowest in Cyprus and Portugal. Cyprus' history is volatile, renowned for hostile confrontations. According to Marvin (2016) about the second millennium BC Cyprus was subjected to foreign domination and from then on, almost without interruption, outside powers control the island. This may have cultivated a low trust culture. Studies by Magalhães (2005), Gyorffy (2012) and Torcal (2014) support that Cyprus and Portugal are low trust countries whereas Sweden is a high trust country (Gyorffy, 2012). The authors attribute the differences in trust to historical and economic aspects which Hofstede (2001) identifies, amongst other factors, as the origins of national culture. Individualism is lowest in Greece and highest in Malta. Greece has been described

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[19] Correlation coefficients: individualism and trust 0.22; trust and hierarchy 0.03; individualism and hierarch 0.09.

by Peristany (1965), Triandis (1972) and Dragonas (1983) as a collectivist country, in which the group values demonstrating support and concern are dominant. In Malta on the other hand, there is a loosely-knit social framework; individuals are expected to take care of themselves and their immediate families and the employer/employee relationship is a contract based on mutual advantage with hiring and promotion decisions based mainly on merit (Hofstede, 2001). Hierarchy is highest in Sweden and lowest in Finland. According to a historical background study by Scase (2016) the labour force in Sweden was structured in a hierarchical manner, in that relationships between employer and employee were often paternalistic. Hout et al. (1993) find evidence that such (class) structures persist even today, in our post-industrial societies. In Finland on the other hand, power is decentralised, employees expect to be consulted, control is disliked, and superiors are accessible (Hofstede, 2001).

We take advantage of this significant variation in cultural values to investigate their impact on bank risk.

2.4.2 Proxies for bank risk

Our main proxy for bank risk is the volatility of Return on Assets (ROA). Following Jin et al. (2013), Craig and Dinger (2013) and García-Kuhnert et al. (2015), we define it as the five-year volatility of the ratio of the gross pre-tax profit (including loan loss provisions) to total assets. Increased volatility in ROA implies a higher level of risk. To control for extreme values, we use the logarithmically transformed ROA volatility in our regression analysis. However, we note that our regression results are not sensitive to this decision and remain if we use the raw ROA volatility values. In Figure 2.2, we plot risk (ROA volatility)

and returns (ROA level) by country. The highest ROA volatility is in Greece, followed by Cyprus and Poland, which is anticipated given the recent financial crisis in these countries, particularly, Greece and Cyprus. Increased risk does not necessarily translate into higher return. The countries with the highest average bank ROA during our time-series are Hungary followed by Poland and Malta. Clearly, the return to risk ratio differs significantly from one country to the other.

In robustness checks we also use the banks' z-score as an alternative proxy for risk, following Boyd et al. (1993), Boyd and De Nicollo (2005), Laeven and Levine (2009), Houston et al. (2010), Beltratti and Stulz (2012) and Tonzer (2015). The z-score measures the distance from insolvency in standard deviations and is defined as the Return on Assets (ROA) ratio plus the Capital Asset Ratio (CAR) divided by the standard deviation of ROA, on a five-year basis. To deal with extreme values, we also use the logarithmic transformation for z-score. In contrast to the ROA volatility, higher z-scores imply lower probability of insolvency, hence lower risk. To facilitate exposition, we multiply the log-transformed z-score values by minus one.

Following Bushman and Williams (2012), Jin et al. (2013) and Makri and Papadatos (2014), our third alternative proxy for bank risk is Loan Loss Provisions. Loan Loss Provisions is the ratio of the loan loss provisions to loans, a measure of the quality of loans granted by banks. Bank asset quality has been responsible for bank failures, and we, therefore, use it as a proxy for risk. Consistent with the treatment of our other risk proxies, we use the logarithmically transformed values in our regression analysis. The use of the loan loss provisions measure allows us to address a caveat with the other two measures since their estimation depends on

5-year windows. This makes claims over a contemporaneous relation more difficult and hinders the interpretation of our sub-period analyses. The loan loss provision measure addresses both issues since it is estimated annually.

2.4.3   Control variables

In line with other studies on bank risk-taking, we control for bank characteristics such as size (Boyd et al., 1993), leverage (García-Kuhnert et al., 2015), net interest marginal revenue (Hellmann et al., 2000) and interest activity (Demirgüç-Kunt and Huizinga, 2010). We also control for country characteristics that might have a high correlation with our cultural value constructs and ultimately drive our results (i.e., confounding effects). To capture cross-country differences, we use macroeconomic, legislative and institutional data. We follow La Porta et al. (1997), Fiordelisi et al. (2011), Li et al. (2013), Anginer et al. (2014) and Ahern et al. (2015) in choosing the relevant country variables (e.g., GDP per capita, GDP growth volatility, domestic credit as a percentage of GDP, legal origin). We collect the information from the World Bank database, as well as the relevant academic papers directly (e.g., La Porta et al., 1998, for legal origin).

Following Barry et al. (2011), we control for whether a bank is listed on a stock exchange or not. We also control for the degree of restriction of non-traditional banking activities in a country, the degree of transparency in bank financial statements, and a country-level index of banks' capital adequacy under adverse conditions (Barth et al., 2013). Furthermore, we include a cash flow index and the ownership level of senior managers, which allow us to capture the cash flow rights of the largest shareholder and senior management, respectively (Laeven and Levine, 2009). In addition, we add the index capturing the information sharing

among creditors by Djankov et al. (2007). Lastly, we control for the nationality of the bank's CEO. We record the nationality of the CEOs on an annual basis for each bank in our sample using the Boardex database.[20] All variables are defined in Appendix 2.1.

2.4.4 Descriptive statistics

Table 2.1 provides the descriptive statistics for our sample. We report the mean, standard deviation, median, 25th percentile and 75th percentile for each variable. We group the variables into dependent, cultural, country, bank financials and other.

Starting with the dependent variables, we observe that ROA volatility has an average (median) of 0.38 (0.23). Similarly, the average (median) value for z-score is 4.50 (2.68). In principle, this median value indicates that European systemic banks during the period 1995 to 2014 were less healthy than banks globally since the z-score is below the median of 3.567 reported by Kanagaretnam et al. (2014) in their study covering 70 countries and approximately 900 banks from 2000 to 2006. However, such comparison is misleading given the limited time-series coverage in Kanagaretnam et al. (2014), which ignores the recent financial crisis period. Finally, the loan loss provisions average is 0.08 higher than the 0.03 reported by Kanagaretnam et al., (2014) indicating that European systemic banks for the period 1995 to 2014 have a higher loan loss provisions to total loans ratio compared to banks globally (for the period 2000-2006), which at first sight appears to be counterintuitive. Again, this difference is likely attributable to the significant discrepancies in terms of time-series

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[20] We find that the CEO is a national of the bank's headquartering country in more than 90% of our observations. Thus, differences between the cultural norms of the CEOs and the societies their banks operate in are unlikely to drive our findings on national culture and domestic bank risk.

coverage between the two studies and highlights the need for large samples covering significant macro events when conducting studies based on international settings.

Turning to the variables proxying cultural characteristics, we observe that individualism and hierarchy have similar values for mean (0.53 and 0.49, respectively) and standard deviation (0.08 for both), while trust is characterised by much more variation (standard deviation is 0.15), whereas the average value is 0.35.

The descriptive statistics for the control variables, i.e., bank and country characteristics, are consistent with those reported in prior work. We note that the average values for the bank- and country-size proxies (e.g., bank size and GDP per capita) are relatively high which is an artefact of our decision to study systemic banks in EU (wealthy) nations.

2.5   Methodology

We apply a hierarchical/multilevel linear modelling approach to test our hypotheses. There are three levels in the data: countries, banks, and observations. To explore these multilevel data and account for the clustered structure of the dataset we employ a hierarchically nested form of the general linear model; see Goldstein (2011) and Raudenbush and Bryk (2002).

The hierarchical approach separates the variance attributable to bank and country-level variables. Thus, homogeneity is not a prerequisite. Multilevel models take into account the sample size within a country by applying weights, and accurately include cross-level interactions between the bank- and country-level variables (Li et al., 2013). According to

Field (2013), errors in these models need not be independent, and inputting or deleting missing data is not necessary. Multilevel linear models can correctly group bank-level effects across countries while also examining country-level relations.

We divide our sample into three periods in order to study the impact of the recent financial crisis to the relation under investigation: the full sample is 1995 to 2014; the non-crisis sample is 1995 to 2006 and 2011 to 2014, whereas the crisis sample is 2007 to 2010. We define the recent financial crisis period following existing literature that has studied banks during the global financial crisis; see for example Dabrowski (2010), Gilbert et al. (2012), Choi (2013) and Mirzaei (2013).

To study the relation between bank risk-taking and cultural values we regress bank risk on cultural, country and bank financial variables for each of the periods under assessment:

$$\text{Bank Risk}_{i,j,t} = \alpha + \beta(\text{Cultural Variables})_{j,t} + \gamma(\text{Country Variables})_{j,t} + \delta(\text{Bank Financial}$$
$$\text{Variables})_{i,j,t} + \zeta(\text{Other Controls})_{i,j,t} + \text{Year FE} + \varepsilon_{i,j,t} \text{ (Equation 2.1)}$$

The main dependent variable (Bank Risk$_{i,j,t}$) for bank i in country j at time t is the ROA volatility.

Vector β captures the national culture variables for country j at time t. Vector γ captures macroeconomic and other country-level variables for country j at time t. Vector δ captures the bank financial variables for bank i in country j at time t, whereas vector ζ includes other

controls such as managerial ownership, capital adequacy under adverse conditions and legal origin.

During 1995-2014, market valuations changed considerably, and macroeconomic shocks (e.g., currency crisis) took place, which affected bank risk at the global level. Hence, we include year fixed effects to control for time effects.[21]

2.6   Empirical results

2.6.1   Multilevel tests

Table 2.2 presents the multilevel linear regression results for all banks. For the whole time-series (column 1), we find a strong relation between the three cultural values and bank risk after controlling for a variety of country, bank and manager characteristics. All three cultural variables, namely, individualism, trust, and hierarchy are statistically significant at 1%. Consistent with our conjectures, individualism and hierarchy are positively associated with bank risk while trust is negatively related to risk. While the positive/negative sign for individualism/trust may be intuitive, the positive sign for hierarchy perhaps demands some explanation. As discussed in previous sections, banks face moral hazard issues, meaning that specific decisions may be to the benefit of certain stakeholders but not others. Specifically, bank risk-taking is beneficial to shareholders and some customers but not to debtholders. We

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[21] Most recent academic papers use hierarchical models when dealing with multilevel cross-country data (e.g., Kayo and Kimura, 2011; Dong and Stettler, 2011; Ketelhöhn and Quintanilla, 2012; Mihet, 2013; Li et al., 2013; Bakar et al., 2017). However, it is also common to run OLS regressions with country and/or firm dummies, to capture country/firm time-invariant (fixed) effects. All our results are insensitive to this modelling choice and our findings remain unchanged when running OLS regressions with country/bank fixed effects (unreported analysis; results are available from the authors upon request). Still, we do not report this analysis not only because we wish to conserve space but also we feel that hierarchical models better capture heterogeneity in our setting (i.e., three levels of clustered observations).

expect this risk-shifting problem to be more profound in hierarchical societies, where agency costs of debt may be higher. Consequently, we expect shareholders and managers in hierarchical societies to take on more risk which could potentially deplete, for example, deposits. A relatively recent example happened in Cyprus, the country with the highest hierarchy score in our sample. Specifically, in 2013, approximately 50% of unsecured deposits were bailed-in (converted to equity) to recapitalise the largest domestic systemic bank. Cyprus has the second highest risk score, followed by Greece, potentially catering to the interests of managers and shareholders which eventually led to the detriment of depositors (who took less risk, by investing in deposits, compared to shareholders who invested in equity).

The findings indicate a non-trivial economic effect of national culture on bank risk. In particular, a one standard deviation increase in individualism around its mean is associated with an increase in ROA volatility by 7.1% relative to the unconditional average ROA volatility (0.38) in our sample. The magnitude of the economic effect is even larger for trust (decrease in ROA volatility by 20.9%) whereas for hierarchy a one standard deviation increase around its mean is associated with an increase in ROA volatility by 4.2%.

We observe that the bank size coefficient is statistically significant and negative, implying that larger banks take lower risks. Existing literature on the relationship between bank size and risk is conflicting. Demsetz et al. (1997) find that large bank holding companies pursue higher risks. In a more recent study, Hakenes et al. (2011) find that small banks take higher risks compared to large banks due to fiercer competition. Given our sampling choices, we expected to find a negative correlation between bank risk and size. Global systemic banks are

subject to stricter regulation and directly supervised by the ECB, hence are expected to take lower risk compared to domestic banks.

The net interest marginal revenue, as expected, is negatively associated with risk. Banks taking higher risk are expected to focus more on non-interest banking activities, increasing revenues from commissions on investments (Barth et al., 2013) consequently decreasing spreads between lending and saving rates (Lepetit et al., 2008).

A higher equity stake of individuals or banking institutions in privately held banks is associated with a decrease in risk whereas institutional investors impose higher risk taking strategies (Barry et al., 2011). Our sample consists of both private and public banks and produces a negative association between managerial ownership and bank risk. This finding is in agreement to Barry's results; bank managers possibly hold portfolios less diversified than institutional investors and consequently opt for lower risk, hence the negative coefficient.

We then focus on the non-financial crisis period (column 2), which we anticipate to be the sub-period driving our results on the whole sample. Indeed, the significant relationship between the three cultural values and risk remains in that period. All cultural variables maintain their statistical significance at 1% and have the predicted signs. Furthermore, all three coefficients are now higher than the corresponding coefficients for the full sample, which is an initial indication that the result is weaker during the financial crisis period. We next turn our attention to the financial crisis sample to corroborate this conjecture.

We follow Dabrowski (2010), Gilbert et al. (2012), Choi (2013) and Mirzaei (2013) in our definition of the financial crisis period (2007-2010). We re-run our main model specification

and find no statistically significant association between the three cultural variables and bank risk during the financial crisis. As mentioned previously, banks become more constrained during financial crises as a result of the significant increase in their borrowing costs. Therefore, bank managers will adapt their risk management policies in response to the macroeconomic uncertainty regardless of societal norms relating to risk taking. At the same time, during financial crises, sovereigns lose part of their autonomy as they become more dependent on the debt markets as well as the support of other states. The latter is particularly relevant in our sample of European banks, many of which had to rely on the European-wide bailout mechanisms that applied directly to them or their sovereigns, e.g., Spain, Ireland, Portugal, Greece, and Cyprus. Under these mechanisms, European institutions, such as the ECB and the ESM took a prominent role in coordinating the efforts of steering the European financial sector out of the crisis, which significantly weakened the impact of informal national institutions, such as, cultural norms on bank risk-taking. Overall, our results are consistent with national culture having a lesser impact on the bank financial decisions due to the above constraints. We note here that the lack of significant results during the crisis period could be an artefact of our decision to study systemic banks, which were under intense scrutiny and the focus of European institutions during this period. It might be the case that there was still a significant, albeit weakened, relation between cultural values and bank risk for peripheral (non-systemic) banks that were less likely to be under the scrutiny of European regulators and policy makers. Examining the differences in the national culture-bank risk relation between systemic and non-systemic banks is an interesting direction for future research.

Next, we turn our attention to verifying our predictions regarding the differential effect of national culture on domestic vs global banks. In particular, as mentioned previously, we expect national culture to affect risk in domestic, but not global, banks. To test this conjecture, we run our main analysis separately for domestic and global banks. According to the Basel Committee on banking supervision, the failure of G-SIBs (Global Systemically Important Banks) has worldwide consequences whereas failure of D-SIBs (Domestically Systemically Important Banks) has financial implications domestically. Hence, global banks are the primary focus of transnational regulations and operate under more stringent requirements, including higher capital requirements, and stricter risk management and compliance, which is particularly true for G-SIBs (Walker, 2012). Furthermore, they are exposed to stakeholders from many different countries, thus, the cultural norms of an individual country are bound to have limited effect on the risk-taking of global bank managers. Thus, if there is a causal relation between national culture and bank risk one would anticipate this to exist only among domestic banks but not global ones.

We start off this analysis in Table 2.3 by presenting multilevel linear regression results for all domestic banks in our sample for each of the three time periods under assessment. We use the Basel Committee definitions to distinguish between domestic and global banks. Consistent with the results reported in Table 2.2, all three cultural variables are statistically significant for the whole time-series as well as the non-crisis period and have the predicted signs. Similar to the previous analysis, we find no significant correlation between the three cultural variables and domestic bank risk during the crisis period.

Table 2.4 presents our regression results on global banks. There are twelve G-SIBs (12% of the sample) which account for 59% of the total assets of all ninety-nine systemic banks in our sample. None of the three cultural variables is statistically significant for the whole period and/or the non-financial crisis period. The results remain insignificant during the crisis period, but we do not tabulate them since the small sample size (40 observations only), leads to fewer degrees of freedom and little confidence about the validity of this analysis. We note here that sample size is a concern for all the analysis relating to global banks but for the non-crisis and overall samples we have a sufficient number of observations to get valid specifications. Overall, the results reported in Tables 2.3 and 2.4 are intuitive and confirm our conjectures regarding the role of national culture.

2.7   Robustness checks

2.7.1   Alternative bank risk proxies

To test the robustness of our results, we use two alternative proxies for bank risk, the z-score which measures the distance from insolvency in standard deviations and the loan loss provisions as per Bushman and Williams (2012) and Makri and Papadatos (2014). The use of alternative risk measures helps us strengthen our inferences since unobservable effects are not expected to be similarly correlated to all three measures. Therefore, this analysis helps alleviate the concern that common confounding factors might be driving our findings. We report the results of this analysis in Panels A and B of Table 2.5. The three cultural variables remain statistically and economically significant for the whole sample regardless of the choice of dependent variable. The only exception is the coefficient of hierarchy when using loan loss provisions as our dependent variable, which has the anticipated sign but is now insignificant. The results are driven again by the non-crisis period and are not statistically

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significant during the crisis period (the coefficient of hierarchy is marginally significant, at 10% level, in Panel B). In untabulated analysis, we further confirm that the effect exists only for domestic banks (D-SIBs) but not for global banks (G-SIBs). Overall, our findings are not overly sensitive to the choice of a particular proxy for bank risk.

We also considered using Risk Weighted Assets (RWA) as an alternative proxy for bank risk. However, only a small number of banks in our sample began reporting this measure in 2004 (mainly global banks). This number increased in 2008, and by 2011 nearly all banks included this measure in their financial accounts. However, given the limited availability of data and the criticism, this specific measure has received recently (Acharya et al., 2014b), we refrain from using it as an alternative risk proxy in this context.

2.7.2   Endogeneity

To formally address concerns regarding the impact of omitted variables (i.e., confounding effects) to our conclusions, we conduct two-stage least squares (2SLS) regressions by selecting instrumental variables (IVs) for our national culture variables (i.e., individualism, trust and hierarchy). We carefully select IVs that are expected to correlate with the first stage dependent variables but not the second stage error term.

We follow prior literature and employ established measures that have been used as instrumental variables for national culture in similar settings. In particular, we instrument national culture using ethnicity, language, religion (Alesina et al., 2003) and geography (Kwok and Solomon, 2006). To test if the IVs are appropriate for our model, we use the approach described by Baum et al. (2011) for under-identification, weak-identification and

over-identification. The four instruments are used as proxies for each of the national culture variables (i.e., individualism, trust and hierarchy). In addition, we separately run redundancy tests for IVs. Table 2.6, Panel A, shows the results of these redundancy tests. Since the null hypothesis of the redundancy test is that each IV is redundant, rejecting this hypothesis validates its inclusion in the analysis. As shown in Panel A, all tests reject the null hypothesis of redundancy (with p-values less than 0.01). These results are not surprising given that prior studies have validated our choice of instruments. In particular, Li et al. (2013) show that ethnicity, language, religion and geography are important determinants of cultural values hence satisfy the relevance criterion. At the same time, we expect them to influence bank risk-taking only through cultural norms, therefore they should also satisfy the exclusion criterion.

As mentioned above, to further strengthen our conjectures we run a series of additional identification tests which validate the use of the chosen IVs (untabulated). Specifically, the hypothesis of weak IVs is rejected by both the Cragg-Donald and Kleibergen-Paap test statistics, since they are both above the Staiger and Stock (1997) cut-off points used as a benchmark for rejecting the weak IV hypothesis. Similarly, the Cragg-Donald and Kleibergen-Paap test statistics further reject the weak IV hypothesis when benchmarked against the threshold for relative bias and relative size (Stock and Yogo, 2005).[22] Moreover, the over-identification test (Hansen J-statistic) has a p-value above 0.10; hence we can safely conclude that our instruments also satisfy the over-identification criterion too.

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[22] The Stock and Yogo (2005) method requires at least "n+2" instrumental variables relative to the number of endogenous regressors (*n*). Hence, we cannot identify the Stock and Yogo cut-offs in our main IV specification given that we have 3 endogenous regressors but only 4 instrumental variables.

Since all identification tests indicate the validity of our instruments, we can now focus on the significance of the three-endogenous cultural regressors (individualism, trust and hierarchy). We find that their coefficients remain statistically significant at the 1% level and with the expected sign (Table 6, Panel B). Therefore, even though we cannot completely rule out endogeneity, we argue that these results mitigate concerns about omitted variable bias driving our findings.

In this paper, we argue that national culture affects bank risk-taking. We do not anticipate the reverse relation (i.e., bank risk to affect national culture) to hold since national cultural norms are established over a very long period, whereas bank risk is volatile and varies in the time-series. Furthermore, perceptions over individualism, trust and hierarchy depend on personal attributes that are deeply rooted in societal characteristics. Still, to address reverse causality concerns, we run an additional test; instead of using national culture constructs based on the responses to the World Value Survey which takes place in waves thus allows for time-series variation in cultural values, we re-run our analysis using static proxies for culture. In particular, we follow Kanagaretnam et al. (2014) and use the Hofstede individualism and uncertainty avoidance values. Hofstede (2001) defines individualism as over-optimism and overconfidence, and hence it is expected to have a positive relation to risk. Uncertainty avoidance is defined as preferring to opt for an event with a higher occurrence probability. Uncertainty avoidance is linked to conservatism and hence is expected to have a negative association to risk. Importantly, the Hofstede measures are static during our time period, thus cannot be affected by in-sample variation in bank risk. Our results are consistent with our conjectures (untabulated). We find a positive association between individualism and domestic bank risk and a negative relation between uncertainty avoidance and domestic bank risk

during non-crisis times. We find no statistically significant association between the two Hofstede national culture variables and domestic bank risk during the recent financial crisis. We also fail to find a significant association for global banks regardless of the period under investigation. Thus, we conclude that our results are not sensitive to the use of time-invariant proxies for national culture, which helps alleviate concerns about reverse causality inferences.

2.8   Conclusion

Cultural values have deep roots in societies and affect financial decision-making. In this study, we focus on three cultural values that we expect to be associated with bank risk-taking: individualism, hierarchy, and trust. Using a sample of 99 banks in 19 European countries over the period 1995 to 2014, we find that these cultural values are important and economically significant determinants of domestic bank risk. Specifically, we find a strong positive (negative) association between individualism, hierarchy (trust) and bank risk-taking.

Consistent with our expectations, we find that this association between cultural values and bank risk-taking does not apply to global banks and during periods of financial crises. Our results are robust to several specifications, which include a variety of control variables as well as alternative definitions for the main dependent and independent[23] variables. Our findings are also robust to tests designed to alleviate endogeneity concerns.

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[23]A possible limitation of our paper is missing important control variables, for example, creditors rights and ownership concentration, which have been associated with bank risk-taking (Laeven and Levine 2009; Houston et al., 2010). Including both variables in our econometric specifications does not alter our results. Our formal analysis dealing with omitted variable problems also confirms the robustness of our results.

This research has implications for bank shareholders when deciding the remuneration schemes of their managers and CEOs. Compensation contracts need to account for the influence of the informal institution we identify in this paper (i.e., national culture) on managerial behaviour. Our findings are also informative for bank regulators who need to take the association between national culture and risk predisposition into account, particularly, given the imminent European banking union. The impact of national culture on the decision making of national regulators, in particular with respect to their implementation of transnational rules at the national level, should be of significant interest. Lastly, our results have some implications for the investment portfolio allocation of bank stakeholders including shareholders, bondholders, and, perhaps more importantly, depositors in their bank selection.

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Appendix 2.1 – Description of variables and sources

Variable names	Variable definition
Risk proxies	
ROA volatility	ROA volatility is defined as the standard deviation of the ratio of gross pre-tax profit (including loan loss provisions) to total assets over five years, that is, ROA Volatility at time *t* is estimated using the ROA values during *t-4* to *t*. To deal with extreme values, we have logarithmically transformed ROA volatility (data from Bloomberg).
Z-score	Z-score measures the distance from insolvency in standard deviations. It is defined as the Return on Assets (ROA) ratio plus the Capital Asset Ratio (CAR) divided by the standard deviation of ROA, on a five-year rolling window basis. To deal with extreme values, we have log transformed z-score. Higher z-score values imply lower probability of insolvency, so to facilitate exposition we have multiplied the log-transformed z-score values by minus 1 (data from Bloomberg).
Loan loss provisions	Loan loss provisions is the annual ratio of the loan loss provisions to loans, a measure of the credit quality of the loans granted by a specific bank. To deal with extreme values, we have log transformed this variable (data from Bloomberg).
-Country cultural variables	
Individualism	Individualism is measured based on survey responses to whether 'incomes should be made more equal or that there should be more incentives for individual effort. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*How would you place your views on this scale? 1 means you completely agree with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between:* *Incomes should be made more equal − We need larger income differences as incentives for individual effort.*" Higher values indicate more individualism. We re-scale the variable so that it takes values between zero and one (data from World Values Survey).
Trust	Trust is measured based on survey responses as to whether or not most people can be trusted. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*" Higher values indicate higher trust in people. The variable takes values between zero and one (data from World Values Survey).

Variable names	Variable definition
Appendix 2.1 continued	
Hierarchy	Hierarchy is measured based on survey responses as to whether or not one follows instructions at work or has to be convinced first. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right. With which of these two options do you agree? 1. Should follow instructions; 2. Must be convinced first.*" Higher values indicate higher hierarchy, i.e., that people are happy to follow instructions without being convinced first. The variable takes values between zero and one (data from World Values Survey).
Country variables	
GDP per capita	GDP per capita is measured as the logarithm of a country's GDP per capita (data from World Bank Database).
GDP growth volatility	GDP growth volatility is the standard deviation of the year on year GDP growth of a country over five years, that is, GDP growth volatility at time *t* is estimated using the GDP growth values during *t-4* to *t* (data from World Bank Database).
Legal origin	Legal origin is an indicator variable, taking the values 1, 2, 3 or 4 representing the four legal origins, that is, English law (1), French law (2), German law (3), Scandinavian law (4) (data from La Porta et al., 1998).
Domestic credit to GDP	Domestic credit is the ratio of the domestic credit provided by the financial sector to GDP (data from World Bank Database).
Bank financial variables	
Bank size	Bank size is the logarithmic transformation of the bank's total assets (data from Bloomberg).
Bank leverage	Bank leverage is the ratio Total equity / Total assets (data from Bloomberg).
Net interest marginal revenue	Bank net interest marginal revenue is the ratio (Interest income - Interest expense) / Interest income (data from Bloomberg).
Interest activity	Interest activity is the ratio Interest income / Total operating income and measures the percentage of the bank's income originating from traditional banking activities (data from Bloomberg).
Other controls	
Domestic CEO	A binary variable taking the value of one if the CEO is a national of the bank's headquartering country, zero otherwise (data from Boardex).
Listed	A binary variable taking the value of one if the bank is listed on any stock exchange, zero otherwise (data from Bloomberg).
Restrict index	Restrict index takes values from 3 to 12 and measures the degree to which banks are permitted to engage in non-lending activities that is, securities, insurance, and real estate activities (Barth et al., 2013).

Variable names	Variable definition
Appendix 2.1 continued	
Degree of transparency	The degree of transparency index takes values from 0 to 6 and measures the transparency in banks' financial statements (Barth et al., 2013).
Cash flow index	The cash flow index measures the cash flow rights of the largest shareholder of the bank (Laeven and Levine, 2009).
Managerial ownership	Managerial ownership measures the cash flow rights of senior managers (Laeven and Levine, 2009).
Information sharing	The Information sharing index measures the depth of information sharing among creditors and takes values from 0 to 6 (Djankov et al., 2007).
Capital stringency index	The capital stringency index measures capital adequacy under adverse conditions and takes values from 0 to 7 (Barth et al., 2013).
Instrumental variables (used in robustness tests)	
Ethnical Fractionalization	The ethnical fractionalisation is the probability that two inidividuals, randomly selected from a country's population, belong to different ethnicities (data from Alesina et al., 2003).
Religion	The percentage of the population of each country that belonged to the: (1) Roman Catholic; (2) Protestant; and (3) Muslim religions in the world in 1980 (data from Alesina et al., 2003).
Language	A measure of the shares of languages spoken as "mother tongues", generally based on national census data (data from Alesina et al., 2003).
Geography	Indicator variables taking the value 1 if a country is in the Eurozone and zero otherwise (data from the European Central Bank).

Figure 2.1 - Average culture values by country

Figure 2.1 presents the average (time-series and cross-sectional) scores for each cultural value, namely, individualism, trust, and hierarchy, by country.
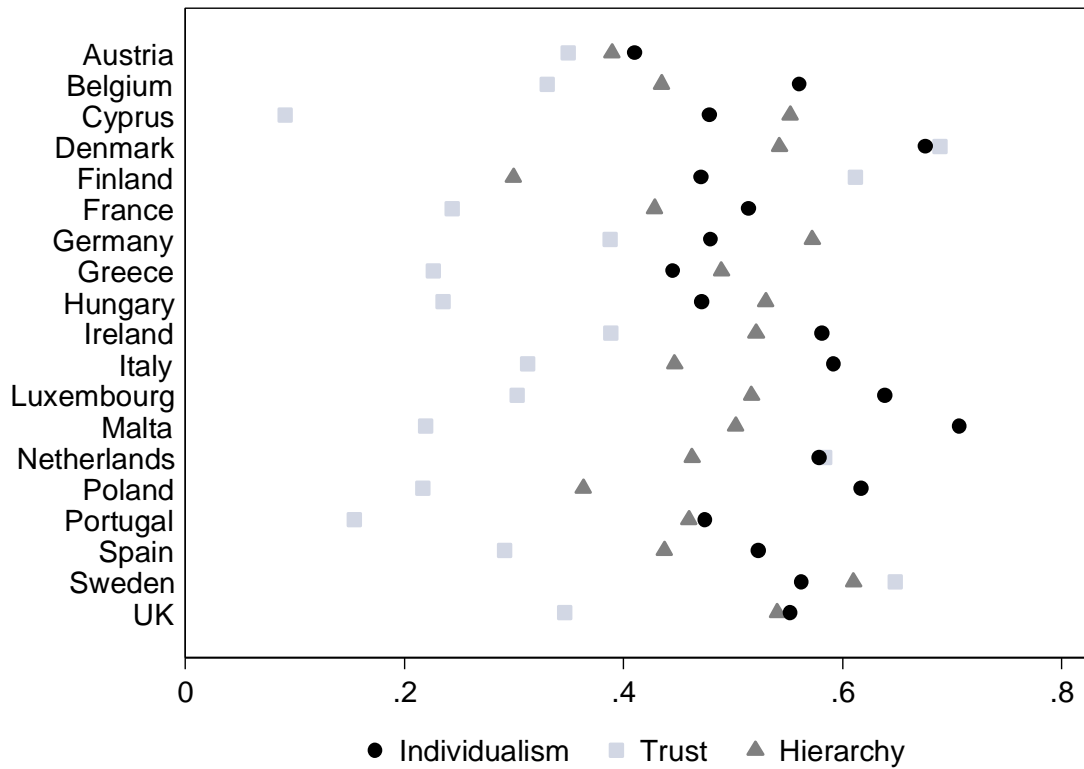
Figure 2.2 - Risk and return on assets by country

Figure 2.2 plots the average (time-series and cross-sectional) Return On Assets (ROA) as well as the ROA volatility for our sample banks in each country.
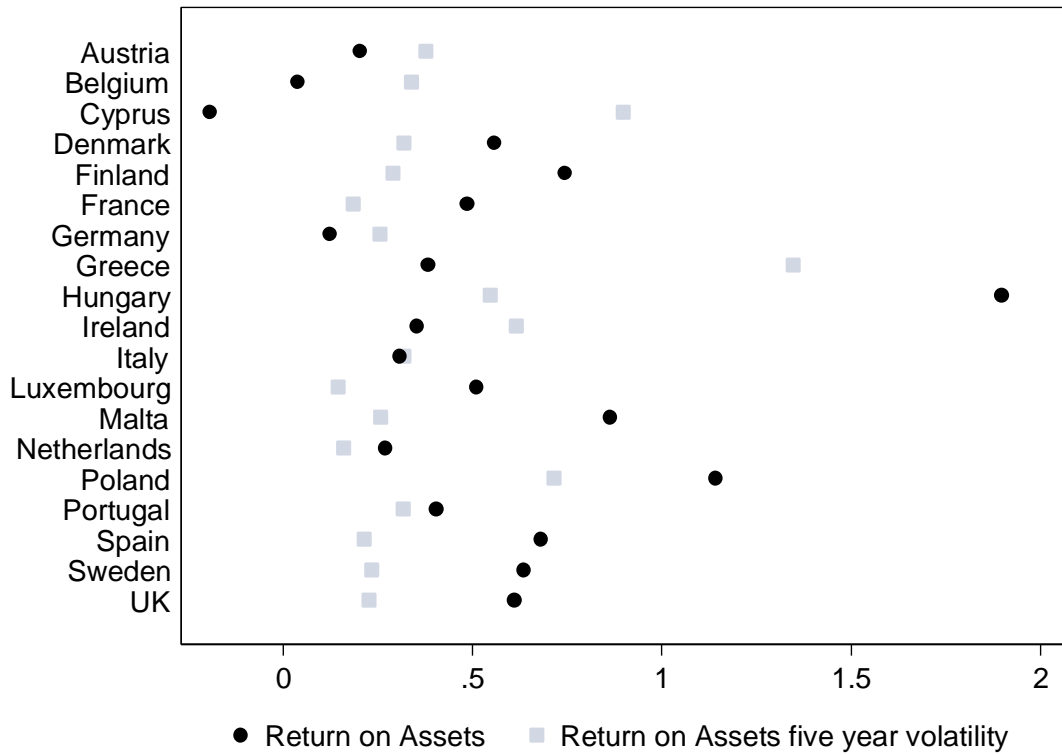
Table 2.1 – Descriptive statistics

This table reports the mean, standard deviation, median, 25th percentile, and 75th percentile for every variable included in our models. Appendix 2.1 provides the definition for each variable.

Variable / Statistic	Mean	Standard Deviation	Median	25th percentile	75th percentile
Dependent variables					
ROA volatility	0.38	0.60	0.23	0.12	0.41
ROA volatility (log)	-1.50	1.00	-1.52	-2.16	-0.89
Z-score	4.50	10.25	2.68	0.76	5.37
Z-score (log)	-0.99	1.22	-1.20	-1.77	-0.26
Loan loss provisions	0.08	0.09	0.05	0.03	0.09
Loan loss provisions (log)	-2.63	1.16	-2.58	-3.22	-1.94
Cultural variables					
Individualism	0.53	0.08	0.55	0.48	0.59
Trust	0.35	0.15	0.31	0.27	0.42
Hierarchy	0.49	0.08	0.47	0.41	0.55
Country variables					
GDP per capita (log)	10.33	0.49	10.44	10.07	10.67
GDP growth volatility	1.93	1.10	1.68	1.06	2.74
Domestic Credit % GDP	1.38	0.49	1.36	1.07	1.62
Legal Origin	2.41	0.83	2.00	2.00	3.00
Bank financial variables					
Bank size (log)	11.24	1.63	11.20	10.26	12.39
Bank leverage	0.06	0.03	0.05	0.04	0.07
Net interest marginal revenue	0.45	0.21	0.45	0.29	0.60
Interest activity	7.03	8.80	5.02	3.00	9.30
Other Controls					
Domestic CEO	0.93	0.25	1.00	1.00	1.00
Listed	0.77	0.42	1.00	1.00	1.00
Restrict index	6.00	1.63	6.00	5.00	7.00
Financial statement transparency	5.00	0.76	5.00	5.00	6.00
Cash flow rights	0.23	0.13	0.18	0.13	0.32
Managerial ownership	0.01	0.03	0.00	0.00	0.00
Information sharing depth amongst creditors index	5.11	0.95	5.25	4.50	6.00
Capital stringency index	4.49	1.70	5.00	3.00	6.00

Table 2.2 – Main regression results

This table reports multilevel (hierarchical) regression results. The dependent variable is the logarithmic transformation of the ROA volatility. Column 1 covers the period from 1995 to 2014, column 2 covers the non-financial crisis period from 1995 to 2006 and 2011 to 2014, and column 3 covers the financial crisis period from 2007 to 2010. The sample includes all banks in our dataset, both global and domestic. All variables are defined in Appendix 2.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Numbers in brackets report the t-statistic.

Variable	All years (1)	Non-financial crisis (2)	Financial crisis (3)
Cultural variables			
Individualism	0.338***	0.397***	0.162
	(4.72)	(4.70)	(1.34)
Trust	-0.530***	-0.705***	-0.061
	(-7.76)	(-8.64)	(-0.50)
Hierarchy	0.199***	0.300***	0.059
	(2.86)	(3.52)	(0.54)
Country variables			
GDP per capita	0.090***	0.137***	-0.114**
	(4.41)	(5.56)	(2.51)
GDP growth volatility	-0.051***	-0.058***	0.005
	(-7.43)	(-7.36)	(0.30)
Domestic credit % GDP	-0.050***	-0.039**	0.022
	(-3.61)	(-2.20)	(0.91)
Legal origin	0.026**	0.041***	-0.021
	(2.52)	(3.28)	(-1.11)
Bank financial variables			
Bank size	-0.016***	-0.01**	-0.03***
	(-3.82)	(-2.13)	(-4.96)
Bank leverage	-0.050	0.228	-0.39
	(-0.22)	(0.85)	(-1.06)
Net interest marginal revenue	-0.094***	-0.094***	-0.097**
	(-3.30)	(-2.76)	(-2.31)
Interest activity	-0.004***	-0.006***	-0.002***
	(-6.85)	(-6.97)	(-3.13)
Other controls			
Domestic CEO	-0.032**	-0.016	-0.031
	(-1.98)	(-0.78)	(-1.40)
Listed	0.036**	0.035**	0.035*
	(2.53)	(1.99)	(1.80)
Restrict index	0.003	0.012***	0.014**
	(0.82)	(2.71)	(1.99)

Variable	All years (1)	Non-financial crisis (2)	Financial crisis (3)
Table 2.2 continued			
Financial statement transparency	-0.018**	-0.012	-0.101***
	(-2.48)	(-1.34)	(-5.92)
Capital stringency index	0.000	0.004	-0.025***
	(-0.09)	(1.08)	(-3.03)
Cash flow rights	-0.109*	-0.073	-0.111
	(-1.88)	(-1.03)	(-1.10)
Managerial ownership	-0.919***	-0.793***	-1.353***
	(-5.78)	(-4.20)	(-4.71)
Information sharing	0.065***	0.065***	0.056***
	(8.39)	(7.13)	(3.76)
Year fixed effects	YES	YES	YES
Adjusted R^2	0.334	0.365	0.434
Number of observations	1,232	936	296

Table 2.3 – Domestic banks

This table reports multilevel (hierarchical) regression results. The dependent variable is the logarithmic transformation of the ROA volatility. Column 1 covers the period from 1995 to 2014, column 2 covers the non-financial crisis period from 1995 to 2006 and 2011 to 2014, and column 3 covers the financial crisis period from 2007 to 2010. The sample includes domestic banks only. All models include the control variables used in our main specification, but we do not report their coefficients for brevity. All variables are defined in Appendix 2.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Numbers in brackets report the t-statistic.

Variable	All years (1)	Non-financial crisis (2)	Financial crisis (3)
Cultural variables			
Individualism	0.344***	0.425***	0.154
	(4.32)	(4.53)	(1.16)
Trust	-0.528***	-0.733***	-0.092
	(-6.86)	(-7.84)	(-0.68)
Hierarchy	0.243***	0.346***	0.109
	(3.10)	(3.54)	(0.92)
Country variables	YES	YES	YES
Bank financial variables	YES	YES	YES
Other controls	YES	YES	YES
Year fixed effects	YES	YES	YES
Adjusted R^2	0.335	0.366	0.437
Number of observations	1,040	754	256

Table 2.4 – Global banks

This table reports multilevel (hierarchical) regression results. The dependent variable is the logarithmic transformation of the ROA volatility. Column 1 covers the period from 1995 to 2014, and column 2 covers the non-financial crisis period from 1995 to 2006 and 2011 to 2014. The results for the financial crisis period (2007-2010) are not reported because of the inadequate sample size (40 observations). The sample includes only global banks. All models include the control variables used in our main specification, but we do not report their coefficients for brevity. All variables are defined in Appendix 2.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Numbers in brackets report the t-statistic.

Variable	All years (1)	Non-financial crisis (2)
Cultural variables		
Individualism	0.222	0.231
	(0.96)	(0.76)
Trust	0.257	0.199
	(1.50)	(1.02)
Hierarchy	0.227	0.561
	(0.63)	(1.17)
Country variables	YES	YES
Bank financial variables	YES	YES
Other controls	YES	YES
Year fixed effects	YES	YES
Adjusted R^2	0.344	0.374
Number of observations	192	152

Table 2.5 – Alternative risk proxies

This table reports multilevel (hierarchical) regression results. The dependent variable in Panel A (Panel B) is the logarithmic transformation of the z-score (the logarithmic transformation of the loan loss provisions). Column 1 covers the period from 1995 to 2014, column 2 covers the non-financial crisis period from 1995 to 2006 and 2011 to 2014, and column 3 covers the financial crisis period from 2007 to 2010. The sample includes all banks in our dataset, both global and domestic. All models include the control variables used in our main specification, but we do not report their coefficients for brevity. All variables are defined in Appendix 2.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. Numbers in brackets report the t-statistic.

Panel A: Z-score

Variable	All years (1)	Non-financial crisis (2)	Financial crisis (3)
Cultural variables			
Individualism	0.023***	0.024***	0.010
	(4.73)	(4.16)	(1.02)
Trust	-0.028***	-0.036***	0.010
	(-5.94)	(-6.33)	(1.01)
Hierarchy	0.017***	0.021***	-0.002
	(3.27)	(3.30)	(-0.21)
Country variables	YES	YES	YES
Bank financial variables	YES	YES	YES
Other controls	YES	YES	YES
Year fixed effects	YES	YES	YES
Adjusted R^2	0.358	0.347	0.429
Number of observations	1,164	882	282

Panel B: Loan loss provisions

Variable	All years (1)	Non-financial crisis (2)	Financial crisis (3)
Cultural variables			
Individualism	1.498***	3.538***	-1.214
	(2.50)	(5.06)	-1.15
Trust	-2.568***	-4.123***	-1.170
	(-3.94)	(-5.61)	-0.96
Hierarchy	0.652	1.636**	0.070*
	(1.00)	(2.30)	(0.06)
Country variables	YES	YES	YES
Bank financial variables	YES	YES	YES
Other controls	YES	YES	YES
Year fixed effects	YES	YES	YES
Adjusted R^2	0.481	0.519	0.433
Number of observations	1,345	1,000	345

Table 2.6 – Instrumental variables regression

We use instrumental variables regression with 2SLS which generates heteroskedasticity-robust standard errors. The 2nd stage dependent variable is the logarithmic transformation of the ROA volatility. Panel A reports the selection process for the Instrumental Variables (IVs) we use for the endogenous regressors approximating national culture. National cultural values are instrumented by the fractionalization variables ethnicity, language and religion (Alesina et al., 2003) as well as geography (Kwok and Solomon, 2006). All 2nd stage models include the control variables used in our main specification, but we do not report their coefficients for brevity. All these variables are defined in Appendix 2.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. The number in brackets is the t-statistic.

Panel A: Instrument Selection for individualism, trust, and hierarchy

Instruments	Individualism	Trust	Hierarchy
Ethnicity	-0.1627***	-0.0681**	0.2183***
	(-6.24)	(-2.31)	(8.41)
Religion	-0.2151***	-0.1108**	0.2123***
	(-12.80)	(-6.06)	(12.70)
Geography	-0.0672***	-0.0506***	-0.0147***
	(-11.86)	(-7.85)	(-2.61)
Language	0.1617***	0.1788***	-0.2667***
	(8.12)	(7.93)	(-13.45)
F-test	42.38***	151.13***	33.08***
Adjusted R^2	0.5673	0.8263	0.5040

Panel B: Stage 2 regression results

Individualism	1.7397***
	(8.00)
Trust	-1.4644***
	(-4.18)
Hierarchy	0.6701***
	(3.37)
Controls	YES
Year fixed effects	YES
Number of observations	1,232
Anderson under-identification test (F test)	52.55
	p-value = 0.000
Over-identification test (Hansen's J)	2.291
	p-value = 0.1301

Chapter 3 – National culture, bank deposits and regulation

3.1 Abstract

This paper investigates the relation between national culture and bank deposits. Using annual data (1995-2015) of a sample of 99 banks that participated in the 2014 stress tests of the European Banking Authority, we document strong relations between three national cultural traits and bank deposits. The effect of hierarchy and individualism on deposits is stronger (positive and negative, respectively) in domestic banks where culture is more homogeneous compared to global banks. However, the positive effect of trust on deposits is robust in both domestic and global banks, reinforcing the view that banking is largely based on trust. Motivated by recent regulatory changes emphasising the importance of liquidity (deposit) stability, we further analyse the impact of annual bank-level deposit stability within countries where trust is invariant. We show that high deposit volatility decreases the positive effect of trust on deposit levels. Results are robust to endogeneity concerns and are economically significant.

3.2 Introduction

Bank deposit levels are of primary importance to bank liquidity and stability. During the recent financial crisis, when liquidity dried up, even well-capitalised banks drawing funding from short-term and unstable sources experienced severe difficulties.[24] Central banks' intervention restored liquidity to the financial markets and at the same time highlighted the importance of bank liquidity management to the financial sector stability and well-functioning. More recently, the importance of bank liquidity has been emphasised by two

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[24] https://www.ecb.europa.eu/pub/pdf/mobu/mb201304en.pdf

relatively new regulations in Europe: (a) the Net Stable Funding Ratio (NSFR)[25] to be introduced in January 2018; and (b) the Liquidity Coverage Ratio (LCR)[26] enforced in January 2015. The level of customer deposits carries high weights (up to 95%) in the calculation of the two ratios, which measure funding stability and short-term liquidity resilience. While the importance of deposits for banks is evident, the relation between national culture characteristics and the level of bank deposits is relatively unexplored in the finance literature.

In this paper, we examine the relation between national culture and the level of bank deposits in Europe. The introduction of NSFR and LCR combined with the high contribution of customer deposits toward their calculation motivates us to focus solely on deposits as opposed to the bank's capital structure in general. According to the Bank of England quartely bulletin (2013), to avoid liquidity problems, banks' need to have a combination of stable sources of funding and a buffer of liquid assets. The Basel committee NSFR policies state that deposits provided by retail and small business customers are behaviourally more stable than wholesale funding of the same maturity from other counterparties. These two documents combined with previous experience of well capitalised banks facing liquidy problems as well as the fact that there is already vast literature on capital structure (Gropp et al., 2010; Allen et al., 2015) were the decisive factors for our topic selection.

The level of deposits is determined by supply of available cash (i.e., from customers) and demand for cash (i.e., from bank management). On the one hand, customers decide whether

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[25] Basel III guidelines require banks to maintain a sustainable funding structure, and to this effect, they introduced the Net Stable Funding Ratio (NSFR) which will become a minimum standard by 1 January 2018 (http://www.bis.org/bcbs/publ/d295.pdf).
[26] http://www.bis.org/publ/bcbs238.pdf

to place their excess wealth on deposit, versus any other financial instruments (e.g., invest in bonds or equity), or even spend it. On the other hand, bank managers have the discretion to decide the amount of liquidity to draw from clients' deposits versus other sources (e.g., the interbank market or other marketable securities). We conjecture that national culture affects local customers' and managers' decisions inspired by the vast literature documenting an association between culture and financial decision-making, such as investment decisions (Guiso et al., 2006), trading volume, volatility and momentum profits (Chui et al., 2010), syndicated bank loans (Giannetti and Yafeh, 2011), corporate risk, (Li et al., 2013) and mergers and acquisitions (Ahern et al., 2015).

Following Ahern et al. (2015), we focus our analysis on three national culture values: trust, individualism, and hierarchy. Trust is possibly the most important cultural trait for banks, particularly in attracting deposits. When consumers place their savings in deposits, they are promised by banks that savings will be repaid in full at maturity, in addition to any interest due. This contract is based on trust in the same manner that all kinds of contracts are thought to be based on trust (Putnam, 2000). Fukuyama (1995) finds that trust enables financial success, performance and economic growth both for companies and individuals. In addition to academic studies (e.g., Sapienza and Zingales, 2012), trust in the banking sector is a commonly referenced term among regulators,[27] the financial press[28] and large consulting firms.[29]

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[27] https://www.fca.org.uk/news/debating-trust-and-confidence-in-banking-
[28] http://www.bbc.co.uk/news/business-29046605
[29] http://www.ey.com/GL/en/Industries/Financial-Services/Banking---Capital-Markets/Global-consumer-banking-survey-2014--Trust-and-Confidence

The second cultural trait we focus on is individualism. Individualistic people value their interests more than the welfare of the group (Brett et al., 1998). They exhibit strong optimism and overconfidence, underestimating a firm's cash flow volatility (Antonczyk et al., 2014) and are likely to take on more debt (Hackbarth, 2009). Individualistic people, being optimists, believe they can exercise control over future outcomes (Hofstede, 2001; Breuer et al., 2012), feel that they are in control over their lives and do not anticipate encountering financial problems. Consequently, we expect that individualistic societies will save less. Antoncyk et al. (2014) find that the managerial traits of optimism and overconfidence explain differences in financing decisions across countries. Consequently, bank managers in individualistic societies may opt for quick funding originating from the interbank market or securitisation, as opposed to the gradual building of customer relationships, a necessary element for attracting deposits (Harker et al., 2000).

The third cultural characteristic we focus on is hierarchy. Hierarchical societies organise themselves in groups according to status (Schwartz, 1994) with higher ranks seen as the role models to trail and follow (Geoffrey and Kamel, 2004). We consequently anticipate lower ranks to follow higher ranks in their investment choices, that is, deposit, shares, bonds or other. Evidence of sequential depositor behaviour is provided by Iyer and Puri (2012) and Kiss et al. (2014) who find that depositors' decisions are influenced by observing other depositors' actions. Furthermore, hierarchical societies are by nature less optimistic compared to egalitarian societies (Schwartz, 1994) and greater egalitarianism is consistently associated with higher optimism (Fischer et al., 2008) We consequently expect hierarchical societies to spend less (Manos et al., 2015) and prefer low-risk investments, such as deposits, compared

to higher-risk investments such as stocks (Guiso et al., 2008). Hence, we anticipate a positive association between hierarchy and deposits.

We construct our sample following Acharya and Steffen (2015) by focusing on the banks selected by the European Banking Authority to perform the 2014 stress tests. We keep those banks with available annual data over at least five consecutive years over the period 1995-2015. The final sample comprises 99 European banks with 1,308 firm-year observations, all of which are systemically important either domestically or globally, representing over 70% of the assets of the European banking sector. These banks operate under a common regulatory framework; that is, the European Central Bank (ECB) regulates them either directly, or indirectly through the domestic central banks.We match this sample with the national culture variables available from the World Values Survey database to test our hypotheses.

Given the different layers of variables in our sample (i.e., countries, banks and bank-years), we use multi-level regressions of bank deposit levels on the three cultural characteristics, after controlling for individual bank performance, country-level economic performance and institutional quality characteristics. We find an economically significant association between all three cultural characteristics and the level of bank deposits. Consistent with our hypotheses, we find that trust and hierarchy are positively related to the level of bank deposits, while individualism has a negative relation.

National culture is expected to have a larger impact on deposits in banks that have more culturally homogeneous customers and employees, than those who operate in a more culturally diverse environment. Hence, we split our sample into domestic and global banks

(Edwards 2012). Domestic banks are those whose failure would have consequences to the national financial system, whereas global banks' failure would impact the financial system globally. Domestic banks typically draw deposits domestically whereas global banks operate in many countries hence draw deposits from customers around the world. Moreover, global banks are directly supervised by the European Central Bank while domestic banks are supervised through national central banks, which could be further influenced by national culture when monitoring domestic banks or implementing transnational regulations. Consistent with our expectation, we find that the impact of cultural variables is stronger in domestic instead of global banks. Specifically, we find a relation between all three cultural variables and the level of bank deposits for domestic banks. In the case of global banks, we only document a positive association between trust and deposit levels (no relationship appears for either individualism or hierarchy), lending support to the popular view that banking is largely based on trust.

Given the robust positive relation between trust and deposit levels, across the samples of domestic and global banks, and motivated by recent regulatory changes that encourage deposit stability, we extend our analysis by investigating whether banks operating in the same cultural environment (with respect to trust) experience cross-sectional heterogeneity regarding other factors that may amplify or dampen the association between trust and bank deposit levels. We find that the positive relation between trust and bank deposit levels is reduced in the presence of high deposit volatility. The size of this reduction is statistically significant across the entire sample, and the subsamples of domestic and global banks.

Cultural characteristics can be thought of as entrenched within a society, much earlier than the beginning of our sample period. Specifically, Guiso et al. (2006) define national culture as *'customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation.'* Hence, while it is unlikely that bank deposit levels will affect a society's cultural traits, that is, reverse causality is unlikely to be present, we still conduct robustness tests using alternative measures of culture that do not change over time (i.e., Hofstede, 1980) and find similar results.

To address concerns about the impact of omitted variables in our models, we include an extensive range of country-, bank- and institutional quality factors, as well as year fixed effects. Furthermore, we identify instrumental variables from the extant literature to proxy for the three national culture characteristics and conduct two-stage least square (2SLS) regressions. Our results are robust to this specification, lending further support to the importance of the relation between cultural characteristics and bank deposit levels while minimising concerns related to omitted variables. Even though we concur that we cannot eliminate endogeneity concerns in our setting, collectively our robustness checks appear to support the causal effect of national culture on bank deposits.

Our paper contributes to several strands of literature. Specifically, it builds on prior work examining bank funding stability (Schlueter et al., 2015), national culture and corporate cash holdings (Chen et al., 2015), as well as national culture and national savings (Manos et al., 2015). Schlueter et al. (2015) examine the behaviour of retail customers regarding non-maturing deposits and how these can be managed by banks using pricing incentives, however, without examing the impact of cultural characteristics. Chen et al. (2015) examine

the impact of national culture on corporate cash savings around the world. Manos et al. (2015) investigate the impact of culture on the individual's rate of aggregate savings' decisions. Our paper differs from these prior studies in several ways. First, we focus on banks, a highly regulated sector, and examine the bank level deposit variation, not the individual, corporation or country cash holdings. Second, we separately test the association between culture and bank deposit levels for domestic and global banks and find more significant impact where cultural factors are more homogeneous. With the exception of trust that has a universal, robust, positive relation with bank deposits for both domestic and global banks, individualism and hierarchy seem to affect deposit levels only for domestic banks. Third, we provide evidence that prior deposit instability (measured using elevated deposit volatility) decreases the positive effect that trust has on deposit levels. Our work also differs in that our analysis addresses reverse causality and omitted variable concerns, while also covering a more recent time-series from 1995 to 2015.

Our paper has public policy implications. Figure 3.1 shows that there is high variability in cultural characteristics among countries, supporting the view that the European Union is a political and economic union, consisting of countries maintaining their unique cultural identity. Consequently, these countries behave differently under similar conditions, for example, under the same regulatory framework.[30] Hence, this paper aims to create awareness to bank management, customers and regulators that cultural characteristics are associated with financial decisions (e.g., level of bank deposits). When choosing their liquidity sources, bank managers should know that their deeply rooted cultural traits are influencing their

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[30] A recent example related to failing banks in different countries within Europe is how Italy and Cyprus treated their failing banks. While on one hand Cyprus abided by the European Bank Recovery and Resolution Directive (BRRD) resolution (or bail-in directive), and bailed-in its largest domestically systemic bank, on the other hand, Italy did not follow the bail-in directive and bailed out its failed banks.

decisions. The same applies to depositors when deciding whether to save or consume their excess wealth. All banks in Europe operate under a single rule book and are supervised by the same authorities. However, regulators do not impose a particular level of risk; instead they set rules to prevent banks from taking excessive risk. Uniformity of regulation, therefore, does not imply consistency in enforcing them and consequently does not produce the same results across countries.

3.3   Institutional framework and hypotheses development

3.3.1   Institutional framework: Why do banks need deposits?

In their need to manage their funding demand curve, banks use several liquidity options available to them. Among the most common liquidity options are the following: customer deposits, the interbank market, sovereign bonds and money market funds via debt issuance. According to Basel III, banks need to maintain stable funding, safeguarding them from liquidity drainages during financial crises. Hence, banks place emphasis on the more stable of the above liquidity options. The recent financial crisis highlighted the fact that the interbank market, sovereign bonds and money market funds become scarcer than customer deposits as a liquidity option to banks during adverse macro events.[31]

The fact that customer deposits constitute one of the most important and stable liquidity vehicle for banks is also echoed in two recent regulations. First, deposits are in the spotlight of the existing Liquidity Coverage Ratio (LCR) requirement,[32] which requires banks to keep a minimum ratio of 60% since 2015, which will increase to 100% in 2019. The second

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[31] https://www.ecb.europa.eu/pub/pdf/other/eubanksfundingstructurespolicies0905en.pdf
[32] The LCR is defined in the following document by the Bank of International Settlements (page 12, point 22): http://www.bis.org/publ/bcbs238.pdf.

regulation is the Basel III Net Stable Funding Ratio (NSFR), which places more emphasis on customer deposits as a form of stability of bank liquidity than certain wholesale options such as leverage via securitisation, for example, attracting liquidity by issuing corporate bonds.

Another reason banks need deposits is to transform illiquid investments into liquid investments by funding viable projects to facilitate economic growth (Levine and Zervos, 1998; Beck et al., 2000; Beck and Levine, 2004; Goldstein and Pauzner, 2005). Allen and Santomero (2001) challenge the financial intermediation role of banks claiming that deposits are losing importance for banks over time because banks tend to engage more in investment management than attracting deposits. However, Allen and Parwada (2004) find that traditional banking activities, such as attracting deposits, are still necessary for banks because they have to comply with prudential regulatory requirements. Instead, non-traditional banking activities, for example, investment management, are only used as complements to traditional banking activities.

3.3.2   Hypotheses development

Given the importance of a stable deposit level for banks, it is then natural to ask whether differences in culture among countries affect banks' efforts to attracting deposits. While, for example, some banks engage in customer segmentation aiming at building strong relationships with customers,[33] customers' likelihood to choose deposits over consumption or riskier investments (e.g., equity) might be determined by a series of factors deeply rooted in

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[33] One example adopted by banks to attract and retain valued depositors, is to segment the customer base based on the amount of deposits, and awarding a "premier" status to those customers with the highest deposit balance (e.g., a strategy adopted by HSBC, Barclays, Bank of Ireland). Another way is to offer rewards or incentives to depositors through advanced retail analytics, given the amount of information banks collect on their existing or new customers.

national culture. Hence, we aim to identify cultural characteristics that correlate with deposit levels in our sample of multiple countries and respective cultures. Controlling for factors, such as bank characteristics and country economic performance, that are expected to correlate with deposit levels in our sample, we examine the impact of three unique cultural characteristics that are expected to impact the levels of deposits in banks. These are trust, individualism, and hierarchy. We develop our hypotheses around these three national cultural characteristics in subsections 3.3.2.1, 3.3.2.2 and 3.3.2.3, respectively.

3.3.2.1 Trust

We consider trust to be the most important cultural dimension related to bank deposit levels. Trust captures the belief by one party that another party is reliable and will deliver on their promises. In our context, we interpret customers' trust towards banks to imply that customers keep their deposits at a bank because they believe that upon maturity of the deposit certificate customers will receive their money back in full plus any interest due on the deposit certificate.

The importance of trust is documented in the literature. Lyons and Mehta (1997) establish that contracts are facilitated by trust, hence, since deposit certificates are a formal contract between the customer and the bank, trust should play a role in the level of deposits. In addition to facilitating contract formation, trust is also described as a social capital component facilitating economic transactions (Putnam, 2000). Furthermore, trust enables financial success, performance, and economic growth, both for society and firms (Fukuyama, 1995), but also promotes cooperation among firms (La Porta et al., 1997). Finally, customer trust is important for banks as it increases satisfaction (Morgan and Hunt, 1994) as well as

customer loyalty (Dwayne et al., 2004) and consequently the retention rate and potential growth rate. Hence, we formally state our first hypothesis based on trust:

H1   Trust and bank deposit levels are positively associated.

3.3.2.2   Individualism

The second cultural characteristic we examine is individualism. Hofstede (2001) defines individualism as the preference to take care of oneself and their immediate families. People in individualistic cultures place their welfare above that of the group. They are very optimistic about the future (Fischer and Chalmers, 2008), often overestimating their control over the outcome (Van Den Steen, 2004). Saving money is sensible; it provides stability during unexpected events such as job loss and entails less risk because deposits are less volatile compared to other investments (e.g., equity). Saving befits collectivist people (the opposite of individualistic) who care more about the 'we' rather than the 'I', acting prudently for the welfare of their group (Chen et al., 2015; Hofstede, 1980).

On the relation between individualism and the management of a firm, Van Hoorn (2014) finds that individualistic bank managers are by nature more optimistic. Hence, they may consequently decide to invest fewer resources in building relationships with customers to enhance the deposit-based business of the bank and opt for the readily available wholesale funding options instead. Thus, we expect fewer deposits when managers are characterised by individualism.

Moreover, customers with excess liquidity living in individualistic societies are expected to have a similar, optimistic view of the future. Therefore, such customers are expected to save less and consume more today. The expectation that (both bank managers and) consumers behave in a way that leads to lower deposits levels in more individualistic societies compared to less individualistic societies, informs our second hypothesis:

H2   Individualism and bank deposit levels are negatively associated.

3.3.2.3   Hierarchy

The third cultural characteristic we focus on is hierarchy. Hierarchy is a dimension included in the cultural sets of Hofstede (1980), Fiske (1991), Schwartz (1994) and Trompenaars (2012). In hierarchical societies, each member assumes their role in a hierarchical structure (Schwartz, 1994). Lower ranking members will turn to the higher ranking members for important decisions (Geoffrey and Kamel, 2004), for example, the decision of choosing a bank to place their deposits. Further evidence is provided by Kiss et al. (2014) who find that depositor's behaviour is partially sequential and many of them follow other depositors in their decisions (Iyer and Puri, 2012). We expect this phenomenon to be more profound in hierarchical societies, where lower ranking members on the society scale are expected to follow the higher ranking members in their investment choices.

To examine the relation between hierarchy and saving behaviour, it is useful to understand the literature on hierarchy and conservatism. Specifically, Schwartz (1994) finds that hierarchy is highly correlated with conservatism. Moreover, Manos et al. (2015) find that when people are more conservative, they are likely to save more and spend less. In addition,

Guiso et al. (2008) find that more conservative people are expected to allocate more on bank deposits and less on other forms of investments given the lower risk inherent in bank deposits relative to other investments. Hence, we expect that more hierarchy should be correlated with more deposits given that (a) hierarchy is correlated with conservatism; (b) conservatism is associated with saving more today (vs. consuming); and (c) saving in hierarchical societies typically takes place in low risk investments (e.g., deposits vs. riskier investments).

H3   Hierarchy and bank deposit levels are positively associated.

3.4   Data and variables

To test our hypotheses, we follow the approach of Acharya and Steffen (2015) to use a sample of systemic financial institutions, which were included in the European Banking Authority (EBA) stress tests.[34] The EBA stress tests evaluate the ability of banks to withstand adverse conditions and contribute to the overall assessment of systemic risk in the EU financial system. These institutions contribute approximately 50% to the domestic banking sector of each country and more than 70% of the total European banking assets (about €29 trillion). These banks are systemically important either domestically or globally; hence, when in financial turmoil the consequences are severe and transmitted to their corresponding sovereigns or the global financial system (Acharya et al., 2014). The major advantage of this sample is that it is rather homogeneous in terms of regulation and supervisory authorities, therefore minimizing heterogeneity concerns and potential confounding effects in the analysis.

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[34] https://www.eba.europa.eu/documents/10180/563711/31012014+EU-wide+stress+Test+2014+%28List+of+sample+banks+%29.xlsx

To build our final sample, we collect information about those banks included in the EBA stress tests for which there are data in Bloomberg for at least five consecutive years. Our entire time-series covers a twenty-one-year period, from 1995 to 2015. The dependent variable we use to capture the level of deposits is the ratio of customer deposits scaled by the bank's assets (Deposit level), following Acharya and Naqvi (2012) and Chen et al. (2015).

3.4.1   National culture variables

We use the individualism, trust and hierarchy scores from the World Values Survey;[35] a global network of social scientists studying the impact of culture. The survey takes place in waves in approximately 100 countries and covers roughly 90% of the world's population with the same questionnaire. Academic research using this survey has been growing (e.g., La Porta et al., 1997; Glaeser et al., 2000; Sapienza et al., 2013; Ahern et al., 2015). We use the same proxy questions as Ahern et al. (2015) for individualism, trust, and hierarchy (see Appendix 3.1 for more details). Following Ahern et al. (2015), we divide survey scores, which originally vary from 0-10, by ten thus producing a variable bounded between zero and one. It is important to note that correlations among the three national cultural characteristics are not statistically significant, which reinforces the view that they capture different cultural dimensions.

3.4.2   Control variables

To control for variables that may affect deposit levels, we inform our models from the existing literature. The control variables that we use and are expected to affect deposits are summarized in three major groups: (a) bank financial variables; (b) country's economic

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[35] http://www.worldvaluessurvey.org/WVSContents.jsp

performance variables; and (c) institutional quality and governance variables. The next three subsections explain our rationale in choosing these variables, while detailed definitions for all variables are provided in Appendix 3.1.

3.4.2.1   *Bank financial variables*

The first control variable we use is net interest marginal revenue. Banks behave strategically and adjust their interest rates accordingly to attract and retain deposits (Calem and Carlino, 1991). The Central Bank of each country, and in the case of the European Union the European Central Bank, sets the interest rate policy. Bank management may or may not decide to pass on these rates to its deposit pricing (Allen and Santomero, 2001; Hofmann and Mizen, 2004; Boyd and De Nicollo, 2005). Dothan and Williams (1980) provide further evidence that the bank's management has some flexibility in their strategic decisions, including deposit collection and loan strategies. Customer deposits constitute the principal source of loanable funds for a bank, and consequently, lending rates feed back to deposit rates (Kiser, 2004). We include deposit and loan interest rates per bank in our analysis using the net interest marginal revenue as a proxy. Net interest marginal revenue is measured as the interest received from loans minus the interest paid on deposits scaled by the total interest income.

We also control for the size of the financial institutions in our sample, as size is an important determinant of banks' funding decisions. Laeven et al. (2014) find that large banks draw less funding from deposits and more from alternative sources.

Risk, is another pivotal factor to banking operations. Banks assume risks (Jin and Zeng, 2014) to attain higher revenues, and the level of risk variation influences the bank's business model. Existing literature associates national culture with bank risk (Kanagaretnam et al., 2011; Mourouzidou-Damtsa et al., 2017). Banks assuming higher risk attract lower levels of uninsured deposits (Lambert et al., 2017). To control for differences in risk, we include in our models the five-year volatility of the Return On Assets (ROA) of each bank.

We next use interest activity to capture the extent of a bank's traditional banking operations. Savings are considered as the inputs and loans as the outputs of banking (Mester, 1987). Specifically, banks provide loans to individuals and firms funded by their customers' savings (Schumpeter, 1961). Consequently, we control for the bank's interest activity measured by the interest income divided by the total operating income and the level of bank loans, both of which are proxies for the level of engagement in traditional banking operations.

Not all banks follow the traditional banking model above. Hence, to control for banking operations not directly linked to deposit-driven business, we construct and use the wholesale funding variable (Demirgüç-Kunt and Huizinga, 2010; Huang and Ratnovski, 2011; Craig and Dinger, 2013). Furthermore, since wholesale funding might be affected by counterparty default risk, we use the 3-month Euribor % in our model as a proxy for counterparty risk. We choose Euribor as the proxy for this risk as most of our countries are in the Eurozone and also Euribor distortions potentially affect the Libor as well (Dolan, 2008; Michaud and Upper, 2008). Finally, we control for the bank's loans to assets ratio and leverage.

3.4.2.2 *Country's economic performance variables*

A country's economic performance might affect the level of deposit in local banks. Specifically, Berger and Hannan (1989) associate the local per capita income with deposit balances. Hence, we control for both the Gross Domestic Product (GDP) per capita as well as the GDP growth per country (La Porta et al., 1997; Fiordelisi et al., 2011; Li et al., 2013; Anginer et al., 2014; Ahern et al., 2015).

Next, since interest rates affect the decision of households to consume or save their excess liquidity (Hutchison, 1995), we control for consumption (as a percentage of GDP) and savings (to national income) for each country. One of the elements factored in the decision of households when choosing between consumption and saving is the prevailing interest rates (Sandmo, 1970) via the substitution effect. The substitution effect argues that a high rate of interest makes consumption today more costly relative to future consumption and encourages households to substitute today's consumption with future consumption. In addition, we control for the inflation in each country, as it affects the general macroeconomic environment within each country.

Finally, while our sample includes solely European banks, each country may have a different legal framework that may affect depositors' saving patterns. To account for legislative variants, we control for the legal origin of the country (La Porta et al., 1998).

3.4.2.3 *Institutional quality and governance variables*

The degree of institutional and governance quality in each country can also influence deposits. We first address the potential criticism that banks may be governed by different

accounting standards and transparency frameworks by using the La Porta et al. (1998) and the Barth et al. (2013) indices which measure the transparency of financial statements (financial statement transparency) and quality of accounting standards (rating on accounting standards) per country (García-Kuhnert et al., 2015). Also, since publicly traded firms are likely to be more transparent, we include the listed indicator to capture differences between listed and non-listed firms. In addition, we control for the La Porta et al. (1998) creditor's index (Creditor Rights), which measures the enforcement of the rules protecting the bank's creditors (including depositors).

Next, we use the Barth et al. (2013) capital stringency index to measure the bank's capital adequacy index under adverse conditions. We do this because capital adequacy influences the bank's ability to attract uninsured deposits (Keeley and Furlong, 1990) as well as the cost at which a bank is able to attract deposits (Diamond and Rajan, 2000).

The deposit protection scheme applies for all European countries, and as such, we did not include it to our explanatory variables.

Finally, as we examine the effects of culture, we also control for the nationality of the CEOs. Specifically, Domestic CEO measures whether the CEO is domestic to the country in which the bank has headquarters.

3.4.3   Descriptive statistics

Table 3.1 presents the summary and descriptive statistics (mean, median, standard deviation, 25th percentile and 75th percentile) of all variables used. We discuss only the main

dependent variable and the three independent variables capturing national cultural characteristics since the statistics for the control variables are consistent to those reported by existing literature.

Our dependent variable (i.e., the ratio of customer deposits to total assets), has a mean (median) of 0.409 (0.406), which means that customer deposits on balance sheet amount to approximately 41% of the total liabilities side. A more visual demonstration of the variation in the average customer deposits scaled by total assets among countries in shown in Figure 3.2. Specifically, we observe the range of the dependent variable extending from 0.14 (Belgium) to 0.81 (Cyprus), while other countries on the low (high) end of the distribution are Finland, Germany and France (Malta, Hungary and Poland).

Turning to the main explanatory variables, we observe that the mean (median) value for trust, individualism and hierarchy are 0.35 (0.31), 0.53 (0.55) and 0.49 (0.47) respectively. The standard deviation is 0.08 for individualism and hierarchy, whereas, for trust, the deviation is higher and stands at 0.15. These statistics demonstrate that while the European Union is an economic union, it is far from a cultural union, given the striking differences in cultural characteristics. A look at Figure 3.1 provides a visual confirmation of the European cultural diversity. Starting with trust, we observe that in most of the northern European countries trust is relatively high compared to the rest of Europe (e.g., Cyprus and Portugal have the lowest values). Next, hierarchy also has significant variation among countries (but less than trust), where low scores describe countries such as Finland and Poland and high scores describe countries such as Sweden and Germany. Finally, in the case of individualism, we note the

highly individualistic societies of Malta, Denmark and Poland and the less individualistic societies of Greece and Austria.

3.5 Estimation model and empirical results

3.5.1 Estimation model

To test our hypotheses, we use a multi-level linear regression framework. We do this following recent literature (Raudenbush and Bryk, 2002; Goldstein, 2011) because our dataset comprises of three different levels of variables: country-specific characteristics; bank-level characteristics; and multiple observations per bank (i.e., over time). The heterogeneity potentially introduced in the sample due to different level of variables (e.g., country vs bank-level data) is addressed in multi-level linear models by a series of methods such as weighing on each group's sample size and interacting across levels (e.g., Li et al. 2013; Field, 2013).

To analyse the relation between culture and bank deposit levels, we use bank deposit levels as the dependent variable and the three national culture variables (trust, individualism and hierarchy) as the three main independent variables. Our control variables in this regression are grouped into bank performance, country economic performance and institutional quality variables.

Specifically:

$$\textit{Bank deposit levels } y_{i,j,t} = \alpha + \beta*(\textit{National Cultural Variables})_{j,t} + \gamma*(\textit{Controls})_{i,j,t} +$$

$$\textit{Year fixed effects} + \varepsilon_{i,j,t} \text{ (Equation 3.1)}$$

$y_{i,j,t}$ represents the bank deposits scaled by the total assets for bank i in country j at year t. Vector β gives the coefficients of the three national culture scores for country j at time t.

Vector γ gives the coefficients of the control variables for bank i in country j at time t. We add year fixed effects to control for deterministic time trends or macro effects over the 21-year period of our analysis.

3.5.2 Results

3.5.2.1 Culture and deposits

In Table 3.2, we show the results of the multi-level linear regression depicted in equation 3.1. Overall, we observe statistically significant relations for all three national culture variables, while controlling for bank, country and institutional quality characteristics. The direction of coefficients is consistent with our three main hypotheses.

Specifically, the coefficient of trust is 0.118 and statistically significant at the 1% level, which indicates that deposit levels are higher in societies with high recorded levels of trust than societies with lower values. This result is consistent with hypothesis 1 and intuitively suggests that consumers deposit their money in banks which operate in an environment (country) of higher trust. This result echoes findings in the literature which identify trust as a major factor in contract formation (Lyons and Mehta, 1997), but also in customer satisfaction (Morgan and Hunt, 1994) and customer loyalty (Dwayne et al., 2004). The size of the coefficient is also economically significant. For instance, a one standard deviation increase in trust (0.145) is associated with a 4.32% increase in the bank deposits to total assets ratio relative to the unconditional average of this ratio.[36]

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[36] To address potential endogeneity concerns, we repeat our analusis in a two stage least squares framework (section 3.6.3), where properly identified instrumental variables are employed. The economic significance of the results using the 2SLS framework is higher as reported in the relevant section.

Next, we find that the coefficient of individualism is -0.120 and also statistically significant at the 1% level, hence the prediction of hypothesis 2 is validated. This result implies that deposit levels are lower in more individualistic societies, compared to deposit levels in less individualistic societies. The direction of the coefficient is justified by the link between individualism and optimism (Fischer and Chalmers, 2008), where both bank managers and customers are expected to behave in deposit-reducing manners. This is because more individualistic societies typically have bank managers who invest less in building customer relationships (i.e., to attract deposits). Also, individualistic societies have consumers who are more optimistic about the future, thus saving (consuming) less (more) in the present. Individualism also has an economically significant effect on bank deposits. As an example, increasing individualism by a one standard deviation (0.084) is associated with a 2.34% decrease in the bank deposit ratio relative to its mean.

We next move to the coefficient of hierarchy, which is positive (0.177) and statistically significant at the 1% level. Similar to the previous two cultural variables, results for hierarchy are consistent with the predictions of hypothesis 3. This result implies that in societies that are more hierarchical (i.e., people tend to follow higher ranking peoples' actions), which are also typically characterised by conservatism, people tend to save (spend) more (less) in the present time vs the future. Moreover, saving typically takes the form of investing in low-risk investments such as bank deposits instead of financial instruments such as bonds or equity. Similar to the other two cultural characteristics, results for hierarchy also have an economically significant effect. Specifically, the bank deposit ratio seem to increase by about 3.45% relative to its mean when hierarchy increases by one standard deviation (0.08).

While several of the control variables related to bank financials and institutional quality obtain significant coefficients, we note that most of the country-specific, economic performance, control variables do not seem to be related to the level of deposits. This is possibly due to the presence of year fixed effects that are likely removing much of the year-to-year variation in countries' economic performance.

Starting with wholesale funding, we observe a negative relation with deposit levels, which is statistically significant at the 1% level. The direction of this relation is in line with expectations given that wholesale funding is an alternative source of banking liquidity to bank deposits. Next, we find a negative association between bank size and deposits, consistent with existing literature (Laeven et al., 2016) who report that larger banks prefer fewer deposits and more wholesale funding. We also find a negative association between deposits and risk. Riskier banks tend to have lower deposit levels, which is consistent with risk-averse customers choosing a safer bank to keep their deposits rather than a riskier one.

Leverage (equity scaled by total assets) has a negative correlation with deposits (significant at the 1% level). The direction of the coefficient is as expected since equity is among the most expensive ways to raise capital, and equity holders are likely to request a higher expected return on their investment (Allen et al., 2015). Hence, bank managers may be looking for a way to assume higher risks (than banks with lower leverage) to generate profits, thus shifting more risk onto consumers' deposits. Turning to loans to assets, we obtain a positive coefficient (at the 1% statistical significance level), which is consistent with the fact that banks use deposits (liabilities) to offer loans (assets) (Allen and Santomero, 2001).

Now focusing on the institutional quality and governance variables, we also observe results consistent with expectations. For instance, variables related to corporate transparency (listed[37], financial statement transparency) have a positive relationship with the level of deposits (both at the 1% statistical significance level) since more transparency is expected to attract more deposits. Creditor rights also obtains a positive coefficient (at the 5% significance level), which is consistent with the explanation that in countries where there is more protection of investors (including depositors), there should be more investment in deposits (Freytag and Voll, 2013). Finally, the capital stringency index, a proxy for well-capitalised banks resistant to adverse economic conditions, has a positive association with deposit levels (at the 1% statistical significance level), since a more stable bank will likely have more deposits than a less stable bank.

3.5.2.2   *Culture and deposits for domestic vs global banks*

Our results from the previous section (Table 3.2) indicate that the three national culture variables have strong correlations with bank deposit levels. However, what happens to bank deposit levels when a bank has a more culturally diverse customer base? In other words, if a bank has global operations and its customer base draws from several countries (or cultures) would we expect the documented relations above to weaken?

We expect the sample of global banks to behave differently than the sample of domestic banks for the following two reasons. First, global banks in our sample are supervised by a

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[37] According to the Basel III guidelines on corporate governance principles (https://www.bis.org/bcbs/publ/d328.pdf) listed banks are subject to more detailed disclosures. However, although disclosure may be less detailed for non-listed banks, especially those that are wholly owned, these banks can nevertheless pose the same types of risk to the financial system as publicly traded banks through various activities, including their participation in payment systems and acceptance of retail deposits.

more senior supervisory body (i.e., the European Central Bank; ECB) than the supervisor of local banks (National Central Bank). This implies that national culture may play a more significant role through the degrees of freedom that the domestic regulator (National Central Bank) has since both regulator and bank management are more likely to be affected by domestic cultural traits. On the other hand, the supervision of global banks from the ECB should have a more diluted cultural impact (than National Central Banks) as the regulator is now less related to a specific country's culture. Second, global banks have a multi-national presence where both employees and customers have diverse cultural backgrounds. Hence the cultural impact on the level of bank deposits is expected to be diluted for global banks.

To test this conjecture, we split our sample into domestic and global banks (Edwards, 2012) using the list of global banks maintained by the Financial Stability Board (FSB).[38] We then re-run the model in equation 3.1 separately for the two subsamples. For brevity, we only report the coefficients of the national culture variables (Table 3.3).

Results in Table 3.3 show that and all three national culture variables maintain both their statistical and economic significance for the sample of domestic banks. Specifically, trust, hierarchy and individualism have coefficients of 0.133, -0.188 and 0.150, respectively, all statistically significant at the 1% level. However, results for global banks change, since hierarchy does not seem to carry any statistical significance, while the association of Individualism on bank deposits is only statistically significant at the 10% level. These two coefficients seem to be consistent with our conjecture that the impact of national culture

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[38] In this paper, we use the list published in 2015: http://www.fsb.org/wp-content/uploads/2015-update-of-list-of-global-systemically-important-banks-G-SIBs.pdf

characteristics will be diluted as banks become more exposed to a diverse set of cultures and at the same time are monitored and regulated by a transnational authority.

Interestingly, the strong relation of trust with bank deposits remains statistically significant (1% level) for the sub-sample of global banks with a coefficient of 0.280[39]. This result shows that trust maintains a pervasive and unparalleled association with bank deposits across cultures, as it is a major component in building lasting customer relationships and satisfaction (Dwayne et al. 2004; Morgan and Hunt, 1994).

In summary, the results of Table 3.3 indicate that stricter regulation and the multi-cultural nature of global banks suppress the impact that hierarchy and individualism have on bank deposits. On the other hand, trust remains a characteristic with solid, positive association with bank deposits for both local and global banks[40].

3.5.2.3 Is deposit volatility important?

Given the robust positive relation between trust and deposit levels, both for domestic and global banks, and motivated by the new NSFR regulation aiming at shielding deposit stability, we investigate this relation further. In particular, we examine whether there is cross-sectional heterogeneity in banks operating in the same cultural environment (i.e., keeping trust constant) with respect to factors increasing or decreasing the impact of trust on bank

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[39] The higher coefficient trust carries for global versus domestic banks may be partly due to the sample differences.

[40] When running our model specification for the crisis (2007-2010) and non-crisis periods (1995-2006 and 2011-2015) the results are consistent with those provided in the previous chapter. That is, the relationship between national culture and deposit levels weakens during the crisis period.

deposit levels. Specifically, we use bank deposit volatility (over a five-year horizon)[41] to examine if deposit volatility impacts the results of the main culture variables, and especially the pervasive impact that trust has on deposit levels. While bank deposit levels could be positively affected by trust, it is also possible that this expected positive relationship would be challenged by high (historical) deposit volatility. Hence, we include deposit volatility in equation 3.1 and we also multiply (interact) deposit volatility with trust.

Regression results are shown in Table 3.4. We observe that the three main cultural variables remain statistically significant (at the 1% level). Their coefficients also have the same direction as the respective coefficients in Table 3.2, albeit with different size (hence economic significance) given the addition of the two new independent variables that are also significant.[42] We note that the magnitude of the interaction effect far outweighs that of the uninteracted coefficients indicating that holding trust constant deposit volatility has a significant negative effect on the level of deposits.[43] This indicates that even in countries/societies characterised by significant trust, banks have to remain focused and efficient in attracting customer deposits in order to maintain high levels in their deposit to total assets ratio.

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[41] The lag in measuring deposit volatility addresses potential feedback effects between deposit levels and volatility. Also, we note that the correlation between trust and deposit volatility is virtually zero (i.e., correlation coefficient of 0.022 with a p-value of 0.43), thus addressing a potential criticism that trust may be related to deposit volatility.

[42] To examine the pure impact of a national culture variable we consider the case of a bank operating with virtually zero deposit volatility. In this case a one standard deviation increase in trust would increase the deposits ratio by about 9.55% relative to its mean. The comparable effects for hierarchy and individualism would be changes of 3.61% and −4.47%, respectively.

[43] For example, in countries where trust takes its highest value (i.e., one) the effect of deposit volatility on the deposit ratio is −0.272 (0.261−0.533).

Next, we re-run equation 3.1 on the sub-samples of domestic vs global banks (results reported in the 2nd and 3rd columns of Table 3.4 respectively). We find similar results as before: most of the results seem to be concentrated in the sample of domestic instead of global banks. This trend is consistent with the explanation of a dilution in the effect of cultural characteristics in the case of more nationally diverse banks (i.e., global banks). Specifically, the coefficients for individualism and hierarchy are (not) significant for domestic (global) banks.

On the other hand, trust appears to obtain robust positive coefficients across both sub-samples, but more interestingly, this effect is largely reduced when combined with high deposit volatility (i.e., the interaction term). Deposit volatility seems to be especially important for global banks, given that both the deposit variable but also the interaction term with trust have highly economically and statistically significant coefficients.

In summary, the results in Table 3.4 are informative with respect to the impact that culture but also deposit volatility have on bank deposit levels. While the association of individualism and hierarchy are opposite (as expected) on bank deposit levels (negative and positive respectively), and their effect is only present in banks with more culturally homogeneous environments (i.e., domestic banks), the universal positive relation of trust with bank deposit levels also remains across more culturally heterogeneous banks (i.e., global banks). More interestingly, this positive relation seems to be largely weakened in banks operating in an environment with the same level of trust, but experiencing elevated deposit volatility. Furthermore, this result is larger for global banks than domestic banks in economic terms.

3.6 Robustness checks

We conduct a series of robustness checks for our analysis. First, we use an alternative measure of deposit levels. Next, we use alternative measures of the major independent variables (i.e., the three cultural characteristics) that help us deal with reverse causality concerns. Finally, we address omitted variable concerns by conducting two-stage least squares regressions (2SLS). The three robustness checks are described in sections 3.6.1, 3.6.2 and 3.6.3, respectively.

3.6.1 Alternative dependent variable

We use the logarithmic transformation of customer deposit balances as an alternative proxy for bank deposits. Our findings remain similar (Table 3.5). Specifically, when the entire sample of banks is used (1st column), we obtain a positive and significant coefficient for both trust and hierarchy, and negative coefficient for individualism (all of them statistically significant at the 1% level). Next, when only the domestic banks are used in the analysis (2nd column), all three coefficients remain the same in both the direction and statistical significance. Finally, in the sub-sample with global banks (3rd column) only the trust variable remains positive and statistically significant (at the 1% level) consistent with the result of the trust variable in Table 3.3.

In short, Table 3.5 echoes the main finding of our paper that culture affects bank deposits, but less so in the case of global banks which have culturally more diverse customers and managers. On the other hand, trust appears to have a lasting impact on bank deposits that is robust across cultural borders.

3.6.2 Alternative culture proxies

We next conduct a robustness check on the main independent variables we use to explain bank deposit levels. One may claim reverse causality might be affecting the results (i.e., that the level of deposits influences cultural variables) since the results from the WVS study are time variant. We, therefore, test our hypothesis using the Hofstede (1980) scores on national culture which remain static in time. We follow Chen et al. (2015) and use individualism and uncertainty avoidance as our alternative independent variables, which allow us to accurately map them to our conjectures about individualism and hierarchy using the WVS proxies. However, we note that Hofstede (1980) offers no proxy for trust.

Individualism is defined as the social framework in which individuals take care of themselves and their immediate families. Individualistic bank managers are overconfident about the bank's ability to draw funding and may opt for the wholesale funding source instead of accumulating deposits from customers.[44] Furthermore, individualistic bank customers are expected to overestimate their control over future financial conditions, thus saving less (consuming more) today. Hence, similar to our second hypothesis, we expect a negative relation between bank deposits and Hofstede (1980)'s individualism measure.

Uncertainty avoidance is the degree to which members of society feel comfortable with uncertainty and ambiguity. Consumers who tend to avoid uncertainty are more likely to prepare for the future thus they tend to save more today. Moreover, bank managers who tend to avoid uncertainty are more likely to follow a more prudent funding strategy by relying more on building customer relationships, hence more funding from deposits.

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[44] At least one advantage of using wholesale sources over consumers' deposits for funding is that it is faster.

Results of our regressions using Hofstede (1980)'s measures are reported in Table 3.6. We obtain similar results to Table 3.2. Specifically, running the analysis on the entire sample (1st column) a positive (negative) coefficient is obtained for uncertainty avoidance (individualism). Both coefficients are statistically significant at the 1% level. When we analyze the sub-sample of domestic banks (2nd column) almost identical results are obtained for the two cultural variables. Finally, similar to prior results, no statistically significant results are present for the subsample of global banks, lending support to our conjecture of a diluted cultural impact in banks with more culturally diverse management and customer base.

3.6.3 Endogeneity

To address potential endogeneity concerns from our regressions (e.g., omitted variable bias), we re-estimate our model in Table 3.2 using a 2SLS regression model instead. To do this, we search for instrumental variables (IVs) that will correlate with the three national culture variables but not the error term of the second step regressions.

We inform our choice of IVs from the existing literature. As we have three variables to instrument (individualism, trust, hierarchy), we need at least four instruments. We follow Li et al. (2013) for our IVs and use religion, ethnicity, language (Alesina et al., 2003) and geography (Kwok and Solomon, 2006).

We include all the independent variables from equation 3.1, defined in Appendix 3.1. We then follow the Baum et al. (2011) redundancy tests to verify whether any of the instruments should be dropped from our models. The null hypothesis of this test is that the "Instrument is redundant". Hence, rejecting this hypothesis for each instrument, allows us to finalise the list

of IVs to be used in our model. Each instrument passes the Baum et al. (2011) redundancy test and the Anderson under-identification test is rejected, thus not invalidating our instrumental variable selection (Table 3.7, Panel B).

To test that the instruments for the cultural variables are valid, we compute the over-identifying restrictions test (Hansen J-statistic) for which the joint null hypothesis that the instruments are uncorrelated with the error term and correctly excluded from the second stage regression is not rejected (Table 3.7, Panel B).

Focusing on the key results, we observe that all national culture variables remain statistically significant (at the 1% level) and with the same direction as Table 3.2. Thus, we argue that our results do not appear to be driven by omitted variable bias.

The results presented in section 3.5 suggest that our findings are robust to different specifications and not sensitive to tests that attempt to mitigate the impact of reverse causality inferences and omitted variable bias to our conclusions. Even though it is difficult to eliminate endogeneity concerns in this line of research, collectively our findings point toward a causal effect of national culture on the level of bank deposits.

3.7   Conclusion

This paper investigates whether national culture influences the levels of bank deposits in Europe. We use data for 99 European banks selected by EBA for the 2014 stress tests over the twenty-one-year period from 1995 to 2015. Our results show that banks in countries with high trust and hierarchy scores have higher levels of deposits as opposed to banks in

countries with high individualism, which on average have lower levels of deposits. Findings remain robust after controlling for endogeneity, using an alternative dependent variable as well as different cultural measures.

Further, we find that the influence of individualism and hierarchy is more profound for domestic banks compared to global banks. This is intuitive since global banks have a presence in many countries, therefore, have employees and customers with diverse cultures. Thus, global banks operate in a less culturally homogeneous environment. At the same time, they operate under a stricter regulatory framework compared to domestic banks and are under the direct supervision of the European Central Bank (ECB). Domestic banks operate mainly in their local market, both their employees and customers are more culturally homogeneous and are supervised by the central bank of their country.

The association between trust and deposit levels deserves special attention. We find that trust in banking has a positive association on the level of deposits, both for global and domestic banks, supporting the popular view that banking is based on trust. However, this universal positive relationship of trust on bank deposits is significantly reduced for banks with elevated, historical volatility in bank deposits. Specifically, we find that banks operating in an environment with the same level of trust suffer a decrease in their deposit levels if their five-year historical volatility in deposits is higher. Furthermore, this effect is larger for global than domestic banks.

Our research is of interest to bank managers when deciding upon their liquidity sources as well as depositors when deciding whether to consume or save. Culture is an informal trait

deeply embedded in societies, and we aim to create awareness to both bank managers and customers that their financial decisions are influenced by their culture.

Our findings are also of interest to bank supervisory authorities who strive to create a single banking rule book. Heavy regulation does not necessarily ensure uniformity in its application. In addition to enforcing a single rule book, authorities need to make its implementation and enforcement less prone to cultural variation. Given our reported differential effect of culture on domestic and global banks a possible way of mitigating cultural effects could be to reduce the differences between global and domestic banks, for example by encouraging diversity in employees and consumers, but also in regulation (e.g., direct ECB involvement with local – large – banks, similar to the ones included in the EBA stress tests).

3.8 References

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Appendix 3.1 – Description of variables and sources

Variable names	Variable definition
Bank deposit level variables	
Deposit level	Customer deposits scaled by the bank's total assets (data from Bloomberg).
Deposit level (log)	The logarithmic transformation of the customer deposits (data from Bloomberg).
Culture variables	
Trust	Trust is measured based on survey responses as to whether or not most people can be trusted. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*" Higher values indicate higher trust in people. The variable takes values between zero and one (data from World Values Survey).
Individualism	Individualism is measured based on survey responses to whether 'incomes should be made more equal or that there should be more incentives for individual effort. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*How would you place your views on this scale? 1 means you completely agree with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between: Incomes should be made more equal−We need larger income differences as incentives for individual effort.*" Higher values indicate more individualism. We re-scale the variable so that it takes values between zero and one (data from World Values Survey).
Hierarchy	Hierarchy is measured based on survey responses as to whether or not one follows instructions at work or has to be convinced first. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right. With which of these two options do you agree? 1. Should follow instructions; 2. Must be convinced first.*" Higher values indicate higher hierarchy, i.e., that people are happy to follow instructions without being convinced first. The variable takes values between zero and one (data from World Values Survey).
Deposit stability variables	
Deposit volatility	Volatility of deposits is defined as the standard deviation of the customer deposits over the past five years. Volatility of deposits at time *t* is estimated using the customer deposit levels from *t-4* to *t* (data from Bloomberg).
Trust* Deposit volatility	The interaction of trust with deposit volatility as defined above (data from Bloomberg and World Values Survey).
Control variables:	
- Bank financial variables	
Risk	ROA volatility is defined as the standard deviation of the ratio of gross pre-tax profit (including loan loss provisions) to total assets over five years, that is, ROA Volatility at time *t* is estimated using the ROA values from *t-4* to *t* (data from Bloomberg).

Variable names	Variable definition
Appendix 3.1continued	
Size	Size is the logarithmic transformation of the bank's total assets (data from Bloomberg).
Net interest marginal revenue	The net interest marginal revenue is the ratio (Interest Income - Interest expense) / Interest income and captures the interest rate differences between banks (data from Bloomberg).
Leverage	The bank leverage is defined as the ratio Total Equity / Total Assets (data from Bloomberg).
Interest activity	The interest activity is defined as the ratio Interest income / Total operating income and measures the percentage of the bank's income originating from traditional banking activities (data from Bloomberg).
Loans to assets	Loans to assets is defined as the ratio of Total loans / Total assets (data from Bloomberg).
3-month Euribor %	The historical close of the 3-month Euribor (data from European Central Bank Statistical Warehouse).
Wholesale funding	The wholesale funding is the amount of liquidity the bank obtained from sources other than customer deposits (including the interbank market and securitisation) scaled by the bank's total assets (data from Bloomberg).
- Country's Economic Performance Variables	
Consumption % GDP	The country's total household consumption expenditure as a % of the GDP (data from World Bank Database).
Savings % National income	The country's total gross savings as a percentage of its gross national income (data from World Bank Database).
GDP growth	The year-on-year GDP growth of the country (data from World Bank Database).
GDP per capita	GDP per capita is measured as the logarithm of the GDP per capita (data from World Bank Database).
Inflation	The inflation percentage per year per country (data from World Bank Database).
Legal origin	A categorical variable, taking the values 1, 2, 3 or 4 representing the four legal origins English law (1), French law (2), German law (3), Scandinavian law (4) (data from La Porta et al., 1998).
- Institutional quality and governance variables	
Creditor rights	A categorical variable taking the values 0, 1, 2, 3 or 4 aggregating different creditor rights. The index if formed by adding 1 when the country imposes restrictions, such as minimum dividends to file for reorganisation; 2 when secured creditors are able to regain position once their petition has been approved; 3 secure creditors rank first in the liquidation process; 4 the debtor does not retain the administration of their assets pending the resolution process (data from La Porta et al., 1998).
Rating on accounting standards	An index measuring the quality of the country's accounting standards. To construct the index, seven categories were assessed: general information, income statements, balance sheets, fund flow statements, accounting standards, stock data and special items (data from La Porta et al., 1998).

Variable names	Variable definition
Appendix 3.1 continued	
Capital stringency index	Capital-stringency index; a capital adequacy measure under adverse conditions (data from Barth et al., 2013).
Listed	A binary variable taking the value of one if the bank is listed on any stock exchange, zero otherwise (data from Bloomberg).
Domestic CEO	A binary variable taking the value 0 if the CEO is not a national and the value 1 if the CEO is a national of the bank's headquartering country (data from Boardex).
Financial statement transparency	A measure of the transparency of the bank financial statement practices, with higher values indicating more transparency. The index takes vales from 0 to 6 (data from Barth et al., 2013).

Hofstede cultural variables (used in robustness tests)

Individualism	The high side of this dimension, called individualism, can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Its opposite, collectivism, represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we" (data from https://geert-hofstede.com/countries.html).
Uncertainty Avoidance (UA)	The uncertainty avoidance dimension expresses the degree to which the members of society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? Countries exhibiting strong UA maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. Weak UA societies maintain a more relaxed attitude in which practice counts more than principles (data from https://geert-hofstede.com/countries.html).

Instrumental variables (used in robustness tests)

Ethnical Fractionalization	The ethnical fractionalisation is the probability that two inidividuals, randomly selected from a country's population, belong to different ethnicities (data from Alesina et al., 2003).
Religion	The percentage of the population of each country that belonged to the: (1) Roman Catholic; (2) Protestant; and (3) Muslim religions in the world in 1980 (data from Alesina et al., 2003).
Language	A measure of the shares of languages spoken as "mother tongues", generally based on national census data (data from Alesina et al., 2003).
Geography	Indicator variables taking the value 1 if a country is in the Eurozone and zero otherwise (data from the European Central Bank).

Figure 3.1 - Average culture values by country

Figure 3.1 presents the average scores for each cultural value (individualism, trust, and hierarchy) by country. Appendix 3.1 provides the variable definitions and data sources.
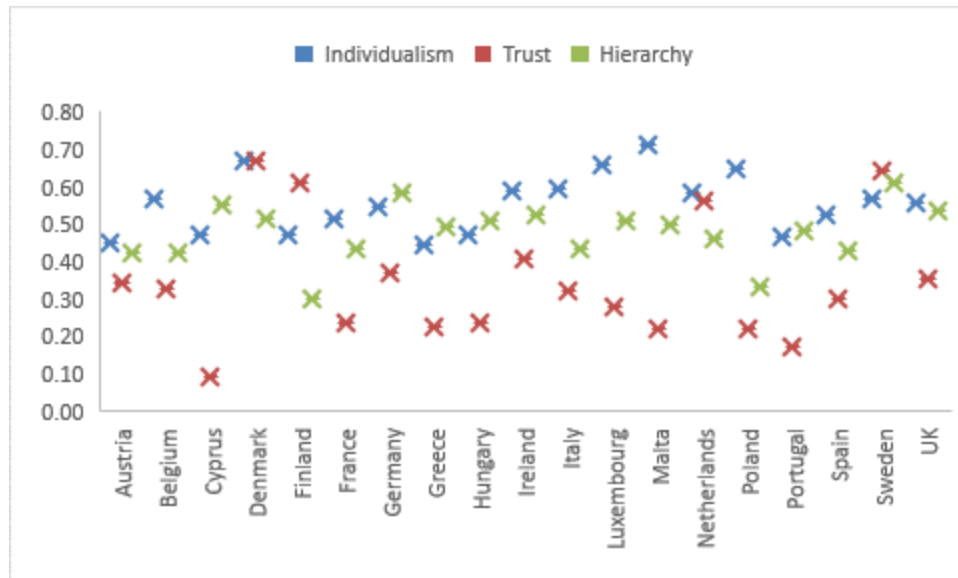
Figure 3.2 - Average deposits scaled by total assets by country

Figure 3.2 presents the average scores deposits scaled by total assets by country. Appendix 3.1 provides the variable definitions and data sources.
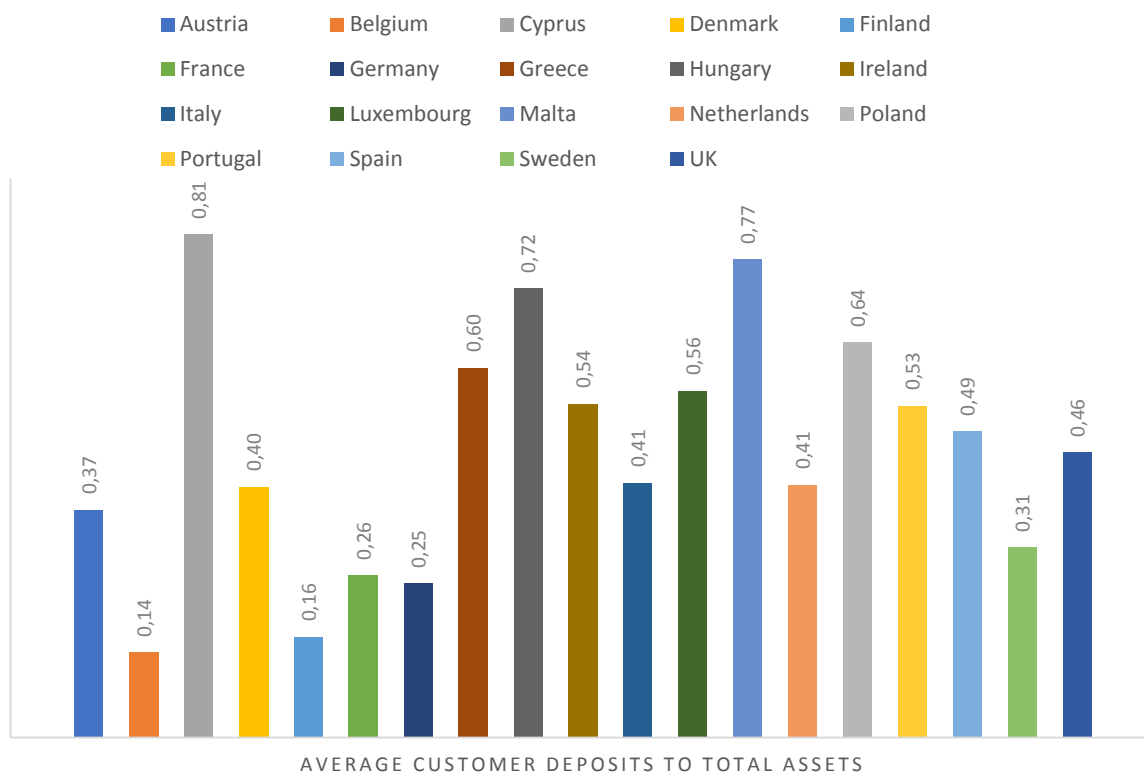
Table 3.1 – Descriptive statistics

Descriptive statistics are provided for the major variables. Appendix 3.1 includes definitions.

Variable / Statistic	Mean	Median	Standard Deviation	25th percentile	75th percentile
Dependent variables					
Customer deposits to Total assets	0.41	0.41	0.21	0.26	0.54
Customer deposits (log)	10.17	10.20	1.67	9.08	11.26
Cultural variables					
Trust	0.35	0.31	0.15	0.27	0.42
Individualism	0.53	0.55	0.08	0.48	0.59
Hierarchy	0.49	0.47	0.08	0.41	0.55
Bank financial variables					
Loans to assets ratio	0.53	0.57	0.21	0.43	0.67
Risk	0.39	0.22	0.63	0.11	0.42
Size (log)	11.27	11.21	1.57	10.27	12.38
Net interest marginal revenue	0.45	0.46	0.21	0.30	0.61
Leverage	0.06	0.05	0.03	0.04	0.07
Interest activity	6.84	4.89	8.50	2.90	9.28
Wholesale funding	0.53	0.52	0.21	0.38	0.69
Country variables					
Consumption	0.57	0.57	0.06	0.54	0.61
Savings	0.22	0.22	0.05	0.19	0.26
Legal origin	2.41	2.00	0.83	2.00	3.00
GDP growth	0.02	0.02	0.03	0.01	0.03
Inflation	0.02	0.02	0.02	0.01	0.03
GDP per capita (log)	10.31	10.44	0.52	10.07	10.66
Other controls					
Creditors rights	2.05	2.00	1.04	1.00	3.00
Capital stringency index	4.52	5.00	1.69	3.00	6.00
Euribor 3-month average %	2.43	2.18	1.78	0.81	4.26
Domestic CEO	0.93	1.00	0.25	1.00	1.00
Rating on accounting standards	61.85	62.00	10.69	61.00	64.00
Financial statement transparency	5.04	5.00	0.76	5.00	6.00
Listed	0.78	1.00	0.42	1.00	1.00
Interaction variables					
Trust*Deposit volatility	0.12	0.09	0.12	0.05	0.15
Deposit volatility	11.20	3.41	20.43	1.16	10.63
Hofstede cultural variables					
Individualism	65.47	67.00	14.39	60.00	76.00
Uncertainty avoidance	69.83	75.00	21.77	65.00	86.00

Table 3.2 – Main regression results

The dependent variable is the bank customer deposits scaled by the bank's total assets. Appendix 3.1 provides the variable definitions and data sources. Year fixed effects are also used. *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively. Numbers next to the statistical significance percentage denote the regression coefficients; numbers in brackets below each regression coefficient denote the test statistic.

Variable	All banks	Variable	All
Culture variables		*Institutional quality and governance variables*	
Trust	0.118***	Euribor 3 month	-0.004
	(2.50)		(-0.13)
Individualism	-0.120***	Creditor rights	0.020**
	(-3.02)		(1.97)
Hierarchy	0.177***	Accounting standards	-0.001
	(4.39)		(-0.70)
Bank financial variables		Capital stringency index	0.004***
			(3.02)
Wholesale funding	-0.282***		
	(-45.14)	Legal origin	-0.017
Bank size	-0.012***		(-1.25)
	(-2.98)	Domestic CEO	0.006
Risk	-0.011***		(0.89)
	(-3.74)	Financial statement transparency	0.011***
Net interest marginal revenue	0.018		(4.45)
	(1.58)	Listed	0.053***
Leverage	-0.644***		(2.87)
	(-7.46)	Constant	0.586***
Interest activity	0.001		(3.43)
	(1.48)	Number of observations	1,308
Loans to Assets	0.116***	Adjusted R^2	0.853
	(7.64)		
Country variables			
GDP growth	0.089		
	(0.87)		
GDP per capita	-0.021		
	(-1.18)		
Inflation	-0.182		
	(-1.46)		
Consumption	0.087		
	(1.47)		
Savings	-0.021		
	(-1.55)		

Table 3.3 – Domestic versus global banks

The dependent variable is the bank customer deposits scaled by the bank's total assets. Appendix 3.1 provides the variable definitions and data sources. Year fixed effects are also used. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively. Numbers next to the statistical significance percentage denote the regression coefficients; numbers in brackets below each regression coefficient denote the test statistic.

Variable	Domestic banks	Global banks
Culture variables		
Trust	0.136***	0.280***
	(3.36)	(2.12)
Individualism	-0.188***	-0.174*
	(-5.47)	(1.56)
Hierarchy	0.145***	0.088
	(4.39)	(0.57)
Bank financial variables	YES	YES
Country variables	YES	YES
Institutional quality and governance variables	YES	YES
Number of observations	1,104	204
Adjusted R^2	0.938	0.830

Table 3.4 – Trust and deposit volatility interaction effects

The dependent variable is the bank customer deposits scaled by the bank's total assets. The table shows the direct effects of trust and deposit volatility as well as the interaction effects between the trust with deposit volatility. Appendix 3.1 provides the variable definitions and data sources. Year fixed effects are also used. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively. Numbers next to the statistical significance percentage denote the regression coefficients; numbers below the regression coefficients denote the test statistic.

Variable	All banks (1)	Domestic banks (2)	Global banks (3)
Culture variables			
Trust	0.261***	0.144***	0.556***
	(3.58)	(3.91)	(4.47)
Individualism	-0.229***	-0.165***	-0.135
	(-3.71)	(-5.21)	(-1.37)
Hierarchy	0.185***	0.126***	0.061
	(2.97)	(4.09)	(0.45)
Deposit stability variables			
Deposit volatility	0.001***	-0.000	0.001***
	(4.00)	(-0.94)	(8.01)
Trust * Deposit volatility	-0.533**	-0.292***	-1.605***
	(-2.38)	(-2.60)	(-3.84)
Bank financial variables	YES	YES	YES
Country variables	YES	YES	YES
Institutional quality and governance variables	YES	YES	YES
Number of observations	1,252	1,053	199
Adjusted R^2	0.854	0.944	0.850

Table 3.5 – Alternative deposit metric

The dependent variable is the logarithmic transformation of the bank customer deposits balances. Appendix 3.1 provides the variable definitions and data sources. Year fixed effects are also used. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively. Numbers next to the statistical significance percentage denote the regression coefficients; numbers in brackets below each regression coefficient denote the test statistic.

Variable	All banks	Domestic banks	Global banks
Culture variables			
Trust	0.595**	0.566**	0.847**
	(2.34)	(2.04)	(2.02)
Individualism	-0.642***	-0.858***	-0.344
	(-3.00)	(-3.56)	(-1.01)
Hierarchy	0.677***	0.625***	0.433
	(3.13)	(2.70)	(0.90)
Bank financial variables	YES	YES	YES
Country variables	YES	YES	YES
Institutional quality and governance variables	YES	YES	YES
Number of observations	1,298	1,094	204
Adjusted R^2	0.5954	0.6381	0.9430

Table 3.6 – Alternative culture proxies

The dependent variable is the bank customer deposits scaled by the bank's total assets. We replace the World Values Survey cultural values of individualism, trust and hierarchy by the Hofstede values of individualism and uncertainty avoidance. Appendix 3.1 provides the variable definitions and data sources. Year fixed effects are also used. *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively. Numbers next to the statistical significance percentage denote the regression coefficients; numbers in brackets below each regression coefficient denote the test statistic. Note that the number of observations decreases (e.g. for "All banks" from 1,308 to 1,252 due to missing observations in Hofstede cultural value scores for some countries).

Variable	All banks (1)	Domestic banks (2)	Global banks (3)
Culture variables			
Individualism	-0.003***	-0.002***	-0.001
	(-3.38)	(-3.62)	(-0.09)
Uncertainty avoidance	0.002***	0.002***	0.007
	(3.52)	(3.30)	(0.73)
Bank financial variables	YES	YES	YES
Country variables	YES	YES	YES
Institutional quality and governance variables	YES	YES	YES
Number of observations	1,252	1,066	204
Adjusted R^2	0.838	0.939	0.820

Table 3.7 – Instrumental variables regression

We use instrumental variables regression with 2SLS which generates heteroskedasticity-robust standard errors. The 2nd stage dependent variable is the ratio customer deposits to total assets. Panel A reports the selection process for the Instrumental Variables (IVs) we use for the endogenous regressors approximating national culture. National cultural values are instrumented by the fractionalization variables ethnicity, language and religion (Alesina et al., 2003) as well as geography (Kwok and Solomon, 2006). All 2nd stage models include the control variables used in our main specification, but we do not report their coefficients for brevity. All these variables are defined in Appendix 3.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. The number in brackets is the t-statistic.

Panel A: Instrument Selection for individualism, trust, and hierarchy

Instruments	Individualism	Trust	Hierarchy
Language	0.143***	0.251***	-0.062***
	(8.59)	(14.59)	(-3.69)
Ethnicity	-0.066***	-0.244***	-0.098***
	(-2.71)	(-9.73)	(-2.55)
Religion	-0.144***	-0.168***	0.054***
	(-6.94)	(-7.88)	(2.55)
Geography	-0.094***	-0.064	-0.018***
	(-14.31)	(-9.49)***	(-2.74)
F test	34.31***	181.21***	24.98***
Adjusted R^2	0.485	0.836	0.404

Panel B: Stage 2 regression results

Individualism	-0.932***
	(-2.63)
Trust	1.491***
	(3.83)
Hierarchy	0.802***
	(3.77)
Controls	YES
Year fixed effects	YES
Number of observations	1,308
Anderson under-identification test (F test)	30.905
	p-value =0.0000
Over-identification test (Hansen's J)	1.381
	p-value=0.240

Chapter 4 – National culture, bank profitability and financial technology

4.1 Abstract

Our paper identifies national culture as an important determinant of bank profitability. We find a strong, robust and economically significant positive (negative) association between individualism, trust (hierarchy) and bank profitability. Looking separately into global and domestic banks reveals that the former are less prone to cultural influences compared to the latter. Furthermore, domestic banks with foreign ownership/management are less susceptible to cultural biases compared to domestic banks with local ownership/management. Banks operating in hierarchical societies may find the potential financial technology disturbance more challenging, compared to banks operating in egalitarian societies.

4.2 Introduction

European bank profitability remains low since the recent financial crisis. Specifically, the average return on equity ranges from 3 to 5 percent while the cost of capital is between 10 to 12 percent (KPMG, 2016).[45] Limited profitability makes banks vulnerable to financial instability (Tsomocos, 2003). Low profitability also typically precedes financial crises (Crockett, 1997; González-Hermosillo, 1999) and weakens the banks' ability to transform short-term liquidity into long-term funding for viable businesses (Levine and Zervos, 1998; Beck et al., 2000; Beck and Levine, 2004; Goldstein and Pauzner, 2005). Weakened financial intermediation constrains the wider economic growth, contributing to the anaemic economic recovery post-crisis.

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[45] https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2016/10/the-profitability-of-eu-banks.pdf

Several reasons contribute to reduced profitability. For example, policies centred at keeping European interest rates at record-low levels, reduce net interest margins. To prevent new financial crises, regulators imposed heavier requirements on banks regarding capital, reporting and liquidity. Stricter regulations impair bank profitability (Albertazzi and Gambacorta, 2009) and make funding more costly for households and micro-businesses (Cull et al., 2011). As a result, parallel and unregulated financial universes are emerging. Financial technology (fintech) enterprises offer payments, credit, securitisation, hedging and other financial services. The basic issue to be addressed is not the imminent changes in the financial sector but how banks will operate better in the new business setting, refine relationships with customers, seize innovation opportunities and yield adequate returns (Campanella et al., 2017), which essentially will define the Bank's strategic development. One of the key features distinguishing this study from prior literature on bank profitability is the fintech discussion and the inclusion of technological adoption in our econometric specification.

The rapidly technologically advancing and changing environment motivates us to revisit the bank earnings literature and explore the role of national culture as a possible determinant of bank profitability. We measure national culture using three dimensions singled-out by sociology and economics (Ahern et al., 2015), namely, individualism, trust and hierarchy. Ex-ante one should expect these cultural dimensions to affect bank profitability as we detail below.

Individualism revolves around personal achievements, control, uniqueness, goals and success (Bellah, 1986). Individualistic people are competitive (Delerue and Simon, 2009), autarkic,

self-reliant (Simmel, 2007), independent, with clearly and confidently defined self-beliefs (Bond, 1996). Chui et al. (2010) link individualism with profitability, specifically momentum profits. We expect success-driven managers to channel their efforts into making their company more profitable pursuing personal achievement, attractive compensation and social status advancement (Alesina and Giuliano, 2015). To increase profitability, individualistic managers apply better management practices and achieve higher productivity and growth (Van Hoorn, 2014).

According to a survey by Ernst and Young[46], trust is imperative for banks. Under high trust levels, CEOs decentralise and delegate more to their managers. Managers respond to the trusting environment by taking the correct decisions and actions (Bloom et al., 2012). Decentralisation means the CEO allocates more time to critical, strategic decisions, including increasing profitability. In addition to bank managers, trust affects the bank's relationship with customers. Banks operating in high levels of trust maintain and increase customer cooperation (Ratnovski, 2013), subsequently increasing profitability. Trust also improves profitability originating from non-traditional banking operations because people in high trust societies invest more in stocks and bonds (Guiso et al., 2008). Consequently, banks sell more investment products, can more easily issue new capital or draw liquidity via bonds. Finally, trust facilitates mobile banking adoption, reducing costs, attracting new and retaining existing customers (Lin, 2011).

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[46]   http://www.ey.com/Publication/vwLUAssets/ey-trust-without-it-youre-just-another-bank/$FILE/ey-trust-without-it-youre-just-another-bank.pdf

In hierarchical societies, lower ranked employees follow instructions given by people in higher ranks. Within a hierarchical setting, bank rank and file employees leave the decision-making to their superiors. The hierarchical process occupies employees from all managerial levels, increases communication costs (Garicano, 2000) and delays the decision process, leading to missed opportunities. In addition to missed opportunities, when a bank does not timely address customers' requests, such as loan applications or complaints, it loses business (Cooil et al., 2007). Finally, hierarchy is positively associated with conservatism (Schwartz, 1994) while conservatism is negatively associated with a company's financial performance (Sturdivant et al., 1985).

Fintech companies are aspiring to compete with banks in every aspect of banking and finance which causes disruptions, but at the same time, forces banks to become more efficient (Oxford Analytica Daily Brief Service, 2016). According to a study by PWC,[47] more than 80% of the financial institutions believe their business is at risk, and as a result, 77% will increase efforts to innovate and 82% expect to increase fintech partnerships in the next three to five years. Today's customers demand convenience and better value Wilson (2017), which makes it imperative for traditional institutions to modernise technologically improving their profitability (Holden and El-Bannany, 2004; Gautam, 2012). We argue that, in general, competition from fintechs potentially has a positive effect on bank profitability since it forces banks to become more efficient in dealing with the challenges and competition fintech firms expose them to. However, in hierarchical societies, where, as previously explained, rigid

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[47] https://www.pwc.com/jg/en/issues/redrawing-the-lines-fintechs-growing-influence-on-the-financial-services-2017.html

bank structures and decision-making hinder traditional banks' ability to adopt to new trends and challenges promptly, we anticipate fintech to have a negative effect on bank profitability.

To test our conjectures, we apply a multi-level hierarchical model. Multi-level regressions are mainly used by social scientists when data is divided into groups (for example grade data for students nested in schools nested in geographical regions). Our sample is nested into 99 European banks, included in the European Banking Authority (EBA) stress tests,[48] nested into 19 countries. Multilevel models take the sample size within each country into account; they do not require homogeneity as they separate the variance attributable to country and bank characteristics, and correctly group bank-level effects while at the same time examining cross-country relations (Raudenbush and Bryk, 2002; Goldstein, 2011; Field, 2013).

As a bank profitability proxy we use the Return on Assets (ROA), the ratio of net profit before taxes scaled by the bank's total assets (Bourke, 1989; Athanasoglou et al., 2008; Chronopoulos et al., 2015; Saghi-Zedek and Tarazi, 2015). For the national culture scores, we use the World Values Survey (WVS) which takes place in waves.[49] WVS is used extensively by academia and has been validated by several studies, for example, Glaeser et al. (2000), Fehr et al. (2003) and Holm and Danielson (2005). We find a positive (negative) statistical and economically significant association between the three culture values individualism, trust, (hierarchy) and ROA.

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[48] https://www.eba.europa.eu/documents/10180/563711/31012014+EU-wide+stress+Test+2014+%28List+of+sample+banks+%29.xlsx

[49] WVS conducted surveys over the following periods: 1981-1984, 1990-1994, 1995-1998, 1999-2004, 2005-2009 and 2010-2014.

We then divide our sample into global[50] and domestic banks.[51] Global banks report directly to the European Central Bank (ECB) whereas domestic banks are supervised by their national Central Bank. Global banks are also subject to stricter regulation compared to domestic banks, leaving them with less flexibility and scope for national culture influences. Furthermore, global banks are multinational and interconnected (Edwards, 2012), they have a presence in several countries, and their employees and customers originate from multiple and typically diverse countries. Hence, no one culture dominates within this multicultural synthesis. Overall, one would expect national culture to affect the profitability of domestic but not global banks. Indeed, we find that the relation between culture and domestic bank profitability is statistically significant, whereas, the relation between national culture and profitability of global banks does not hold.

To further explore our conjecture that a multicultural setting alleviates cultural influences, we divide domestic banks into foreign and locally owned. Using the ownership data from Claessens and Van Horen (2015), we show that the relation between culture and profitability weakens for foreign-owned compared to domestically-owned banks. Also, we divide domestic financial institutions into banks with foreign and local CEOs and find similar results. Banks led by foreign CEOs are less vulnerable to cultural biases. Admittedly, the sample size for the analysis of foreign-owned and foreign-CEO domestic banks is small, which affects both the validity of our estimates and their generalisability. Hence, caution should be exercised in interpreting the strength of these findings.

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[50] The Financial Stability Board (FSB) maintains and updates a list of global banks. We use the list published in 2015: http://www.fsb.org/wp-content/uploads/2015-update-of-list-of-global-systemically-important-banks-G-SIBs.pdf

[51] Failure of a global bank would potentially disrupt the financial system worldwide whereas failure of a domestic bank would have consequences on the financial system domestically

We apply four tests to check the robustness of our results. First, we replace the dependent variable Return on Assets (ROA), which measures managerial efficiency in generating profits utilising assets (Saghi-Zedek and Tarazi, 2015), with the Return on Equity (ROE), which measures shareholder returns (Dietrich and Wanzenried, 2014). Second, in line with prior studies, we test our results for omitted variable bias by instrumenting cultural variables with the religion, ethnicity, language (Li et al., 2013) and geography (Kwok and Solomon, 2006). Third, we substitute WVS scores with the static Globe (House, 2004) and (Hofstede, 2001) cultural variables. Finally, we use an alternative market concentration index, namely, the Lerner index from two different sources, Gischer et al. (2015) and Delis et al. (2016).

National culture is associated with firm risk-taking (Li et al., 2013; Ashraf et al., 2016); thus, a possible criticism of our study is that our results are driven by bank risk since ROA is expected to be highly correlated with risk. We offer two clarifications in response: First, we explicitly control for risk (e.g., credit risk) or its determinants in all our models. Second, our instrumental variables analysis mitigates concerns over the impact of omitted variables to our findings. Hence, we argue that our findings are above and beyond the impact of national culture on bank risk.

Our study adds to the growing literature associating national culture with economic decisions, making several contributions. First, we build on prior literature explaining cross-country firm-profitability variations with national culture (Clark, 1987; Bloom and Van Reenen, 2007, 2010) by adding the highly regulated financial industry to the firms influenced by cultural traits. Further, we add to the study by Kanagaretnam et al. (2011) who relate culture with earnings management (i.e., managing earnings to just meet-or-beat prior year's earnings

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benchmark or income smoothing). Kanagaretnam covers the pre-crisis period 1993-2006 using banks globally and focuses mainly on cultural influences on financial reporting. Our paper associates national culture with bank earnings (ROA), not the way they are reported in financial statements, uses a rather homogeneous sample consisting of European systemic banks, covers an extended 21-year time series (1995 to 2015) including pre-crisis, crisis and post-crisis periods. Second, we add to studies investigating bank profitability (Albertazzi and Gambacorta, 2009; Staikouras and Wood, 2011; Dietrich and Wanzenried, 2014) by adding national culture to the determining factors. Third, we build on research examining the impact of technology on profitability (Bodo and Mark, 2003; Seth and Claes, 2005; Campbell and Frei, 2009; Roth, 2015). These studies find that technological advancements, considering customer engagement and customer value delivery, reduce costs and consequently increase profitability. Managerial decisions to address the threats and opportunities presented by the innovative and rapid technological advancements are influenced by national culture. Banking, as opposed to other firms, is constrained by heavy regulation, making strategic decisions more challenging and impactful. Our study is in agreement with prior studies that technological advancement is positively correlated with profitability. At the same time, national culture is influencing managerial decisions and explains profitability differences between countries which implies that certain banks operate in a more favourable environment compared to others to address the financial technology challenges. When interacting culture, specifically hierarchy, with technological adoption we find that banks operating in hierarchical societies are at a disadvantage compared to banks operating in egalitarian societies to address the fintech disruption to the banking sector profitability.

4.3   Literature review and hypothesis development

Our study is closely related to existing literature on national culture and its influence on managerial decisions (Schneider and De Meyer, 1991; Moussetis et al., 2005) as well as prior research on bank profitability (Demirgüç-Kunt and Huizinga, 2000; Kanas et al., 2012). To test our hypotheses, we use the three cultural dimensions (individualism, trust, hierarchy) selected by Ahern et al. (2015) in their paper examining the impact of national culture on mergers and acquisitions.

Psychologists consider individualism as one of the main dimensions measuring cultural variation (Heine, 2012). Individualistic people take care of themselves and their immediate families (Hofstede, 2001) at the expense of the group benefit. As such, they behave autarkically, are self-reliant (Simmel, 2007), focus on their rights instead of their duties and shape their identity based on their achievements (Hofstede, 1980). Having their achievements in high priority, they value their individuality, separate themselves from the group (Brett and Okumura, 1998) and maintain their independence (Markus and Kitayama, 1991). In contrast, collectivist individuals desire to fit-in and maintain harmonious relationships with others in their group. They sacrifice their self-interests and place the group's welfare above their own. Applying the preceding discussion to our context, we expect individualistic bank managers to vigorously pursue profitability, irrespective of the potential associated costs (e.g., downsizing through employee layoffs), in their efforts to secure higher compensation and social status.

Van den Steen (2004) associates individualism with optimism and confidence; Chen et al. (2017) associate individualism with innovation. From a very young age, these optimistic, confident and innovative people behave as 'winners' (Heine et al., 1999). A 'winner' CEO in

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the banking sector would be a successful one, leading a profitable company. CEOs that are successful in leading their financial institutions to profitability are high in demand. Competition for such managerial ability motivates banks to increase pay for performance (Acharya et al., 2012) and equips managers with more flexibility in their decision making. In turn, managerial decision making is prone to cultural influences (Chui et al., 2002; Zheng et al., 2012; Shao et al., 2010) and according to Chui et al. (2010), individualism is positively correlated with profitability momentum. The above discussion leads to our first hypothesis:

H1:   Individualism and bank profitability are positively related

Economic aspects such as prosperity (Fukuyama, 1995), growth (Knack and Keefer, 1997), firm size (La Porta et al., 1997), and international trade (Guiso et al., 2009) are related to trust levels. The 2007-2009 financial crisis raised the importance of trust in banking, which became a popular theme among market participants.[52]

How does trust influence bank profitability? According to Bloom et al. (2012), when trust is high, CEOs are more likely to delegate to managers and in turn, managers, who know their CEO trusts them, are more likely to take the correct actions. Bloom's argument goes a step further, and places trust above monitoring mechanisms and incentives, which are less needed when firms operate in trusting societies.

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[52]   http://www.ey.com/gl/en/industries/financial-services/banking---capital-markets/ey-trust-without-it-youre-just-another-bank
Trust: the faith that moves Mammon http://www.economist.com/node/12436122
https://www.fca.org.uk/news/debating-trust-and-confidence-in-banking-

Trust decentralises decision making in organisations, that is, the CEO trusts middle-managers to make them, and frees valuable time for the CEO to focus on the bank's strategic direction. When CEO efforts are concentrated on strategy and protecting the bank from potential threats, we expect the bank to be more profitable compared to banks whose CEOs are more involved in the day-to-day business. On the other hand, the same argumentation may support a negative association between trust and bank profitability. Specifically, one may argue that decentralising decisions may lead to less monitoring, which may in turn have detrimental effects on the firm's value.

Another argument supporting the positive association between trust and profitability is that trust increases cooperation within a firm (Glaeser et al., 2000) making it more productive. Increasing cooperation within a bank implies its units (be it branches or divisions or subsidiary companies) collaborate harmoniously, share common goals and consequently, increase profitability.

We now turn our attention from bank management to bank customers. When customers trust their banks, they maintain and increase their relation (Ratnovski, 2013). Establishing long-term relations with their clients increases bank profitability, specifically profitability originating from traditional banking activities (mainly collecting deposits and extending loans). Trust also facilitates profitability originating from nontraditional banking activities, as it is positively related to stock market investments (Guiso et al., 2008). Trust facilitates a bank's securitisation process, capital increase via share issuance or drawing liquidity via bonds. According to our findings in Chapter 2, trust is negatively associated to bank risk. Allen and Jagtiani (2000) find that non-traditional activities reduce the overall risk to the

firm, but increase systemic risk, limiting the firm's ability to diversify. Consequently, while on the one hand moderate risk-taking, potentially facilitated by trust, may be value enhancing, on the other hand excessive risk-taking leads to the opposite effect. Based on the preceding discussion, it is ultimately an empirical question whether trust affects bank profitability in a positive / negative way. H2: Trust and bank profitability are significantly associated

In hierarchical societies, power is distributed unequally, and multiple ranks are formed based on authority, social status or wealth (Hofstede, 1980; Schwartz, 1994). In such environments, people in lower ranks blindly follow the instructions given by individuals in higher ranks. Requesting instructions increases communication costs, as, most times, the lower ranks refer to the upper ranks for directions (Garicano, 2000). Involving both low and high ranked employees increases costs and delays the decision-making process. Delaying decisions leads to missed opportunities, especially when the time is of the essence, consequently reducing profitability.

In hierarchical structures, the lower ranked employees follow management instructions without questioning them, making such decisions prone to error, which could reduce profitability. In contrast, egalitarians are confident to voice any objections until they obtain satisfactory explanations before following instructions (Au and Cheung, 2004). When a bank manager knows her decisions are going to be questioned or scrutinised, she will probably think about them more carefully, gather information and be prepared to defend them. We expect decisions based on sufficient evidence to withstand scrutiny to have a high probability of being correct.

Our final argument supporting a negative association between hierarchy and profitability is based on the notion of conservatism. Schwartz (1994) finds the Hofstede power distance or hierarchy value is positively associated with conservatism. Conservatism among senior managers is negatively associated with the company's financial performance (Sturdivant et al., 1985). Under the current rapidly changing environment, CEOs need to be innovative and independent, think outside the box and take proactive measures instead of being conforming and reactive, a trait of hierarchical societies (Mihet, 2013). Our third hypothesis is:

H3:   Hierarchy and bank profitability are negatively associated

4.4   Bank profitability determinants and variable selection

4.4.1   Profitability proxies

There are two profitability proxies used by existing studies: the Return on Assets (ROA) and the Return on Equity (ROE). ROA is the ratio of net profit before taxes scaled by the bank's total assets (Bourke, 1989; Athanasoglou et al., 2008; Chronopoulos et al., 2015; Saghi-Zedek and Tarazi, 2015). ROE is the ratio of net profit before taxes scaled by total equity (Pasiouras and Kosmidou, 2007; Albertazzi and Gambacorta, 2009; Dietrich and Wanzenried, 2014).

ROA is considered a measure of managerial efficiency because it reflects the bank's management ability to generate profits from its total assets. The ROE, on the other hand, is a shareholder return measure echoing the management's ability to generate profits from the banks' equity. Some studies prefer one measure over the other, for example, Goddard et al.

(2004) consider ROE as a better profitability proxy because, unlike ROA, it does not take off-balance-sheet activities into account. ROE, however, neglects leverage and the risks associated with it. We use both measures to test our conjectures.

4.4.2 Bank profitability determinants

4.4.2.1 Internal bank profitability determinants

The bank-level (internal) determinants associated with bank profitability are bank size, internal business mix, cost to income, ownership, funding cost, operating expenses, credit risk, capital adequacy, the annual change in loans, and CEO nationality.

McAllister and McManus (1993) find a positive relation between bank size, in terms of total assets, and profitability due to economies of scale. Pasiouras and Kosmidou (2007) verify the positive correlation between size and profitability; the bigger the bank, the stronger its market power leading to higher profits. Pasiouras and Kosmidou claim many banks merged with or acquired other banks to increase their market power and consequently their profits. Boyd and Runkle (1993), on the other hand, find the too-big-to-fail moral hazard motivates authorities to impose stricter regulations on big banks limiting their profitability potential. We include the bank size, measured in terms of total assets, on our econometric models.

Berger et al. (1987) find the bank's specialisation (product mix), and its cost-effectiveness should be examined together with its size. Following Berger, we include both the internal business mix and the cost-effectiveness in our models. The internal business mix measures the profitability originating from traditional (interest income from on-balance-sheet activities) versus non-traditional (trading fees, non-deposit funding) activities. It acts as a specialisation

indicator for each bank (García-Kuhnert et al., 2015) impacting earnings (Angbazo, 1997). We use the cost to income ratio to measure cost-effectiveness. Banks with a higher cost to income ratio are less profitable (Bourke, 1989; Dietrich and Wanzenried, 2014; Saghi-Zedek and Tarazi, 2015). The ratio is also a managerial effectiveness indicator, measuring the expenses to revenues relation (Kosmidou, 2008).

Another factor associated with profitability is the bank's ownership status. Shehzad et al. (2010) and Barry et al. (2011) associate the levels of risk with the bank's ownership. Privately owned banks take less risk and have lower non-performing loans, in contrast, to publicly owned, listed banks which apply riskier strategies aiming to higher profitability.

Funding and operating costs negatively impact profitability: the higher the costs, the lower the profits. Banks with high creditworthiness pay less interest (Dietrich and Wanzenried, 2014) compared to banks with low creditworthiness which pay higher rates. Paying less interest has a positive effect on bank profitability because their funding costs are lower. Operating expenses, including personnel salaries, are negatively associated with bank profitability (Athanasoglou et al., 2008).

Another profitability determinant is credit risk, measured by the non-performing loans ratio. The higher the credit risk, the lower the profitability (Angbazo, 1997; Athanasoglou et al., 2008; Dietrich and Wanzenried, 2014; Saghi-Zedek and Tarazi, 2015).

Berger (1995b) finds capital adequacy ratios and profitability ratios are positively related, despite the lower risk associated with higher capital. Bourke (1989), Demirgüç-Kunt and

Huizinga (1999), Berger and Bouwman (2013) and Saghi-Zedek and Tarazi (2015) reach similar conclusions since they find that capital has positive effects on profitability because it safeguards banks during crises.

Kanas et al. (2012) add loan variation to bank profitability determinants. The increase in loans may lead to higher profitability if loans are more profitable compared to other assets (Iannotta et al., 2007). However, an increase in loans may also lead to lower profitability if it leads to an increase in non-performing loans (Bourke, 1989; Molyneux and Thornton, 1992).

Lastly, following Ahern et al. (2015), we add a variable controlling whether the CEO is domestic to the country where the bank is headquartered. Domestic CEOs might have a better understanding of the intricacies of the domestic market allowing them to generate more profits. At the same time, the increased availability of talent at the global level might help banks that recruit CEO talent from abroad to perform better. Therefore, it is difficult to come up with unambiguous predictions *ex-ante*.

4.4.2.2 *External and macroeconomic bank profitability determinants*

We use control variables to measure technology application, banking concentration, and market capitalisation at the country level. Although our sample consists entirely of European systemic banks, which operate under a common regulatory framework, we also control for four institutional variables: creditor rights, shareholder rights, financial statement transparency and the country's legal framework.

In the Introduction (paragraph 4.2), we discussed the potential impact of technology on bank profitability. As such, we need to add a relevant control variable to our models. Financial technology is a very new concept, and data is not available for our time series (1995-2015). Instead, we select a proxy for technological adoption because banks can strategically acquire, partner or develop financial technology. Specifically, we select the index measuring mobile subscriptions per 100 people as a technological adoption proxy for three reasons. First, the banking industry is among the leading sectors utilising mobile technology as a channel for financial services delivery with mobile banking evolving much faster than internet banking (Tommi, 2007). The increasing mobile phones advancement made the transformation of banking applications to mobile devices a logical development (Pousttchi and Schurig, 2004) and increased mobile banking popularity in daily life (Chaushen, 2013). Mobile banking advantages include convenience (having access to banking services twenty-four hours a day wherever you are), saving time, effort and cost (Suoranta, 2003).

Second, we follow existing literature exploring consumer adoption of mobile payments (Mallat, 2007; Au and Kauffman, 2008; Slade et al., 2015) motivated by a specific fintech example, Paypal. Paypal is a successful online payment system, with more than 20 million users in 38 countries and about 28,000 new users per day (González, 2004). New EU legislation (Payment Services Directive, or PSD2), is focused on payment services, indicating the fintech impact will potentially grow in mobile payments before it expands to other banking services. With PSD2 bank executives need to evaluate their strategic and tactical options and make the right decisions considering their desired position in the value chain and disruption on their modus operandi (Cortet et al., 2016). The legislation will be enforced in

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2018 and aims to increase competition, innovation and transparency across the European payments market. Finally, data is available for the time series and countries in our sample.

Another external bank profitability determinant is banking concentration. When the market is not competitive, increased banking concentration may lead to higher profitability (Bourke, 1989; Molyneux and Thornton, 1992). Berger (1995a) considers market concentration as a managerial efficiency measure, whereby a bank grows and earns market share because of its strategy. In contrast, Demirgüç-Kunt and Huizinga (1999) and Staikouras and Wood (2011) find a negative relationship between concentration and bank profitability. We control for market concentration using the Herfindahl index (Bikker and Haaf, 2002; Claessens and Laeven, 2004; Coccorese, 2005c; Alegria and Schaeck, 2008; Michis, 2016). We get the Herfindahl index per country data from the ECB (Figure 4.1). As a robustness check, we replace the Herfindahl index with three Lerner indices provided by Gischer et al. (2015) and Delis et al. (2016); see paragraph 4.7.2 for more details. Additionally, we control for the country's market capitalisation which is related to concentration and competition. Markets with high stock capitalisation are more competitive, compared to those with low stock capitalisation; increased competition may apply pressure to banks to decrease their profit margins (Dietrich and Wanzenried, 2014).

We follow Demirgüç-Kunt and Huizinga (2000) and use four institutional variables, the shareholder's rights, creditor rights, common vs civil law and restrictions on banking. The creditor rights index considers the country's institutional forces during liquidation such as secured creditor's access to their holdings. According to La Porta et al. (1998), creditors' rights are a function of a country's legal system. Further, Djankov et al. (2007) find that

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stronger creditors' rights encourage an increase in the supply of credit. Acharya et al. (2011) find that stronger creditor's rights motivate firms to engage in diversifying acquisitions that are value-reducing. King et al. (2011) suggest that Acharya's findings confirm the argument that strong creditors' rights mitigate the agency problem between shareholders and creditors. Similarly, the shareholder index considers factors such as the minimum percentage of share capital entitling shareholders to call for an extraordinary shareholders' meeting and whether the shareholders have preemptive rights that can only be waived by a shareholders' vote. We obtain data for the shareholder and creditor rights from La Porta et al. (1998). We also use data from La Porta to differentiate between countries applying the common vs civil law system. Lastly, we control for discrepancies between countries' accounting standards quality by including the financial statement transparency index by Barth et al. (2013).

For macroeconomic factors, we use the tax rate, GDP growth, the annual change in Euribor, inflation and GDP per capita. According to Demirgüç-Kunt and Huizinga (1999) and Athanasoglou et al. (2008), tax impairs bank profitability whereas Gross Domestic Product (GDP) growth and inflation have a positive impact on bank earnings. To account for interest rate variations, we follow Bourke (1989), one of the earliest studies on bank profitability, and include the annual Euribor changes in our econometric models. We also use the GDP per capita to capture the differences in the income levels per country (Dietrich and Wanzenried, 2014).

4.5   Data and methodology

We follow Acharya and Steffen (2015) and use a dataset of European banks included in the EBA stress tests.[53] The stress tests assess the financial institution's resilience to adverse market conditions as well as the systemic risk in the European banking sector. Our sample consists of 99 banks in 19 countries which were selected by the EBA for the 2014 stress tests, covering at least 50% in the domestic banking sector and approximately 70% in terms of 2013 total European banking assets. All banks in our sample follow a common regulatory framework and have a common regulator, namely, the ECB. The relatively homogenous sample selection mitigates confounding effects concerns due to heterogeneity.

4.5.1   Data sources

We collect national culture data from the World Values Survey (WVS)[54] as per La Porta et al. (1997); Glaeser et al. (2000); Sapienza et al. (2013) and Ahern et al. (2015). WVS is an international survey, using a common data set, which is conducted in approximately 100 countries and covers approximately 90% of the world population. We get annual data on the bank financials from Bloomberg and the bank CEO nationality from Boardex. The country data is from the World Bank database and the interest rate data from the European Statistical data warehouse. Finally, the institutional variables are from La Porta et al. (1998) and Barth et al. (2013).

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[53] https://www.eba.europa.eu/documents/10180/563711/31012014+EU-wide+stress+Test+2014+%28List+of+sample+banks+%29.xlsx
[54] http://www.worldvaluessurvey.org/WVSContents.jsp

4.5.2 Descriptive statistics

In Table 4.1, we provide descriptive statistics (mean, standard deviation, skewness, kurtosis, median, 25th percentile and 75th percentile) for all the variables we use in our models. We briefly discuss a few interesting observations.

The mean for individualism, trust and hierarchy is 0.53, 0.35 and 0.49 respectively. We follow Ahern et al. (2015) and bind the scores between zero and one by dividing the WVS survey results by 10.

The ROA average is 0.42, which is close to the 0.50 mean of the high-income countries reported by Dietrich and Wanzenried (2014). The time series (1998 to 2012 vs 1995 to 2015) and the countries in the sample are different (their sample includes 118 countries worldwide vs our sample which includes 19 countries from the European Union), which potentially explain the discrepancy. The cost to income ratio average is quite healthy (31%) compared to the Dietrich and Wanzenried, 68%, for high-income countries which reflect the efforts by European banks to reduce their costs and remain profitable under a prolonged low-interest rate environment. The average annual change in Euribor is negative (-0.30) during our time-series.

The Capital adequacy ratio is the total equity scaled by total assets. The average capital ratio in our sample is 6% compared to approximately 8% of the high-income countries reported by Dietrich and Wanzenried (2014). The required capital ratio currently stands at 10.5%, but our average is for the time series 1995 to 2015 and includes years when a lower capital ratio was considered as adequate.

The Herfindahl index, our banking concentration proxy, varies significantly from country to country. The trends are also different between countries during our time-series, showing European countries may share a common legal framework but are not aligned on many other levels including market concentration as well as national culture. The average Herfindahl index stands at 0.10, which is the same as that reported by Michis (2016) who studies market concentration in European banking. The higher the concentration, the higher the monopolistic benefits for financial institutions competing for market share.

4.5.3   Methodology

We use a multilevel linear regression as our data is clustered into three levels: country, bank and observations. Multilevel modelling accounts for bank- and country-level variation in estimating coefficients (Gelman, 2007). Multilevel regression recognises hierarchical structures and correctly accounts for the clustered data formation (Goldstein, 2011; Raudenbush and Bryk, 2002). Hierarchical models do not require regression slope homogeneity, and errors need not be independent (Field, 2013). Lastly, multilevel regressions take the sample size within each country into account using weights and include cross-level interactions between bank- and country-level explanatory variables (Li et al., 2013).

Our model specification is provided below:

$$\text{ROA}_{i,j,t} = \alpha + \beta(\text{Cultural Variables})_{j,t} + \gamma(\text{Controls})_{i,j,t} +$$

$$+ \text{Year FE} + \varepsilon_{i,j,t} \qquad \textit{(Equation 4.1)}$$

The dependent variable is ROA, measured as the ratio of net profit before taxes scaled by the bank's total assets, for bank i in country j at time t. Vector β captures the three cultural

variables, individualism, trust and hierarchy. Vector γ includes control variables for bank i in country j at time t. All variables, together with their sources are defined in Appendix 4.1.

We use year fixed effects to capture macroeconomic variations (e.g., currency crisis) which occurred during the time series under consideration (1995 to 2015) and had an impact on bank ROA.

4.6   Empirical results

We run equation 4.1 through a hierarchical regression for three groups: all banks in our sample, domestic banks and global banks.

4.6.1   All banks

For all the banks in the sample, we find all three cultural variables are associated to ROA (Table 4.2). Individualism and trust have a positive association and hierarchy a negative relation with ROA; (our hypotheses development is detailed in paragraph 4.3).

When individualism increases a one standard deviation around its mean (from the 25th to the 75th percentile) the total effect is to increase ROA by 6%. Given the unconditional ROA mean stands at 0.42, we consider this increase to be economically significant, consistent with our first hypothesis (H1). The magnitude of the economic effect of trust and hierarchy is to increase (decrease) ROA by 11% and (2%) respectively.

4.6.2 Domestic vs global banks

Table 4.3 reports our results for domestic and global banks. For domestic banks, we confirm the relationship between national culture and bank profitability (Table 4.3, Column 1) since all coefficients are statistically significant and with the predicted sign. For global banks, however, the relationship between the three cultural variables and profitability does not hold (Table 4.3, Column 2). As discussed earlier, global banks are multinational and multicultural with no one culture dominating others. Both management and employees originate from diverse cultural backgrounds. Therefore, the lack of impact of national culture on global bank profitability is consistent with our conjectures.

To further explore the impact of multiculturalism and bank profitability, we divide domestic banks into local and foreign-owned. The relationship between national culture and domestic locally-owned bank profitability holds for all three cultural dimensions, namely, individualism, trust and hierarchy (Table 4.4, Column 1). However, the relation becomes insignificant for domestic foreign-owned banks (Table 4.4, Column 2), which offers evidence consistent with global banks; multicultural management dilutes national cultural effects on bank profitability.

We then divide domestic banks into two groups: banks with local CEOs and banks with foreign CEOs. All three cultural values are statistically significant for domestic banks with domestic CEOs (Table 4.4, Column 3). However, the relation between national culture and bank profitability does not hold for domestic banks with foreign CEOs (Table 4.4, Column 4). Mixing nationalities and cultures mitigates cultural effects on bank profitability. Our

findings are in line with Bloom et al. (2012) who find multinationals take their home country's culture to their overseas affiliates.

We note though that the relatively small sample size for domestic banks which are foreign-owned and those with foreign CEOs (125 and 75 observations respectively) is a potential source of concern over the stability and generalisability of these findings. Hence, we advise caution in the interpretation of these results.

4.6.3 Interaction effects

In addition to analysing the main effects, we also explore the interaction effects between hierarchy[55], the cultural value negatively associated with profitability, and technological adoption. People in hierarchical societies are conservative (Schwartz, 1994), resistant to change (Vogel and Wanke, 2016) and, as such, avoid uncertainty. Conservative and resistant to change people typically apply technological advances with significant lag since they prefer to remain within their comfort zone.

According to Table 4.2, our technology proxy (mobile subscriptions per 100 people) is positively associated with profitability. We interact hierarchy with technology by creating a new variable, multiplying hierarchy with the mobile subscriptions per 100 people scores. When we run our model with all variables as per equation 4.1, plus the interaction term, we find a negative association between the interaction regressor (hierarchy with technology) and bank profitability (Table 4.4, Column 5). The uninteracted variable (mobile subscriptions per

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[55] The interaction of technological adoption with individualism or trust did not produce statistically significant results.

100 people) remains statistically significant and positive. Hierarchy mitigates the positive technological effects on profitability. Consequently, banks operating in hierarchical societies are at a disadvantage compared to banks operating in egalitarian societies to address the fintech disruption to the banking sector profitability.

4.7 Robustness checks

We test our results for robustness using the following four specifications. First, we replace the dependent variable ROA with ROE. Second, we replace the market concentration Herfindahl index with three alternative Lerner indices provided by Gischer et al. (2015) and Delis et al. (2016). Third, we replace the WVS cultural variables with two alternative cultural sets provided by Globe and Hofstede. Finally, we use instrumental variable regression to address endogeneity and omitted variable biases. Each test is explained in detail below.

4.7.1 Alternative profitability proxy

We replace the dependent variable with an alternative profitability proxy. Existing literature related to bank profitability uses ROA and ROE (Return on Equity) interchangeably. We, therefore, run our model substituting ROA with ROE. ROA and ROE have the same numerator, profit before taxes, but different denominator. For ROA, the denominator is the bank's total assets, showing the resources utilisation percentage towards profitability. For ROE, the denominator is the bank's total equity. ROE indicates the shareholder's equity utilisation percentage towards profitability. Table 4.5 reports the hierarchical regression results with ROE as the dependent variable. All three cultural variables are statistically significant at least at the 5% level and have the expected signs for

the whole sample and domestic banks. For global banks, we confirm that none of the three cultural values is statistically significant, as per our findings in Table 4.3 (Column 2).

4.7.2 Alternative market concentration index

We replace the market concentration Herfindahl index with three Lerner indices provided by Gischer et al. (2015) and Delis et al. (2016). The indices were constructed by the authors specifically for the banking industry while considering factors such as the lending business per country and the banks' foreign ownership (see Appendix 4.1 for relevant definitions). The data do not cover our time-series completely (the data in Gischer et al. (2015) cover the period from 2003 to 2013, whereas the data in Delis et al. (2016) cover the period from 1997 to 2010); nevertheless, our results remain relatively unchanged (Table 4.6).

4.7.3 Alternative culture proxies

We use two alternative cultural sets to address confounding effects. We do not expect bank profitability would significantly influence national culture. However, using two alternative cultural sets should help alleviate both reverse causality and omitted variable concerns. Specifically, we replace the three WVS cultural variables with the static Globe cultural variables (House, 2004) and with the individualism, power distance and uncertainty avoidance variables by Hofstede, 1980). Given that these variables do not change during our time-series, we avoid capturing any potential feedback effects of bank profitability on national culture (reverse causality). We note that there is no corresponding variable for trust in either the Globe or Hofstede sets.

We report the results in Table 4.7. Four out of nine Globe culture values are statistically significant: institutional collectivism, performance orientation, uncertainty avoidance and power distance. The most appropriate proxies for individualism and hierarchy are institutional collectivism, individualism, uncertainty avoidance and power distance. Institutional collectivism is the degree to which practices encourage collective reward distribution. Chen et al. (2015) construct individualism by multiplying institutional collectivism by minus one. As shown in Table 4.7, the coefficient for institutional collectivism is negative confirming the positive relation we find in Table 4.2 between ROA and (WVS) individualism. Similarly, we find a positive association between the Hofstede individualism dimension and bank profitability.

Power distance is defined as the extent to which community endorses authority, power and status, same as hierarchy. Again, we find a negative relation between power distance and ROA, validating the negative association we find between ROA and hierarchy. The same applies for the Hofstede power distance dimension.

Uncertainty avoidance is the intolerance to unpredictability by relying on rules, formal procedures and laws. Uncertainty avoidance is associated with conservatism (Hofstede, 1980; Kanagaretnam et al., 2011) and conservatism is associated with lower profitability (Sturdivant et al., 1985). We find a negative association between the uncertainty avoidance dimension (both Globe and Hofstede) and bank profitability.

Overall, the use of alternative cultural constructs leads to similar conclusions regarding the role of specific cultural dimensions on bank profitability.

4.7.4 Endogeneity

Our final robustness check is to address endogeneity concerns using instrumental variable regression. We follow prior literature in our IV selection and use the variables religion, ethnicity, language (Li et al. (2013) and geography (Kwok and Solomon, 2006). All independent variables, defined in Appendix 4.1, are included. According to the first stage regression results (Table 4.8, Panel A), all three excluded instruments are highly correlated with the three cultural variables, individualism, trust, and hierarchy. We test for under-identification (Anderson test), and over-identification (Hansen J test). Each instrument passes the Baum et al. (2011) redundancy test and the Anderson under-identification test is rejected, thus not invalidating our instrumental variable selection (Table 4.8, Panel B). Moreover, the over-identification test (Hansen J-statistic) has a p-value above 0.10; hence we can safely conclude our instruments also satisfy the over-identification criterion (Table 4.8, Panel B). With all identification tests validating our instruments, we finally concentrate on the significance of the three endogenous cultural regressors (individualism, trust and hierarchy) to find that their coefficients remain statistically significant at the 5% level and with the expected sign. To conclude, although we cannot completely rule out endogeneity, our findings mitigate such concerns.

4.8 Conclusion

We examine whether national culture influences bank profitability using a sample of 99 banks in 19 European countries, selected by the European Banking Authority to conduct the 2014 stress tests because of their domestic or global systemic importance. We argue national culture influences bank profitability, even in such a homogeneous (European) sample in terms of regulation and supervisory framework.

As a proxy for bank profitability, we use the Return on Assets measured as the ratio of net profit before taxes scaled by the bank's total assets. We use a multilevel/hierarchical model and find a positive (negative) statistically and economically significant association between individualism, trust (hierarchy) and profitability. Our results are economically significant and robust to several tests including alternative profitability measures and alternative cultural constructs. Dividing our sample into global and domestic banks, we find global banks are less sensitive to national culture influences compared to domestic banks. We further divide the domestic banks according to ownership and management and find that domestic banks with foreign owners or managers are less susceptible to national cultural influences compared to locally owned and managed domestic banks.

The banking sector is currently facing several challenges, including low profitability, increased regulation and new competition by financial technology firms who aspire to revolutionise banking. Culture influences strategic decisions. Under the current uncertain environment, strategic decisions may shape the future of banking. Our results show a positive relationship between the technological adoption/advancement and bank profitability. Banks embracing technological progress are more profitable than other banks. Each bank is accountable to its shareholders to formulate the appropriate strategy, to closely monitor the disruptive financial technologies emergence and either imitate and improve or acquire such companies. On the other hand, interacting hierarchy with technology we find a negative association between the interaction variable and bank profitability. Hence, banks operating in societies with high hierarchy scores, which are conservative and less progressive, have a disadvantage versus banks operating in societies with lower hierarchy scores.

Bank regulators need to acknowledge that the current legal framework has certain boundaries imposed by informal institutions. Bank managers should also be aware of their national culture influences to their decisions. Bank stakeholders (including depositors, bondholders, shareholders) need to be informed that national culture is associated with bank profitability when choosing their bank(s), either for banking purposes (deposit placement) or for investment purposes (buying bank stocks or bonds). Lastly, the European Union is currently planning a banking union under adverse conditions (including Brexit and populists' rise) and needs to be aware that the countries to be united under a common banking regime are culturally different. These cultural differences have a direct impact on bank profitability hence will affect the efforts for further harmonisation through the banking union.

Cultural values are deeply embedded in societies and remain relatively unchanged from generation to generation (Guiso et al., 2006). Hence there are two possible actions. One is to take cultural diversity for granted. As proposed by The Economist,[56] Europe's integration depends on embracing differentiation by creating a multi-tier Europe. The other is to identify actions to mitigate the impact of culture on bank decisions. Our findings indicate banks with foreign ownership or management are less prone to cultural effects compared to domestically owned or managed banks. In a multicultural setting, the dominance of a single culture is less probable.   In sum, cultural influences on financial decisions are economically significant. Investigating ways to integrate a multicultural Europe or mitigate cultural effects in the diverse European setting, are interesting topics for future research.

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[56]   http://www.economist.com/news/leaders/21719462-if-it-survive-european-union-must-become-lot-more-flexible-can-europe-be-saved

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Appendix 4.1 – Description of variables and sources

Variable name	Variable definition
Profitability proxies	
Return on Assets (ROA)	The ratio of the gross pre-tax profit (including loan loss provisions) to total assets (data from Bloomberg).
Return on Equity (ROE)	The ratio of the gross pre-tax profit (including loan loss provisions) to total equity (data from Bloomberg).
Country cultural variables	
Individualism	Individualism is measured based on survey responses to whether 'incomes should be made more equal or there should be more incentives for individual effort. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*How would you place your views on this scale? 1 means you completely agree with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between: Incomes should be made more equal−We need larger income differences as incentives for individual effort.*" Higher values indicate more individualism. We re-scale the variable taking values between zero and one (data from World Values Survey).
Trust	Trust is measured based on survey responses as to whether or not most people can be trusted. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*" Higher values indicate higher trust in people. The variable takes values between zero and one (data from World Values Survey).
Hierarchy	Hierarchy is measured based on survey responses as to whether or not one follows instructions at work or has to be convinced first. Consistent with Ahern et al. (2015) we track the responses to the following survey question: "*People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right. With which of these two options do you agree? 1. Should follow instructions; 2. Must be convinced first.*" Higher values indicate higher hierarchy, i.e., people are happy to follow instructions without being convinced first. The variable takes values between zero and one (data from World Values Survey).
Bank financial variables	
Size	Size is the logarithmic transformation of the bank's total assets (data from Bloomberg).

Appendix 4.1 is continued on the next page

Variable name	Variable definition
Appendix 4.1 continued	
Bank ownership (listed or private)	A binary variable taking the value of one if the bank is listed on any stock exchange, zero otherwise (data from Bloomberg).
Yearly change in loans	Year on Year change in bank loans (data from Bloomberg).
Funding cost	Interest cost divided by total deposits (data from Bloomberg).
Operating expenses	Operating expenses scaled by total assets (data from Bloomberg).
Capital adequacy	Total equity scaled by total assets (data from Bloomberg).
Credit risk	Loan loss provisions scaled by total loans (data from Bloomberg).
Cost to income	Total expenses scaled by total generated revenues (data from Bloomberg).
Internal business mix	Other operating income scaled by total income (data from Bloomberg).
Domestic CEO	A binary variable taking the value of one if the CEO is a national of the bank's headquartering country, zero otherwise (data from Boardex).
External profitability determinants	
Mobile subscriptions per 100 people	A proxy for technology adoption (data from World Bank Database).
Banking concentration	Herfindahl–Hirschman index (data from European Central Bank).[57]
Market capitalisation to GDP	Stock market capitalisation divided by GDP (data from World Bank Database).
Shareholder rights	An index of shareholder rights ranging from 1 to 6. The index is formed by adding 1 if: (1) the country allows the shareholders to mail their proxy to the firm; (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting; (3) cumulative voting or proportional representation of minorities on the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent (the sample median); or (6) shareholders have preemptive rights can oly be waived by a shareholders' vote (data from La Porta 1998).
Creditor rights	A categorical variable which is taking the values 0, 1, 2, 3 or 4 aggregating different creditor rights. The index if formed by adding 1 when the country imposes restrictions, such as minimum dividends to file for reorganisation; 2 when secured creditors can regain position once their petition has been approved; 3 secure creditors rank first in the liquidation process; 4 the debtor does not retain the administration of their assets pending the resolution process (data from La Porta 1998).
Common vs Civil law	Value 1 for countries with common law and 1 for civil law (data from La Porta 1998).

Appendix 4.1 is continued on the next page

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[57] http://sdw.ecb.europa.eu/browseTable.do?node=bbn2869

Variable name	Variable definition
Appendix 4.1 continued	
Financial statement transparency	A measure of the transparency of the bank financial statement practices, with higher values indicating more transparency. The index takes values from 0 to 6 (data from Barth et al., 2013).
Macroeconomic profitability determinants	
Tax rate	Total taxes scaled by pre-tax profit (data from Bloomberg).
Yearly change in Euribor	Year on Year change in the 3-month Euribor (data from ECB statistical warehouse).
GDP growth	The year on year GDP growth of the country (data from World Bank Database).
GDP per capita	The logarithm of the GDP per capital measured in Euros (data from World Bank Database).
Inflation	The inflation percentage per year per country.
Other market concentration variables (used in robustness checks)	
Lerner index	The index measures the degree of market power in the lending business per country, in contrast to other studies which use the ratio of total revenues to assets (data from Gischer et al., 2015).
Lerner index	The index measures the degree of market power considering foreign bank ownership, which has a positive and significant effect on bank market power, because foreign banks enter the market via mergers and acquisitions, not through greenfield investments (data from Delis et al., 2016).
Lerner index	Same as above, but relaxing the assumption banks operate in a fully efficient market (data from Delis et al., 2016).
Assertiveness	The degree of assertiveness confrontation, and aggressiveness human relationships (data from globeproject.com).
Institutional collectivism	The degree to which institutional practices encourage reward (data from globeproject.com).
In-Group collectivism	The degree to which individuals express pride, loyalty and cohesiveness in their organisations and families (data from globeproject.com).
Future orientation	The degree of engagement in planning, investing in the future and delaying gratification (data from globeproject.com).
Gender egalitarianism	The degree to which gender inequality is minimised (data from globeproject.com).
Humane orientation	The degree of encouragement of individuals for being fair, generous and kind to others (data from globeproject.com).
Performance orientation	The degree of encouragement for performance improvement and excellence (data from globeproject.com).
Uncertainty avoidance	The degree to which society relies on rules, laws, institutions, social norms and procedures to avoid unpredictable future events (data from globeproject.com).
Power distance	The degree to which society accepts and endorses authority, power differences and status prerogatives (data from globeproject.com).

Variable name	Variable definition
Appendix 4.1 continued	
Hofstede cultural variables (used in robustness checks)	
Individualism	The high side of this dimension, called individualism, can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Its opposite, collectivism, represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we" (data from https://geert-hofstede.com/countries.html).
Uncertainty avoidance	The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact the future can never be known: should we try to control the future or just let it happen? Countries exhibiting strong UAI maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles (data from https://geert-hofstede.com/countries.html)..
Power distance	Defines the extent to which the less powerful members of institutions and organisations accept power inequality. In high power distance societies, people accept hierarchical order in which everybody has a place and which needs no further justification (data from https://geert-hofstede.com/countries.html)..
Interaction variable	
Hierarchy x Mobile subscriptions	The interaction of hierarchy with mobile subscriptions as defined above (data from World Values Survey and World Bank Database)
Instrumental variables (used in robustness tests)	
Ethnical Fractionalization	The ethnical fractionalisation is the probability that two inidividuals, randomly selected from a country's population, belong to different ethnicities (data from Alesina et al., 2003).
Religion	The percentage of the population of each country that belonged to the: (1) Roman Catholic; (2) Protestant; and (3) Muslim religions in the world in 1980 (data from Alesina et al., 2003).
Language	A measure of the shares of languages spoken as "mother tongues", generally based on national census data (data from Alesina et al., 2003).
Geography	Indicator variables taking the value 1 if a country is in the Eurozone and zero otherwise (data from the European Central Bank).

Figure 4.1 – Herfindahl index

Figure 4.1 shows the level of market concentration per country from 1997 to 2015.
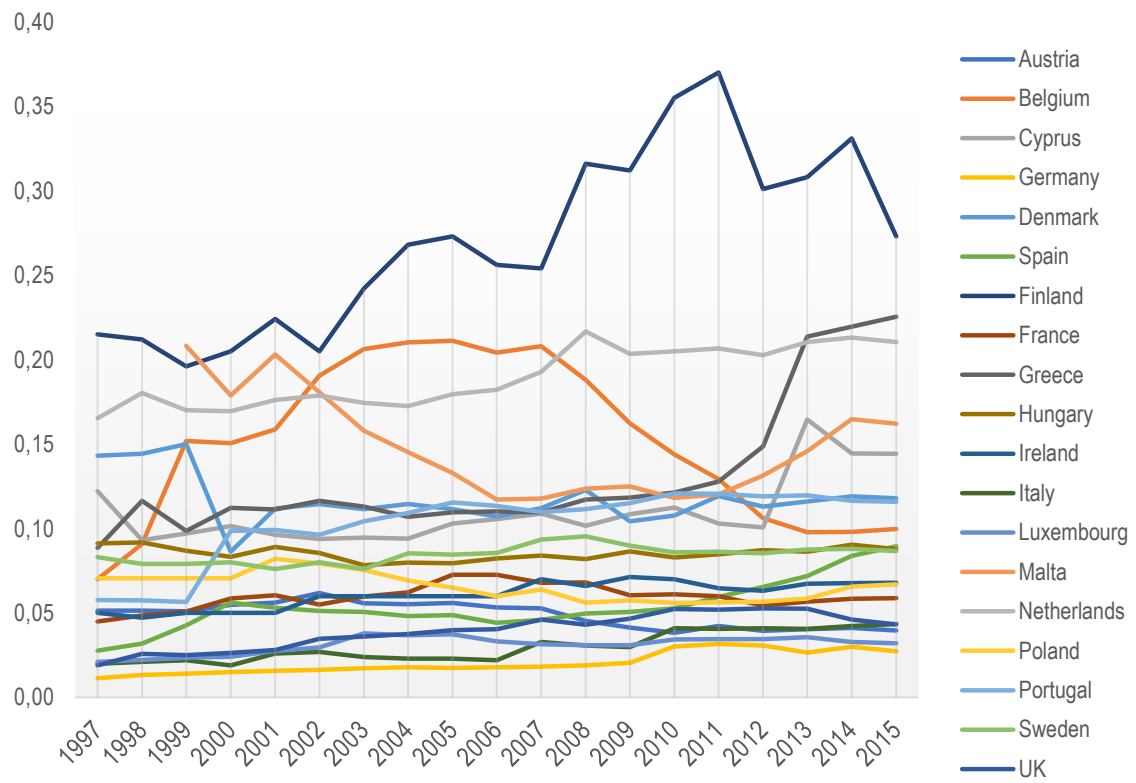
Table 4.1 – Descriptive statistics

The table reports the mean, standard deviation, skewness, kurtosis, median, 25th percentile, and 75th percentile for each variable included in our models. A detailed description of all the variables together with the data sources is provided in Appendix 4.1.

Variable / Statistic	Mean	Median	Standard deviation	25th percentile	75th percentile
Dependent variables					
Return on Assets (ROA)	0.42	0.41	0.75	0.15	0.78
Return on Equity (ROE)	0.17	0.17	0.10	0.10	0.23
Culture variables					
Individualism	0.53	0.55	0.08	0.48	0.59
Trust	0.35	0.31	0.15	0.27	0.42
Hierarchy	0.49	0.47	0.08	0.41	0.55
Control variables					
- Internal profitability determinants					
Size	11.22	11.16	1.57	10.24	12.31
Bank ownership (listed or private)	0.74	1.00	0.44	0.00	1.00
Yearly change in loans	0.09	0.06	0.19	-0.01	0.15
Funding cost	0.08	0.06	0.05	0.04	0.10
Operating expenses	0.02	0.02	0.01	0.01	0.02
Capital adequacy	0.06	0.06	0.03	0.04	0.07
Credit risk	0.05	0.01	0.73	0.00	0.01
Cost to income	0.31	0.31	0.15	0.22	0.40
Internal business mix	0.05	0.03	0.08	0.01	0.05
Domestic CEO	0.93	1.00	0.25	1.00	1.00
- External profitability determinants					
Mobile subscriptions per 100 people	96.68	107.12	39.94	78.26	120.92
Market capitalisation to GDP	0.57	0.53	0.33	0.33	0.73
Banking concentration (Herfindahl)	0.10	0.08	0.06	0.05	0.12
Shareholder rights	2.25	2.00	1.26	1.00	3.00
Creditor rights	2.14	2.00	0.94	2.00	3.00
Common vs Civil law	0.10	0.00	0.29	0.00	0.00
Financial Statement Transparency	4.51	5.00	0.97	4.00	5.00
- Macroeconomic profitability determinants					
Tax rate	0.24	0.25	0.21	0.15	0.33
Yearly change in Euribor	-0.30	-0.23	1.06	-0.82	0.36
GDP growth	0.02	0.02	0.03	0.00	0.03
GDP per capita	10.07	10.20	0.50	9.80	10.38
Inflation	0.02	0.02	0.02	0.01	0.03
Lerner (Gischer et al., 2015)	0.64	0.65	0.65	0.55	0.76
Lerner (Delis et al., 2016)	0.19	0.19	0.19	0.16	0.23
Adjusted Lerner (Delis et al., 2016)	0.14	0.14	0.14	0.10	0.18

Variable / Statistic	Mean	Median	Standard deviation	25th percentile	75th percentile
Table 4.1 continued					
Globe cultural variables (used in robustness tests)					
Assertiveness	4.31	4.39	0.35	4.11	4.59
Institutional collectivism	4.11	3.87	0.47	3.82	4.51
In-group collectivism	4.75	4.89	0.64	4.38	5.28
Future orientation	3.89	3.77	0.48	3.52	4.23
Gender egalitarianism	3.45	3.30	0.30	3.21	3.72
Humane orientation	3.70	3.66	0.39	3.38	3.77
Performance orientation	4.04	4.00	0.35	3.66	4.30
Uncertainty avoidance	4.50	4.66	0.68	3.85	5.27
Power distance	5.29	5.45	0.42	5.09	5.59
Hofstede cultural variables (used in robustness tests)					
Individualism	65.47	67.00	14.38	60.00	76.00
Uncertainty avoidance	69.83	75.00	21.77	65.00	86.00
Power distance	44.98	50.00	16.15	35.00	57.00
Interaction effects					
Hierarchy x Mobile subscriptions	46.27	48.87	19.97	37.26	61.49

Table 4.2 – Main regression results

The dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. *, **, *** next to the regression coefficients denote statistical significance at the 10%, 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. A detailed description of all the variables together with the data sources is provided in Appendix 4.1.

Variable	All banks	Variable	All banks
Culture variables		*External profitability determinants*	
		Mobile subscriptions	
Individualism	1.279***	per 100	0.005***
	(3.69)		(3.56)
Trust	0.817***	Market capitalisation to	0.203***
	(2.77)	GDP	(2.69)
Hierarchy	-1.771***	Banking concentration	-0.978
	(-4.65)		(-1.43)
Internal profitability determinants		Shareholder rights	0.080
Size	0.005		(1.36)
	(0.26)	Creditor rights	0.013
Bank ownership (listed or	0.039		(0.23)
	(0.63)	Common vs Civil law	-0.215
Yearly change in loans	0.424***		(-1.08)
	(5.24)	Financial statement	
		transparency	-0.064
Funding cost	-4.276***		(-0.94)
	(-7.94)	*Macroeconomic profitability determinants*	
Operating expenses	-2.333	Tax rate	0.083
	(-0.97)		(1.24)
Capital adequacy	7.745***	Yearly change in Euribor	-0.329
	(11.90)		(-1.06)
Credit risk	-0.168**	GDP growth	9.298***
	(-2.06)		(11.94)
Cost to income	-1.759***	GDP per capita	-0.067
	(-8.89)		(-0.70)
Internal business mix	1.250***	Inflation	7.027***
	(5.42)		(8.25)
Domestic CEO	0.074	Constant	0.064
	(1.13)		(0.06)
		Year fixed effects	YES
		Number of observations	1,396
		Adjusted R^2	0.560

Table 4.3 – Domestic versus global banks

The dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. We divide our sample into domestic and global banks and provide results for each subsample. Financial distress for global banks is expected to have consequences worldwide whereas, for domestic banks, the consequences are expected to be contained domestically. *. **. *** denote statistical significance at the 10%. 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. A detailed description of all the variables together with the data sources is provided in Appendix 4.1. All control variables used in our main specification are included. For brevity, we report only the cultural variable results.

Variable	Domestic banks (1)	Global banks (2)
Culture variables		
Individualism	1.312***	-1.098
	(3.30)	(-1.62)
Trust	0.789**	0.132
	(2.22)	(0.18)
Hierarchy	-1.953***	-2.667
	(-4.56)	(-1.61)
Constant	0.229	1.967
	(0.19)	(0.65)
Internal profitability determinants	YES	YES
External profitability determinants	YES	YES
Macroeconomic profitability determinants	YES	YES
Year fixed effects	YES	YES
Number of observations	1,200	196
Adjusted R^2	0.570	0.688

Table 4.4 - Domestic banks with local and foreign ownership/CEO

The dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. We divide our sample into domestic banks with local and foreign ownership/CEO and provide results for each subsample. Financial distress for global banks is expected to have consequences worldwide whereas, for domestic banks, the consequences are expected to be contained domestically. We then use the whole sample and add interaction effects creating a new variable multiplying hierarchy with mobile subscribers (column 5). *. **. *** denote statistical significance at the 10%. 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. A detailed description of all the variables together with the data sources is provided in Appendix 4.1. For results in columns (1) and (2) all control variables used in our main specification are included. For results in columns (3) and (4) all control variables used in our main specification except 'Domestic CEO' are included. For brevity, we report only the cultural variable results.

Variable	Domestic Owners Local (1)	Domestic Owners Foreign (2)	Domestic CEO Local (3)	Domestic CEO Foreign (4)	Interaction effects (5)
Culture variables					
Individualism	1.302***	-0.885	1.302***	0.942	1.197***
	(3.09)	(-0.29)	(3.40)	(0.42)	(3.37)
Trust	0.700**	-2.340	0.742**	-0.174	0.941***
	(2.02)	(-0.76)	(2.39)	(-0.15)	(2.97)
Hierarchy	-1.623***	-1.590	-1.523***	1.134	-0.978**
	(-3.75)	(-1.66)	(-3.83)	(0.58)	(-1.83)
Hierarchy x Mobile subscribers					-0.013***
					(-2.62)
Mobile subscriptions per 100 people					0.01***
					(4.32)
Constant	-0.321	-9.652	0.553	-26.217	-0.090
	(-0.26)	(-2.55)	(0.51)	(-3.43)	(-0.08)
Internal profitability determinants	YES	YES	YES	YES	YES
External profitability determinants	YES	YES	YES	YES	YES
Macroeconomic profitability determinants	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES
Number of observations	1,095	105	1,125	75	1,396
Adjusted R^2	0.573	0.660	0.581	0.737	0.562

Table 4.5 – Alternative profitability proxy

The dependent variable is the Return on Equity (ROE) measured as the ratio of net profit before taxes scaled by total equity. All variables are defined in Appendix 4.1. *. **. *** denote statistical significance at the 10%. 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. A detailed description of all the variables together with the data sources is provided in Appendix 4.1. All control variables used in our main specification are included. For brevity we report only the cultural variable results.

Variable	All banks	Domestic banks	Global banks
Culture variables			
Individualism	0.256***	0.269***	-0.045
	(5.86)	(5.67)	(-0.37)
Trust	0.096**	0.093**	0.104
	(2.32)	(2.14)	(0.74)
Hierarchy	-0.100**	-0.107**	0.360
	(-1.99)	(-2.01)	(1.62)
Constant	0.013	0.052	-1.909
	(0.08)	(0.32)	(-2.38)
Internal profitability determinants	YES	YES	YES
External profitability determinants	YES	YES	YES
Macroeconomic profitability determinants	YES	YES	YES
Year fixed effects	YES	YES	YES
Number of observations	1,398	1,202	196
Adjusted R^2	0.441	0.434	0.667

Table 4.6 – Alternative market concentration indices

The dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. We replace the Herfindahl index with the Lerner index for banks as provided by Gischer et al. (2015) divide our sample into domestic and global banks and provide results for each subsample. Financial distress for Global banks is expected to have consequences worldwide whereas, for domestic banks, the consequences are expected to be contained domestically. *. **. *** denote statistical significance at the 10%. 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. A detailed description of all the variables together with the data sources is provided in Appendix 4.1. All control variables used in our main specification are included. For brevity, we report only the cultural variable results.

Variable	Lerner (1)	Lerner (2)	Adjusted Lerner (3)
Culture variables			
Individualism	0.887**	0.813***	0.867***
	(2.30)	(2.93)	(3.21)
Trust	0.983**	0.373**	0.278*
	(2.11)	(1.85)	(1.41)
Hierarchy	-1.235*	-0.750***	-0.647**
	(-1.85)	(-2.72)	(-2.40)
Constant	2.560	1.612**	1.616**
	(1.13)	(2.09)	(2.14)
Internal profitability determinants	YES	YES	YES
External profitability determinants	YES	YES	YES
Macroeconomic profitability determinants	YES	YES	YES
Year fixed effects	YES	YES	YES
Number of observations[4]	607	871	871
Adjusted R^2	0.521	0.611	0.627

1. Data from Gischer et al. (2015)
2. Data from Delis et al. (2016)
3. Data from Delis et al. (2016)
4. Data for the Gischer Lerner index exist from 2003 to 2013; data for the Delis Lerner Index exist from 1997 to 2010.

Table 4.7 – Alternative culture proxies

The dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. As a robustness test. we replace individualism. trust and hierarchy with the set of nine globe cultural dimensions. We then replace individualism, trust and hierarchy with the Hofstede individualism, uncertainty avoidance and power distance dimensions. All variables are defined in Appendix 4.1. *. **. *** denote statistical significance at the 10%. 5% and 1% levels respectively. Numbers in the brackets denote the test statistic; numbers above the test statistic denote the regression coefficients. All control variables used in our main specification are included. For brevity we report only the cultural variable results.

Globe culture dimensions		*Hofstede culture dimensions*	
Variable	All banks	Variable	All banks
Assertiveness	2.155*	Individualism	0.005**
	(1.98)		(2.01)
Institutional collectivism	-2.135**	Uncertainty avoidance	-0.006**
	(-2.13)**		(-2.02)
In-Group collectivism	0.310	Power distance	-0.010
	(1.50)		(-2.33)
Future orientation	1.214*	Constant	-1.933
	(1.66)		(-1.98)**
Gender egalitarianism	0.018	Year fixed effects	YES
	(0.07)	*Internal controls*	YES
Humane orientation	1.105*	*External controls*	YES
	(1.65)	*Macroeconomic controls*	YES
Performance orientation	1.281**	Number of observations[1]	1,339
	(2.05)	Adjusted R^2	0.565
Uncertainty avoidance	-1.260**		
	(-1.86)		
Power distance	-1.705**		
	(-2.11)		
Constant	4.145**		
	(2.18)		
Year fixed effects	YES		
Internal profitability controls	YES		
External profitability controls	YES		
Macroeconomic profitability controls	YES		
Number of observations[1]	1,232		
Adjusted R2	0.579		

1. Globe and Hofstede data do not exist for all countries in our sample

Table 4.8 – Instrumental variables regression

We use instrumental variables regression with 2SLS which generates heteroskedasticity-robust standard errors. The 2nd stage dependent variable is the Return on Assets (ROA) measured as the ratio of net profit before taxes scaled by the bank's total assets. Panel A reports the selection process for the Instrumental Variables (IVs) we use for the endogenous regressors approximating national culture. National cultural values are instrumented by the fractionalization variables ethnicity, language and religion (Alesina et al., 2003) as well as geography (Kwok and Solomon, 2006). All 2nd stage models include the control variables used in our main specification, but we do not report their coefficients for brevity. All these variables are defined in Appendix 4.1. *, ** and *** denote significance at the 10%, 5% and 1% levels respectively. The number in brackets is the t-statistic.

Panel A

Presents the correlation of the instrumental variables with the instrumented variables

Instruments	Individualism	Trust	Hierarchy
Ethnicity	-0.172***	-1.053***	-0.165***
	(-6.16)	(-49.07)	(-5.77)
Religion	0.176***	-0.209***	0.323***
	(7.80)	(-12.05)	(13.94)
Geography	-0.306***	-0.186***	-0.416***
	(-12.28)	(-9.69)	(-16.28)
Language	0.357***	0.557***	0.158***
	15.96	(32.42)	(6.87)
	-13.13	(-29.32)	(-12.85)
F test	101.42***	647.42***	85.43
Adjusted R^2	0.798	0.962	0.768

Panel B

Stage 2 regression results

Individualism	1,579**
	(2,42)
Trust	0.830***
	(2.76)
Hierarchy	-1.958***
	(4.41)
Controls	YES
Year fixed effects	YES
Number of observations	1,375
Anderson under-identification test (F test)	174.64
	p-value = 0.000
Hansen J statistic (overidentification test of all instruments)	1.123
	p-value=0.772

Chapter 5 – Conclusion

This thesis is an effort to enrich growing literature on national culture by adding the highly regulated financial services industry to the sectors susceptible to cultural biases. Specifically, I highlight three dimensions of banking which according to my findings are prone to culture influences. First, I find that culture influences bank risk-taking. When bank risk is excessive, it may lead to financial crises with global adverse consequences. In the first chapter, I find that national culture influences domestic bank risk-taking but not risk-taking by global banks. Also, during the latest financial crisis (2007-2010) the effect of national culture on risk diminished. Second, I find that national culture helps explain the differences in deposit levels between countries. I investigate the subject in light of two new liquidity ratios which banks need to satisfy: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). Third, I find that national culture is one of the determinants of bank profitability. Since the latest financial crisis, bank profitability remains low, and a new industry, financial technology (fintech), has emerged as the prospect of changing the banking of things. National culture influences bank management decisions and subsequently their strategy in the way banks will respond to fintech (e.g., acquire, compete).

The overall conclusion of the thesis is that despite heavy regulation imposed on the financial sector, bank managers' decisions are shaped by national culture. This implies that national culture defies strict regulation which cannot fully capture the complex decision-making dynamics of banks and their customers.

In the following sections, I provide a summary of the thesis findings, their implications, limitations and suggestions for future research.

5.1 Results summary

In all three chapters, I focus on three cultural values (individualism, trust and hierarchy) identified in psychology, sociology and economic studies as important dimensions of culture (Hofstede, 1980; Fiske, 1991; Schwartz, 1994; Guiso et al., 2006; Trompenaars, 2012).

In Chapter 2, using data for 99 European banks selected by EBA for the 2014 stress tests in 19 European countries over the period 1995 to 2014, I find that these cultural values are important and economically significant determinants of domestic bank risk. Specifically, I find a strong positive (negative) association between individualism, hierarchy (trust) and bank risk-taking. The association between cultural values and bank risk-taking does not apply to global banks and during periods of financial crises. Global banks have a presence in many countries, employees and customers with diverse cultures. Also, global banks operate under a stricter regulatory framework compared to domestic banks and are under the direct supervision of the European Central Bank (ECB). Domestic banks operate mainly in their local market, both their employees and customers are less culturally different and are supervised by the Central Bank of their country not the ECB directly.

To test my results are robust, I perform three tests. Firstly, I substitute the risk-taking proxy (five-year Return on Assets volatility) with z-score, measuring the distance from insolvency in standard deviations and loan loss provisions. Secondly, to mitigate endogeneity concerns, I use Instrumental Variable (IV) regressions using instruments employed by existing literature in analogous settings. Specifically, I use the Alesina et al. (2003) fractionalization measures (ethnicity, language and religion) and geography (Kwok and Solomon, 2006). To test if the IVs are appropriate for my model, I use the approach described by Baum et al. (2011) for

under-identification, weak-identification and over-identification. The four instruments are used as proxies for each of the national culture variables (i.e., individualism, trust and hierarchy). Also, I separately run redundancy tests for IVs. Thirdly, I substitute the cultural value scores obtained from the WVS with the Hofstede cultural values. WVS is a survey carried out in waves whereas the Hofstede values are static during our time series.

In Chapter 3, I assess whether national culture influences the levels of bank deposits, using the same sample of banks but stretch the time series to 2015, because of data availability (this chapter was written one year after Chapter 2). Trust in banking has a positive association with the level of deposits, both for global and domestic banks, supporting the popular view that banking is based on trust. When interacting trust with deposit volatility, I find a negative association between the interaction variable and the level of deposits. This means that high volatility in deposits mitigates the positive effects of trust. According to my results, banks in countries with high trust and hierarchy scores have higher levels of deposits as opposed to banks in countries with high individualism which have lower levels of deposits. Further, I find that the influence of individualism and hierarchy is more profound for domestic banks compared to global banks.

For robustness, I use the same three tests applied for Chapter 2. Firstly, I substitute the dependent variable from the customer deposits scaled by the bank's total assets to the logarithmic transformation of deposit balances per year per bank. Then I use IV regressions to mitigate omitted variable concerns and, finally, I replace the WVS with the Hofstede cultural value scores.

In Chapter 4, I use the same sample of banks from 1995 to 2015 to assess whether national culture is a bank profitability determinant influencing mainly domestic versus global banks. I also examine the relation between technological adoption/advancement and bank profitability. Each bank is accountable to its shareholders to formulate the appropriate strategy, to closely monitor the disruptive financial technologies emergence and either compete with or acquire such companies. Still, after interacting hierarchy with technology, I find a negative association between the interaction variable and bank profitability. Hence, banks operating in societies with high hierarchy scores, which are conservative and less progressive, have a disadvantage versus banks operating in societies with lower hierarchy scores.

In each chapter, I verified the relationship between national culture and domestic bank- risk, deposits and profitability. The association does not hold for global banks, except trust which is positively correlated to deposits, both for domestic and global banks.

5.2   Implications and suggestions for future research

The high variability of culture values supports the view that Europe is a political and economic union, consisting of countries maintaining their unique cultural identity. Consequently, these countries behave differently under similar conditions, for example, under the same regulatory framework. A very recent example of different behaviour, which could be partly attributed to national culture, is the stance of each country during the European migrant crisis. Some countries were willing to allow entry to asylum-seekers and some closed their borders altogether. Another recent example in my context this time is the case of Italy, where, instead of following the European Bank Recovery and Resolution Directive (BRRD),

or bail-in directive, it bailed out its failed banks. In 2013, Cyprus on the other hand followed EU rules and bailed-in its largest domestically systemic bank.

My research findings show that national culture is a determinant of bank risk, deposits and profitability. This research aims to create awareness to bank management, customers and regulators and my findings have multifaceted implications.

In Chapter 2, I find that national culture influences bank risk. This implies that bank manager and CEO remuneration schemes need to account for the influence of national culture on managerial behaviour. Bank regulators need to take the association between national culture and risk predisposition into account. Further, the national culture influences on the decision-making of national regulators, in particular concerning their implementation of transnational rules at the national level, should be of significant interest. My results have some implications for the investment portfolio allocation of bank stakeholders including shareholders, bondholders, and, perhaps more importantly, depositors in their bank selection.

In Chapter 3, I find that national culture explains the differences in deposit levels between countries. Bank managers need to be aware that they are under the influence of their deeply rooted cultural traits when deciding their liquidity sources. Culture also influences depositors when deciding whether to save or consume their excess wealth. Future research could assess the impact of the regulation, recently introduced in 2015/2018 and still unfolding, hence not fully captured in our time series.

In Chapter 4, I find that national culture is a bank profitability determinant, influencing the bank's strategic decisions. Again, managers need to be aware their decisions are biased based on their culture and be able to formulate the appropriate strategies for the benefit of all the bank's stakeholders.

My findings also have policy implications. Bank supervisory authorities strive to create a single banking rule book. However, it seems that heavy regulation does not necessarily ensure uniformity in its application. In addition to enforcing a single rule book, authorities need to make its implementation less prone to cultural variation. Since the relation between culture and global banks was not validated, possible ways to mitigate cultural effects could be based on the differences between global and domestic banks. For example, direct supervision by the ECB or applying the same regulation to both global and domestic systemic banks. Also, my findings indicate banks with foreign ownership or management are less prone to cultural effects compared to domestically owned or managed banks. In a multicultural setting, the dominance of a single culture is less probable.

Applying legislation homogeneously will safeguard the financial sector. It will also protect the bank's financial intermediation role which is to allocate excess wealth to viable projects facilitating economic growth and prosperity. Economic well-being is a necessary element for restoring political stability in the currently fragile European ecosystem.

Another completely different option is not to mitigate but accept cultural diversity. According to The Economist,[58] Europe's integration depends on embracing differentiation by creating a multi-tier Europe.

In sum, cultural influences on financial decisions are economically significant. Investigating ways to integrate a multicultural Europe or mitigate cultural effects in the diverse European setting, are interesting topics for future research.

5.3 Limitations

When examining my research questions, I have taken every effort to provide solid empirical evidence. However, I acknowledge that my work has certain limitations which I discuss in this section. The list is not exhaustive. These limitations may potentially undermine the robustness of my results.

In Chapter 2, in addition to the five-year volatility of ROA and the z-score, I could use the Risk Weighted Assets ratio. This ratio is a risk proxy in the banking industry, and it is currently reported by banks in their financial statements. I have not done so because of data availability as this ratio exists for all banks in my database since 2011, whereas my time series covers the period from 1995 to 2015. For the same reason (data availability), I used loan loss provisions instead of non-performing loans as a risk proxy when testing the robustness of my results. The former is the figure banks provided in anticipation of the loans they expected to become non-performing, and the latter is the actual figure of non-performing

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[58]   http://www.economist.com/news/leaders/21719462-if-it-survive-european-union-must-become-lot-more-flexible-can-europe-be-saved

loans on the bank's balance-sheet. Another limitation is the definition of the crisis period. I decided to use 2007-2010, based on existing literature. Obviously, not all countries in my sample went through the financial crisis at the same time.

Another possible limitation is my sample, which includes the systemic banks selected by EBA for their stress tests. This decision may have sample bias implications. Personally, I believe quite the opposite. Selecting a sample of systemic banks, important enough for selection by the EBA, to assess the financial stability of the European financial sector makes my results more profound and less susceptible to confounding effects due to heterogeneity. A potential limitation of selecting this sample, however, is that the lack of significant results during the crisis period could be due to my decision to study solely systemic banks, which were under intense scrutiny and monitoring by the European institutions during this period. Future research could examine the differences in the national culture-bank risk relation between systemic and non-systemic banks. In addition, my sample size for the analysis relating to global banks is a concern and results may not be generalisable, but for the non-crisis and overall samples, I have a sufficient number of observations to get valid specifications. Finally, the analysis in Chapter 2 might be missing important control variables, for example, creditors rights and ownership concentration, which have been associated with bank risk-taking (Laeven and Levine 2009; Houston et al., 2010). Including both these variables in our econometric specifications does not alter our results.

In Chapter 3, the dependent variable and its alternative are very similar. The first is the customer deposits scaled by the bank's total assets and the second is the logarithmic transformation of the deposit levels. These, however, are the actual figures of customer

deposits, not constructed proxies. Therefore I consider this limitation to have a small impact. Another limitation of the third chapter is that the figure for customer deposits includes Retail, Legal Entity and International deposits. I did not have data allowing me to disentangle customer deposits further. If I did, I would have run the regressions separately for each category and compare the results. Also, in this chapter, I am referring to two ratios that are very new. LCR was enforced in 2015 and NSFR will be applicable in 2018. I project that countries with high scores in trust will probably have higher NSFR. This is an interesting question for future research, and I look forward to reading a relevant paper in a decade or so!

In Chapter 4, I am using the mobile subscriptions figure as a technology application proxy and provide, in my opinion, sufficient support for this selection. However, again because of data availability, I am not able to use a proxy for fintech. I am taking a stance that countries with high hierarchy scores are more likely to find the fintech disturbance challenging compared to egalitarian countries. I look forward to reading relevant research confirming this in the future.

Another potential limitation is the relatively small sample size of foreign-owned and managed domestic banks; these results may not be generalisable. Another possible criticism for Chapter 4 is that the dependent variable is influenced by the dependent variable for Chapter 2 (ROA compared to the five-year volatility of ROA). I elaborate on this in the chapter pointing out three factors. First, I explicitly control for determinants of risk in my model. Second, my instrumental variables analysis mitigates omitted variable concerns. Finally, to the best of my knowledge, there is no literature using ROA as a risk proxy.

5.4　References

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