



# The impact of organizational culture on bank stability

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Accepted: 22 March 2023 / Published online: 24 April 2023

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## Abstract

This paper examines the impact of organizational culture on bank stability. We rely on the Competing Values Framework (CVF) to identify the four cultural dimensions of banks, namely *Control*, *Collaborate*, *Compete* and *Create* cultures. Using the textual analysis technique and banks' annual reports, we obtain organizational culture values in conjunction with the CVF for a large sample of US-listed banks from 1994 to 2020. We find that banks with cultures leaning toward consistency, monitoring, and control practices (i.e., *Control*-oriented and *Compete*-oriented cultures) exhibit a higher level of stability. Additional analyses show that *Control*-oriented banks have higher asset quality and are less risky, whereas *Compete*-oriented banks have higher asset quality and better financial performance. We also find that the impact of culture on bank stability is more pronounced during “non-crisis” periods and is more prominent for small and medium-sized banks.

**Keywords** Bank culture · Textual analysis · Competing values framework · Bank stability

**JEL Classification** G21 · M14 · G28

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## 1 Introduction

Bank stability has long been a topic of great interest to banking regulators, market participants, and the general public, particularly after the collapse of giant banking institutions like Lehman Brothers and its destructive spillover effect across the banking industry. For this reason, policymakers and academic researchers have devoted significant effort to examining how various environmental factors, including banking regulation (Demirgüç-Kunt and Detragiache 2011), industry competition (Goetz 2018), and macroeconomic shocks (Haq and Heaney 2012), affect bank stability. Several other studies shift the focus to the internal dynamics of banks and investigate the extent to which bank-specific characteristics, such as bank size (Haq and Heaney 2012), bank capital (Boyd and Nicolo 2005), charter value (Park and Peristiani 2007), the business model (Köhler 2015), and corporate governance (i.e., board size, board diversification, CEO powers, and traits) (Altunbaş et al. 2020; Ho et al. 2016; Pathan and Faff 2013), affect the safety and soundness of banks.

Despite providing some important initial insights, this literature only focuses on observable determinants of bank stability. Minimal effort has been made to uncover whether bank stability is also explained by a latent and unobservable factor—bank culture. Recently, bank culture has gained much publicity as a crucial factor that shapes moral content, risk-taking incentives, and the overall economic outcomes of banks (Group of Thirty 2015; Nguyen et al. 2019; Song and Thakor 2019; Thakor 2016). Despite this popular narrative, the extent to which organizational culture affects bank stability is still largely ambiguous. In this paper, we significantly augment this prior literature by investigating the impact of different organizational culture values on bank stability.

Organizational culture is defined as a “*set of norms and values that are widely shared and strongly held throughout the organization*” (O’Reilly and Chatman 1996). It symbolizes the unspoken code of communication among an organization’s members and thus determines how an organization responds to various environments (Gordon 1991; Murphy 1989). Thus, organizational culture shapes the ways in which a firm conducts its business (Guiso et al. 2015b; Hartnell et al. 2011; O’Reilly and Chatman 1996). Anecdotal and survey evidence from business leaders also shows that organizational culture is an essential intangible asset crucial for an organization’s performance and success (Tremblay 2020; Graham et al. 2022).

The critical role of organizational culture has also been confirmed in many management studies. These streams of literature document that organizational culture shapes organizational procedures and their effectiveness (Schein 1984, 1985, 2010). Corporate finance literature has recently uncovered the impact of organizational culture on firm behavior and outcomes (Gorton et al. 2022). For example, Flamholtz (2001) finds that the financial performance of a division is enhanced if employees in the division behave consistently with the firm’s desired culture. Tellis et al. (2009) conclude that culture is the most critical factor that drives radical innovation, which can subsequently facilitate the financial performance of firms. Fiordelisi and Ricci (2014) examine the impact of organizational culture on CEO turnover and document that organizational culture can explain the CEO turnover probability and predict the choice of hiring an outsider for succession. Graham et al. (2022) illustrate that firm value can be enhanced by improving organizational culture. Li et al. (2021) document a strong relationship between organizational culture and firms’ risk-taking behavior, earning management practices,

executive compensation, and, ultimately, firm efficiency and value. More recently, Hasan (2022) conclude that corporate culture can shape corporate financing decisions by showing that firms with superior corporate culture tend to have less bank debt.

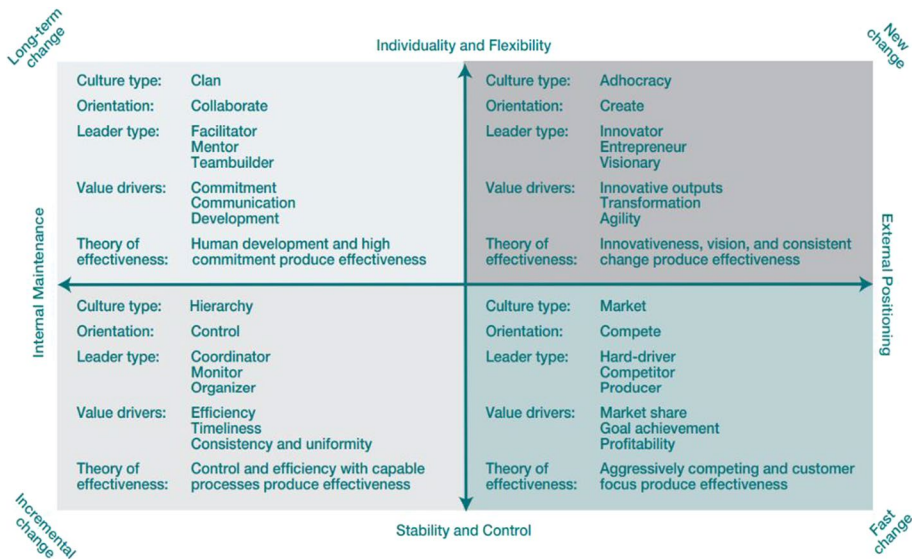
Despite its increasing popularity, the role of organizational culture has largely been ignored in banking research. Banks are often excluded from most corporate finance studies due to their unique characteristics that distinguish them from firms in other industries.<sup>1</sup> However, banks are not immune to cultural influence. Recent studies have started evaluating the role of culture in banking, particularly in the aftermath of a series of cultural failures that have badly damaged bank reputations and public trust over the last decade. In particular, Song and Thakor (2019) theorize that organizational culture lies in banks' choice between growth and safety objectives. Nguyen et al. (2019) provide empirical evidence demonstrating that organizational culture explains banks' risky lending decisions. They demonstrate that banks with cultures leaning toward aggressive competition tend to have higher loan approval rates, accept lower borrower creditworthiness, and have fewer debt covenants. Subsequently, Barth and Mansouri (2021) suggest that organizational culture can explain banks' CEO compensation by influencing their risk-taking incentives. Taken together, we contend that since organizational culture can explain banks' trade-off decisions between growth and safety, determine the behavior norms for employees in banks, and influence the banks' economic decisions (Barth and Mansouri 2021; Nguyen et al. 2019; Song and Thakor 2019), it should ultimately affect bank stability.

Estimating the impact of organizational culture on bank stability is inherently challenging, primarily due to the difficulties in measuring culture. This problem arises from the nature of organizational culture as an abstract concept with significant cross-sectional variation (Song and Thakor 2019). Several attempts have been made to quantify organizational culture. For example, Denison (1990) and Kotter and Heskett (1992) use employee surveys to capture how employees perceive the firm's culture. Unfortunately, survey results are often subject to bias due to the restricted sample size and the subjectivity of the respondents. Subsequently, Flamholtz (2001) uses the stated value of the firms as a measure of culture. While this cultural measure can be readily observable, the stated value of firms can differ from the authentic culture of the firms since the achievement of specific business goals can be easily claimed. Another approach is to measure organizational culture via firm ranking datasets. For example, Guiso et al. (2015a, b) focus on the integrity aspect of the "Great Place to Work" dataset to capture organizational culture. However, one potential problem is that ranking data may not directly capture organizational culture.

In our study, we rely on the Competing Values Framework (CVF) developed by Quinn and Rohrbaugh (1983) and Cameron et al. (2006) to identify the organizational culture at individual banks. The CVF is an organizational culture taxonomy extensively used in both organizational behavior and strategic management literature (Cameron and Quinn 2011; Hartnell et al. 2011; O'Neill and Quinn 1993) and recent empirical accounting and finance studies (Barth and Mansouri 2021; Fiordelisi and Ricci 2014; Nguyen et al. 2019; Bhandari et al. 2022). The CVF identifies four cultural dimensions: *Control*, *Compete*, *Collaborate* and *Create*. These cultures may complement each other and coexist in an organization (Hartnell et al. 2011). While *Control* and *Compete* cultures lean toward stability and control, *Collaborate* and *Create* cultures lean toward discretion and flexibility (Cameron

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<sup>1</sup> For example, banks are highly leveraged, have more complex and opaque assets, and have a more complicated governance structure due to high agency conflicts among bank managers, creditors, and shareholders (Morgan 2002; Flannery et al. 2004; Lepetit et al. 2018).



**Fig. 1** The competing values framework. *Source:* Adapted from Cameron et al. (2006)

et al. 2006; Hartnell et al. 2011). These divisions place *Control/Compete* at one extreme and *Collaborate/Create* at the other. Figure 1 summarizes the features of each cultural dimension in the CVF.

To quantify the bank culture in conjunction with the CVF, we follow Nguyen et al. (2019), Barth and Mansouri (2021), and Fiordelisi and Ricci (2021) and adopt the textual analysis approach to pull out cultural values embedded in the annual reports of banks.<sup>2</sup> The textual analysis approach is conducted based on the assumption that the organizational culture developed by a bank can be reflected in the official documents (i.e., annual reports) it uses to communicate with outsiders (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019). Our textual analysis is carried out in two steps: In the first step, we identify a set of keywords and their synonyms reflecting each of the four cultural dimensions described in the CVF. In the second step, we calculate the frequency of each set of words that appears in the reports and scale them by the total number of words appearing in the report. Section 3.1 discusses our measurement approach in more detail.

To investigate the impact of culture on bank stability, we used a sample of 483 publicly listed US bank holding companies (BHCs)<sup>3</sup> from 1994 to 2020. We follow the standard practice in the previous literature and use the natural logarithm of the Z-score as a measure of bank stability (Laeven and Levine 2009; Schaeck et al. 2012). Overall, we find

<sup>2</sup> Our choice of using annual reports for textual analysis is motivated by the fact that they are official documents used by banks to communicate with outsiders, including investors, debtholders, business partners, regulators, and supervisors, as well as the general public. In addition, banks' annual reports incorporate both the banks' lending activities and other important business activities, such as quality assurance, human resource strategies, risk management activities, expansion strategies, and mergers and acquisitions strategies. Thus, banks' annual reports provide an extensive source of information that enables us to capture the organizational culture of banks effectively.

<sup>3</sup> For expositional convenience, the terms BHC and bank will be used interchangeably.

that *Control*-oriented and *Compete*-oriented banks are more financially stable. This result remains robust across several robustness checks and our controls for endogeneity issues.

We further investigate the channels through which culture can affect bank stability. In particular, we examine how different cultures may affect bank financial performance, risk-taking, and asset quality. We find that *Control*-oriented banks enjoy a lower level of risk and have better asset quality. Meanwhile, *Compete*-oriented banks have superior financial performance and a higher quality of assets. These results support the prior finding that *Collaborate*- and *Create*-oriented banks are associated with a lower level of stability.

We also examine whether the impact of culture remains consistent over time and find evidence that culture affects bank stability significantly in “normal” times but not during crisis periods (i.e., the Dot-com crisis of 2000–2002 and the global financial crisis of 2007–2008). These results are reasonable given that, during a crisis period, banks attract heightened attention from banking regulators and market participants. Their stability is also seriously impaired due to the adverse economic conditions, and this effect is contagious across all banks (De Bruyckere et al. 2013). Thus, it is very likely that severe economic impact during a turbulent period overwhelms the impact of culture on bank stability.

Finally, we examine whether the impact of culture is homogenous across banks. Arguably, larger banks are more strictly monitored by regulators (Boot et al. 2008; Leuz et al. 2008) and closely followed by their stakeholders, the media, and the general public (Haq et al. 2018). Thus, their behavior and subsequent economic outcomes can be shaped more by their size than by cultural values. For this reason, we suspect that the impact of organizational culture on bank stability is weaker for larger banks and more prominent for smaller banks. In line with this proposition, we find that culture has no significant impact on the stability of large banks in our sample.

Our paper contributes to the literature in several ways. First, we contribute to the literature that investigates the factors affecting bank stability. Previous studies only focused on observable factors when assessing bank stability, for example, industry competition (Goetz 2018), business model (Köhler 2015), transparency (Nier 2005), and social capital (Jin et al. 2017). We find that a critical latent and unobservable factor, i.e., organizational culture, can also explain bank stability. In this regard, we directly contribute to the limited but growing research focusing on organizational culture’s role in banking. The empirical literature on this topic is limited to Nguyen et al. (2019) and Barth and Mansouri (2021). This literature shows that bank culture can affect lending decisions (Nguyen et al. 2019) and the self-selection of employees (Barth and Mansouri 2021). Our study is perhaps closely related to Nguyen et al. (2019). However, our study differs from theirs in several aspects. While Nguyen et al. (2019) treat organizational culture as monopolistic and time-invariant, our approach is more aligned with the spirit of the CVF in that different cultural values can coexist in one organization (Cameron and Quinn 2011) and cultural values can evolve (Fiordelisi and Ricci 2014; Fiordelisi et al. 2019). In addition, Nguyen et al. (2019) infer that banks’ risk-taking behavior stems from their lending decisions. However, merely focusing on banks’ lending activities and ignoring other activities may lead to a material oversight. This is important given that banks have increasingly diversified their businesses toward non-traditional activities (e.g., derivatives trading and underwriting, etc.), and the incomes and risks stemming from these non-traditional activities may outweigh those of the traditional interest-bearing activities. Thus, by using Z-score to measure a bank’s distance to insolvency, our results can provide a broader inference on the impact of organizational culture on bank risk and stability.

Our findings also have important practical implications. The findings suggest that when accessing bank behavior, particularly safety and soundness, banking regulators

and market participants should consider culture as an important internal mechanism that governs bank stability. Bank culture can be considered an additional layer of monitoring on top of regulatory supervision. Therefore, regulators may consider how the existing monitoring tools (e.g., capital requirements and deposit insurance) can guide bank culture toward stability and control focus. At the same time, it is equally important to initiate bank culture reform by, for example, providing practical guidelines or frameworks to promote sound culture across a country's banking system, with the main focus being on banks' safety and soundness.

The remainder of this study is structured as follows: Sect. 2 discusses the relevant literature, Sect. 3 outlines our data and methodology, and Sect. 4 presents our empirical results and discusses the main findings. Section 5 provides additional robustness checks, and Sect. 6 contains our conclusion.

## 2 Literature review

### 2.1 Organizational culture: conceptual foundation

Organizational culture involves a set of values, assumptions, beliefs, and norms that shape how a firm conducts its business (O'Reilly and Chatman 1996; Pettigrew 1979). The widespread perception is that culture helps members understand their organization (Deshpandé and Farley 1999) and provides them with response patterns when confronted with problems or opportunities (Westrum 2004).

Organizational culture can be partitioned into three levels: artifacts, espoused beliefs and values, and underlying assumptions (Schein 1985). An artifact lies at the surface level and comprises visible, audible, and perceptible phenomena (such as language, the technology employed, and rituals). Artifacts emerge when an individual encounters a new group with an unfamiliar culture. Meanwhile, beliefs and values represent a set of values, norms, and operational rules such as strategies, goals, policies, and philosophies shared by members of an organization. Thus, beliefs and values predict many aspects of overt behavior and other physical manifestations observable at the surface level. Finally, culture involves a basic underlying assumption at the most fundamental level. It reflects the unconscious beliefs, perceptions, and thoughts established when the beliefs and values described previously prove to be successful over time and gradually come to be treated as realities. They are resistant to change and modification and thus permeate a given organization over time.

Existing literature confirms the role of culture in organizational behavior and outcomes. For example, Schwartz and Davis (1981) highlight that organizational culture and corporate strategy are closely linked. Morgan (1993) suggests that culture can be considered a practical management tool and plays an important role in facilitating and managing strategic change. Schein (1984) and Day (1994) document that organizational culture can unify the capabilities of a firm into a cohesive whole, which allows firms to address problems effectively and achieve their goals. Similarly, Scholz (1987) contends that culture is vital to strategic management since it contributes significantly to creating and maintaining operational strategies. Likewise, Hall (1993) and Sadri and Lees (2001) further stress that, since the inherently complex nature of culture makes it almost impossible to imitate other firms, organizational culture can sustain a firm's competitive strength and performance.

## 2.2 The competing values framework and bank stability

While the concept of cultural values has attracted much attention in qualitative research, the empirical research into the culture–organizational behavior nexus remains equivocal, primarily because there is a lack of a taxonomy of organizational culture. Recent studies (i.e., Cameron et al. 2006; Hartnell et al. 2011; Fiordelisi and Ricci 2014; Nguyen et al. 2019) have started to use the Competing Values Framework (CVF) when assessing organizational culture. The CVF captures the well-perceived dilemmas of organizational life and has emerged as one of the most widely adopted frameworks for evaluating corporate culture (Barth and Mansouri 2021; Fiordelisi and Ricci 2014; Nguyen et al. 2019; Schneider et al. 2013).

In the CVF, there are four different cultural dimensions: *Control*, *Compete*, *Collaborate* and *Create*. They are sorted into four quadrants, each using a different set of competing values (Fig. 1). It is worth noting that although these cultural dimensions have different assumptions, beliefs, values, behaviors, and effective criteria (Fig. 2), they may coexist and complement each other within an organization (Hartnell et al. 2011).

According to the CVF, *Control* culture is underpinned by an organizational structure steeped in stability and control. This type of culture tends to emphasize efficiency, rigid control mechanisms, and utmost safety, which would arguably lead to a high level of stability. Likewise, *Compete* culture is also supported by a well-controlled organizational structure. This culture type usually behaves aggressively and forcefully against competitors to achieve superior performance in the immediate term. Extant literature documents that *Compete* culture embraces clear and concise communications, aggressive competition, and customer focus (Barth and Mansouri 2021; Cameron et al. 2006). This may subsequently lead to smoother functioning, higher revenues, a more significant market share, and rapid growth (Hartnell et al. 2011). Given that banking is a highly competitive market (Lence 1997), the focus on aggressive competition and winning market share can ultimately strengthen bank stability. Taken together, we suspect that banks with a *Control*- or *Compete*-oriented culture enjoy higher stability.

Culture Type	Assumptions	Beliefs	Values	Artefacts (behaviours)	Effectiveness Criteria
<b>Collaborate</b> (Clan)	Human affiliation	People behave appropriately when they have trust in, and are loyal to, the membership in the organisation.	Attachment, affiliation, collaboration, trust and support	Teamwork, participation, employee involvement and open communication	Employee satisfaction and commitment
<b>Create</b> (Adhocracy)	Change	People behave appropriately when they understand the importance and the impact of the task.	Growth, stimulation, variety, autonomy and attention to detail	Gathering customer and competitor information, goal-setting, planning, task focus, competitiveness and aggressiveness	Increased market share, profit, product quality and productivity
<b>Competition</b> (Market)	Achievement	People behave appropriately when they have clear objectives and are rewarded based on their achievements.	Communication, competition, competence and achievement	Gathering customer and competitor information, goal-setting, planning, task focus, competitiveness and aggressiveness	Increased market share, profit, product quality and productivity
<b>Control</b> (Hierarchy)	Stability	People behave appropriately when they have clear roles and procedures are formally defined by rules and regulations.	Communication, routinisation, formalisation and consistency	Conformity and predictability	Efficiency, timeliness and smooth functioning

**Fig. 2** The CVF's four cultural dimensions. *Source:* Adapted from Hartnell et al. (2011)



In contrast, *Collaborate* culture is reinforced by an organizational structure driven by discretion and flexibility mechanisms. This type of culture tends to emphasize the need for discretion and collaboration between organizational members with a high level of flexibility. This may in fact lead to too much discretion among employees to exploit and evade their legal obligations. It could also result in increased opportunism by employees and, consequently, a lower level of operational efficiency (Cho 2004). Altogether, this may lead to less stability.

Meanwhile, *Create* culture is also supported by a flexible organizational structure. This type of culture focuses on innovation, creativity, risk-taking, and constant change (Nguyen et al. 2019). *Create* culture values the generation of new business opportunities through a vigorous innovation process. Therefore, it incentivizes organization members to pursue aggressive risk-taking behavior and rule-breaking activities and to venture beyond borders (Fiordelisi and Ricci 2014). Given that the innovation process involves the high possibility of project failure and adverse economic outcomes (Bengt 1989), banks with a *Create*-oriented culture may be associated with lower levels of stability. To this end, we posit that banks with a *Collaborate*- or *Create*-oriented culture are less stable.

### 3 Model specification and data

#### 3.1 Measuring culture

In our study, we rely on the CVF to identify four different cultures at banks: *Control*-oriented, *Collaborate*-oriented, *Compete*-oriented, and *Create*-oriented. We follow the previous literature and conduct a textual analysis of individual bank annual reports (i.e., 10-K reports)<sup>4</sup> to quantify these cultures (Barth and Mansouri 2021; Fiordelisi and Ricci 2021; Nguyen et al. 2019). The motivation for our textual analysis stems from the proposition that the words and expressions used by an organization reveal its embedded organizational culture that has been developed over a period of time (Barth and Mansouri 2021; Fiordelisi and Ricci 2014; Levinson 2003).

To quantify each of the organizational culture dimensions, we follow Fiordelisi and Ricci (2021), Nguyen et al. (2019), and Barth and Mansouri (2021) and determine four bags of keywords that represent each of the CVF's four cultural dimensions: *Collaborate*, *Control*, *Create*, and *Compete*. Each bag of keywords is constructed using a two-step procedure to avoid the issue of subjectivity in the choice of keywords (Carretta et al. 2011). Specifically, in the first step, words representing each cultural dimension are adopted from Cameron et al. (2006). Those selected words are then used in the second step to find additional synonyms using the Harvard IV-4 Psychological dictionary. For instance, words such as "efficient," "conservative," and "expectation" are related to "control," suggesting a *Control*-oriented culture. Similarly, words such as "deliver," "direct," "market," and "revenue" are associated with "compete," suggesting a *Compete*-oriented culture. Words such as "certain," "relation," and "people" are regarded as synonyms for "collaborate," implying a *Collaborate*-oriented culture. Finally, words such as "adapt," "idea," "innovate," and "thought" represent "create," implying a

<sup>4</sup> A 10-K form is a comprehensive report filed annually by a publicly listed company about its business and financial condition. The U.S. Securities and Exchange Commission (SEC) is in charge of requiring the report.



**Table 1** Bags of words.

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

Source: Adapted from Fiordelisi and Ricci (2021)

*Create*-oriented culture. Table 1 provides the four bags of keywords representing the four cultural dimensions used for our textual analysis.

Next, we estimate scores for each of the cultural dimensions for each bank in a given year by counting the number of times the words belonging to each specific set of keywords occur in an annual report and dividing this number by the total number of words appearing in the report. For example, if 281 *Control*-related synonyms appear in a 26,295-word annual report, the value of our “*Control*-oriented” culture equals 1.07% (or 281 divided by 26,295, shown as a percentage).

### 3.2 Measuring bank stability

In this paper, we follow the previous literature and use the *Z-score* as a key measure for bank stability (Carretta et al. 2015; Goetz 2018; Schaeck and Cihák 2014). This method is perceived as an unbiased and complete stability indicator in the banking sector (Ahamed and Mallick 2019; Ariss 2010). A higher *Z-score* indicates a higher level of bank stability, whereas a lower *Z-score* indicates a higher level of insolvency risk. The *Z-score* is estimated in the following way:

$$ZScore_{it} = \frac{ROA_{it} + Equity_{it}}{SDROA_{it}} \quad (1)$$

where  $ROA_{it}$  is the return on assets, and  $Equity_{it}$  is the equity to total assets of bank  $i$  in year  $t$ .  $SDROA_{it}$  is the standard deviation of the return on assets. In line with the existing literature, we calculate  $SDROA$  using a three-year rolling window to allow for variations in the value of the *Z-score* (Ahamed and Mallick 2019; Schaeck and Cihák 2014). Since the *Z-score* is highly skewed, we follow Laeven and Levine (2009) and Schaeck et al. (2012) and employ the natural logarithm of the *Z-score* to capture bank stability.

### 3.3 Model specification

In order to investigate the impact of organizational culture on bank stability, we employ the following standard regression model:

$$\ln(ZScore)_{i,t} = \delta_1 + \delta_2 Bank\ Culture_{i,t-1} + \delta_3 X_{i,t-1} + State - YearFEs + \varepsilon_{i,t} \quad (2)$$

where  $\ln(ZScore)_{i,t}$  is the natural logarithm of the *Z-score* of bank *i* in year *t* as calculated in Eq. (1). *BankCulture* is a vector of the four measures of organizational culture dimensions: *Control-oriented*, *Compete-oriented*, *Collaborate-oriented* and *Create-oriented*.

We also follow the literature and incorporate a set of bank-specific characteristics (i.e.,  $X_{i,t-1}$ ) that might exert some impact on bank stability as our control variables (Carretta et al. 2015; DeYoung and Torna 2013; Jin et al. 2017). More specifically, we incorporate *Bank Size*, measured as the natural logarithm of total assets, to account for the fact that larger banks tend to take excessive risk and thus are less stable (Kim and Sohn 2017; Köhler 2015; Nier 2005). We use *Bank Age*, measured as the natural logarithm of the number of years a bank has appeared plus one, to account for the bank's operating experience in the market. Since older banks tend to have valuable experience built over time, they can enjoy higher profitability, profit efficiency, and financial stability (Duho et al. 2019).

Other control variables include bank loans (*Loan Ratio*), measured as net loans scaled by total assets. A higher *Loan Ratio* may imply greater liquidity risk (Ahamed and Mallick 2019) and therefore be associated with lower bank stability. However, a higher *Loan Ratio* can also indicate higher bank stability, as lending specialization could bring banks more informational advantages, which might help to diminish their default risk (Köhler 2015). *Equity* is measured as banks' equity scaled by total assets and proxies for the ability of a bank to absorb risk (Bhattacharya and Thakor 1993; Repullo 2004). Thus, a higher equity level should be associated with more stability. We further consider *Good Will*, calculated as goodwill divided by total assets. A higher value of goodwill can be interpreted as banks having lower liquidity assets (Wagner 2007) and thus being less stable (DeYoung and Torna 2013). Net interest margin (*NIM*), measured as net interest income to total earning assets, captures an individual bank's profitability from lending activities (Ahamed and Mallick 2019). Prior literature (e.g., Ahamed and Mallick 2019; Köhler 2015; Nguyen et al. 2019) suggests that when a bank's net interest margin is low, it could have more incentive to engage in excessive risk-taking activities to restore profitability, which consequently affects the bank's stability. *Diversification*, measured as non-interest income divided by total operating income, shows the level of banks' dependence on their traditional activities (DeYoung and Roland 2001; Köhler 2015). Previous studies suggest that diversification could enable banks to hedge against insolvency risk and alleviate financial distress, thereby enhancing the banks' profitability and stability (Froot et al. 1993; Köhler 2015). However, diversification and bank stability can also be negatively related because income derived from non-traditional activities may fluctuate more, which subsequently leads to higher overall bank risk and lower bank stability (Bilgin et al. 2021; Lepetit et al. 2008b).

To mitigate the endogenous concern, we follow the common practice in the banking and finance literature and lag all right-hand-side variables for one year (Beck et al. 2013; Fiordelisi and Ricci 2014; Schaeck and Cihák 2014). This approach has also been adopted in prior empirical research on the role of culture in non-financial firms (Carretta et al.

**Table 2** Variable description

Variable	Description	Source
<i>Dependent variables</i>		
Assets quality	Nonperforming loans divided by total loans	Authors' calculation using data retrieved from SNL Financial Database
Ln (Z-score)	The natural logarithm of $(ROA + Equity)/SDROA$ , where <i>Equity</i> is the capital to total assets ratio, <i>SDROA</i> is standard deviation of return on assets, and <i>ROA</i> is return on assets	Authors' calculation using data retrieved from SNL Financial Database
ROA	Net income to total assets	Authors' calculation using data retrieved from SNL Financial Database
SDROA	The standard deviation of return on assets calculated using three-year rolling window	Authors' calculation using data retrieved from SNL Financial Database
<i>Culture measures</i>		
Collaborate dominant	Collaborate-dominant organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Compete dominant	Compete-dominant organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Control dominant	Control-dominant organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Create dominant	Create-dominant corporate organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Collaborate-oriented	Collaborate-oriented organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Compete-oriented	Compete-oriented organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Control-oriented	Control-oriented organizational culture acquired by textual analysis	Compiled from the bank 10 K report
Create-oriented	Create-oriented organizational culture acquired by textual analysis	Compiled from the bank 10 K report
<i>Control variables</i>		
Bank size	The natural logarithm of total assets	Authors' calculation using data retrieved from SNL Financial Database
Bank age	The natural logarithm of the number of years the bank has appeared	Authors' calculation using data retrieved from SNL Financial Database

Table 2 (continued)

Variable	Description	Source
Diversification	Non-interest income divided by total operating income	Authors' calculation using data retrieved from SNL Financial Database
Equity	Total equity to total assets	Authors' calculation using data retrieved from SNL Financial Database
Good will	Goodwill divided by total assets	Authors' calculation using data retrieved from SNL Financial Database
Loan ratio	Net loans divided by total assets	Authors' calculation using data retrieved from SNL Financial Database
NIM	Net interest income to total earning assets	Authors' calculation using data retrieved from SNL Financial Database
ROA	Net income to total assets	Authors' calculation using data retrieved from SNL Financial Database
SDROA	The standard deviation of return on assets calculated using three-year rolling window	Authors' calculation using data retrieved from SNL Financial Database
Crisis return	The bank's dividend-adjusted stock return from July 1, 2007, until the day in global financial crisis period on which the bank obtains its lowest stock price	Authors' calculation using data retrieved from CRSP database
Rebound return	The bank's stock return over the six months following the date on which the lowest stock price first occurs in the global financial crisis period	Authors' calculation using data retrieved from CRSP database
<i>Corporate governance variables</i>		
Board independent	The proportion of independent directors on the board of directors	Authors' calculation using data retrieved from BoardEx Database
Board size	The natural logarithm of total number of directors on board	Authors' calculation using data retrieved from BoardEx Database
Gender diversification	The proportion of male directors on the board of directors	Authors' calculation using data retrieved from BoardEx Database
CEO overconfidence	A dummy that equals one if a CEO postpones the exercisable options that are more than 65% in the money, and zero otherwise	Authors' calculation using data retrieved from ExecuComp
<i>Classification variables</i>		
Crisis	A dummy variable equals one for the period 2000–2002 (Dot-com crisis) and the period 2007–2008 (Global financial crisis), and zero otherwise	Authors' calculation using data retrieved from SNL Financial Database
Large bank	A dummy variable equals one if the bank's size belongs to the top quantile in a given year, and zero otherwise	Authors' calculation using data retrieved from SNL Financial Database

**Table 3** Summary statistics of the main variables

	N	Mean	Std	p25	p50	p75
<i>Ln (Z-score)</i>	6592	4.3029	1.1961	3.6883	4.3547	5.0578
<i>Control-oriented</i>	6590	0.6735	0.1672	0.5571	0.6533	0.7646
<i>Compete-oriented</i>	6590	2.0067	0.3890	1.7385	2.0211	2.2675
<i>Collaborate-oriented</i>	6590	0.8309	0.2878	0.6687	0.7828	0.9138
<i>Create-oriented</i>	6590	1.1907	0.2143	1.0509	1.1655	1.2971
<i>Bank size</i>	6592	14.7764	1.7093	13.5167	14.3732	15.6645
<i>Bank age</i>	6586	2.9912	0.7144	2.6391	3.0445	3.4012
<i>Loan ratio</i>	6592	0.6551	0.1277	0.5984	0.6741	0.7389
<i>Good will</i>	6588	0.0126	0.0161	0.0001	0.0062	0.0191
<i>Equity</i>	6592	0.0986	0.0253	0.0812	0.0959	0.1127
<i>NIM</i>	6592	0.0365	0.0080	0.0320	0.0360	0.0407
<i>Diversification</i>	6592	0.1864	0.1239	0.1081	0.1570	0.2313
<i>ROA</i>	6592	0.0088	0.0089	0.0069	0.0096	0.0121
<i>SDROA</i>	6592	0.0029	0.0053	0.0007	0.0014	0.0027
<i>Assets quality</i>	6410	0.0151	0.0191	0.0037	0.0083	0.0184

This Table reports the summary statistics of all main variables used in our empirical analysis. The definitions for all variables are outlined in Table 2

2015; Fiordelisi and Ricci 2014). It is worth noting that all our empirical specifications, unless otherwise stated, include state-year fixed effects. These fixed effects absorb all variables that do not vary within a given state and year, for example, local economic conditions and changes in state-level regulation, which all could affect a bank's stability level.  $\varepsilon_{it}$  is the robust standard error term. The full list of variables used in our analysis is provided in Table 2.

### 3.4 Data

Our data analysis is based on a sample of publicly listed US bank holding companies (BHCs) from 1994 to 2019. We first collect banks' financial data from their annual reports, retrieved from the SNL Financial database. Second, we download the banks' complete 10-K reports from the Edgar website ([www.sec.gov](http://www.sec.gov)). For each of these reports, we perform a textual analysis (using the Python programming language) to identify each bank's cultural dimensions in conjunction with the CVF (as described in Sect. 3.1).

To mitigate the effect of outliers and data errors, we follow the common practice in the previous studies and winsorize all continuous variables at the 1% and 99% percentiles. It is worth noting that, since our econometric model involves the use of lagged variables, our empirical examination is conducted on a retained dataset containing a maximum of 6417 bank-year observations from 483 unique BHCs.

## 4 Empirical results

### 4.1 Descriptive statistics

Table 3 provides the summary statistics for all the main variables used in our model. The mean values of the four cultural variables, *Control-oriented*, *Compete-oriented*, *Collaborate-oriented* and *Create-oriented*, are 0.6735, 2.0067, 0.8309, and 1.1907, respectively. The average level of bank stability is indicated by the natural logarithm of *Z-score* ( $\ln(Z\text{-score})$ ), which is 4.3029. This figure is consistent with those reported in previous studies, including Lepetit and Strobel (2015) and Goetz (2018). The mean value of bank size (measured as the natural logarithm of total assets) is 14.7764, while that of bank age (measured as the natural logarithm of the number of years in operations plus one) is 2.9912. The mean value of the diversification ratio is 0.1864, indicating that, on average, income from non-interest-bearing activities takes up around 18.6% of the bank's total operating income. On average, net loans account for 65.51% of total assets, while goodwill represents 1.26% of total assets. Finally, on average, the equity ratio is 0.0986, indicating total equity only accounts for 9.86% of total assets.

Table 4 reports the correlation matrix among the independent variables used in our analyses. It shows that most of the correlation coefficients are relatively low. The highest correlation coefficient value is 0.5319 between *Bank Size* and *Diversification*. We also test for multicollinearity across all independent variables using the variance inflation factor (VIF). Since all the reported values are much lower than the threshold value of 10, multicollinearity is not a major problem that may affect our empirical results.

### 4.2 Main results

Table 5 provides the regression results for our baseline model (Eq. 2) to estimate the impact of culture on bank stability. Columns (1)–(4) show the regression results where only one of the four cultural dimensions (i.e., *Control-oriented*, *Compete-oriented*, *Collaborate-oriented* and *Create-oriented*) is included at a time. Column (5) reports the regression results when all four cultural dimensions are incorporated into the model.

Overall, the regression results provide evidence that different cultures may impact bank stability differently. *Control-oriented* estimated coefficients are specifically positive and statistically significant (Columns 1 and 5). This result suggests that banks with a *Control-oriented* culture experience a higher level of stability. One possible explanation is that *Control-oriented* banks often share a safety focus and lean toward stability and control (Cameron et al. 2006). They also place emphasis on compliance, rigid control mechanisms, predictability, and efficiency, which lead to the highest level of stability. Our findings support the prior study by Barth and Mansouri (2021), who argue that a safety- and stability-focused culture could help diminish downside risk and the probability of bank failure. Our results also align with the finding of Nguyen et al. (2019) that *Control-oriented* banks are associated with less risk-taking behavior. Regarding economic significance, we find that the coefficient of *Control-oriented* in Column (5) is 0.3390, which is significant at the one percent level. This means that a one standard deviation increase in *control-oriented* (i.e., 0.1672; see Table 3), can increase bank stability by nearly 5.7% (i.e.,  $5.7\% = 0.3390 \times 0.1672$ ).

**Table 4** Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	VIF
1 <i>Control-oriented</i>	1													1.06
2 <i>Compete-oriented</i>	0.0749***	1												1.30
3 <i>Collaborative-oriented</i>	0.0586***	0.3429***	1											1.17
4 <i>Create-oriented</i>	0.1274***	-0.1531***	-0.1497***	1										1.15
5 <i>Bank size</i>	0.0226*	0.1055***	0.0669***	0.1981***	1									2.02
6 <i>Bank age</i>	0.1052***	0.0057	0.0424***	0.1798***	0.5126***	1								1.48
7 <i>Loan ratio</i>	0.0489***	-0.0848***	-0.0413***	-0.0742***	-0.2293***	-0.2083***	1							1.30
8 <i>Good will</i>	0.0679***	0.0946***	-0.0243**	0.0759***	0.4535***	0.2035***	-0.0760***	1						1.76
9 <i>Equity</i>	0.1065***	-0.0346***	-0.0906***	0.1438***	0.1535***	0.1091***	-0.0177	0.5207***	1					1.64
10 <i>NIM</i>	-0.0856***	0.0952***	0.054***	-0.1324***	-0.3438***	-0.2385***	0.3225***	-0.1457***	0.0912***	1				1.42
11 <i>Diversification</i>	0.0475***	0.1062***	0.0711***	0.1618***	0.5319***	0.4505***	-0.3606***	0.2324***	0.1514***	-0.2783***	1			1.71
12 <i>ROA</i>	0.0246**	0.1617***	0.0707***	-0.0084	0.0480***	0.0613***	-0.1014***	0.0978***	0.2837***	0.1822***	0.2085***	1		1.64
13 <i>SDROA</i>	-0.0229*	-0.0826***	-0.0348***	0.0543***	0.0513***	0.0247**	-0.0279**	0.0039	0.0497***	-0.0511***	0.0404**	-0.3355***	1	1.35
14 <i>ASSETS QUALITY</i>	-0.0254**	-0.2544***	-0.1197***	0.1567***	0.0048	0.0426***	-0.0090	-0.0661***	-0.0256**	-0.0415***	-0.0283**	-0.4627***	0.4627***	1.59

This Table reports the correlation matrix of all main variables used in our empirical analysis. The definitions for all variables are outlined in Table 2



**Table 5** Baseline regression

	Dependent variable: $\ln(Z\text{-Score})$				
	(1)	(2)	(3)	(4)	(5)
<i>Control-oriented</i>	0.4051*** (0.1024)				0.3390*** (0.1061)
<i>Compete-oriented</i>		0.1787*** (0.0395)			0.1523*** (0.0414)
<i>Collaborate-oriented</i>			0.0419 (0.0464)		-0.0276 (0.0482)
<i>Create-oriented</i>				-0.0473 (0.0792)	-0.0900 (0.0802)
<i>Bank size</i>	-0.0304*** (0.0118)	-0.0414*** (0.0118)	-0.0359*** (0.0119)	-0.0340*** (0.0118)	-0.0347*** (0.0120)
<i>Bank age</i>	0.0497** (0.0250)	0.0535** (0.0249)	0.0504** (0.0250)	0.0503** (0.0250)	0.0515** (0.0250)
<i>Loan ratio</i>	-0.2942** (0.1377)	-0.3093** (0.1382)	-0.3168** (0.1384)	-0.3168** (0.1382)	-0.2968** (0.1381)
<i>Good will</i>	0.2279 (1.2128)	-0.4874 (1.2126)	0.0077 (1.2091)	-0.0647 (1.2119)	-0.3360 (1.2226)
<i>Equity</i>	4.8649*** (0.8191)	4.9380*** (0.8197)	4.9151*** (0.8209)	4.9215*** (0.8219)	4.9131*** (0.8207)
<i>NIM</i>	0.6984 (2.3114)	-0.1225 (2.3377)	0.7926 (2.3189)	0.8837 (2.3171)	0.0305 (2.3301)
<i>Diversification</i>	-0.3158** (0.1584)	-0.3664** (0.1601)	-0.3113* (0.1599)	-0.3026* (0.1595)	-0.3594** (0.1594)
<i>Constant</i>	4.0796*** (0.2296)	4.1892*** (0.2227)	4.4007*** (0.2136)	4.4598*** (0.2273)	4.0396*** (0.2443)
State-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.3637	0.3640	0.3619	0.3619	0.3652
Observations	6592	6592	6592	6592	6592

This Table reports the results of the baseline regression model (Eq. 2) to estimate the impact of organizational culture on bank stability. The dependent variable is bank stability, which is proxied as the natural logarithm of Z-score ( $\ln(Z\text{-Score})$ ). The main explanatory variables are the four organizational culture variables in conjunction with the CVF, including *Control-oriented*, *Compete-oriented*, *Collaborate-oriented*, and *Create-oriented*. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

Regarding *Compete* culture, the estimated coefficients of *Compete-oriented* are positive and statistically significant, as illustrated in Columns (2) and (5), suggesting that *Compete-oriented* banks also exert higher levels of stability. This is consistent with what is proposed in the CVF, that while *Compete-oriented* banks embrace aggressive competition, they also lean toward stability (Cameron et al. 2006). Banks with a *Compete* culture often integrate external competitive environment factors into their profitable activities and tend to behave aggressively and forcefully against competitors in order to achieve financial effectiveness and superior performance in the immediate term (Barth and Mansouri 2021; Cameron et al. 2006). Given that banking is a highly competitive

industry (Lence 1997), such aggressive and competitive characteristics could enable *Compete*-oriented banks to drive their competitors out of the market, thereby increasing their market share and facilitating their growth and survivability (Hartnell et al. 2011). Focusing on Column (5), we find that the coefficient for *Compete-oriented* is 0.1523, which is significant at the one percent level. This means when *Compete-oriented* increases by one standard deviation (i.e., 0.3890; see Table 3), the level of bank stability increases by approximately 5.9% (i.e.,  $5.9\% = 0.1523 \times 0.3890$ ).

In contrast, we find that the estimated coefficients of *Collaborate-oriented* and *Create-oriented* are not significant (Columns 3, 4, and 5), indicating that *Collaborate-oriented* and *Create-oriented* banks are not associated with a higher level of insolvency risk.

Other control variables also provide some important insights. In particular, we find that larger banks are less stable, as the estimated coefficients of *Bank Size* are negative and enormously significant across all the models, which is consistent with earlier findings (i.e., Köhler 2015; Nier 2005). By contrast, older banks appear to be more stable, as indicated by the positive and significant coefficients of *Bank Age*. This finding is supported by Duho et al. (2019), who argue that bank age positively impacts profitability, profit efficiency, and financial stability. Moreover, the coefficients of *Diversification* are significantly negative, indicating that income diversification adversely affects bank stability. This result is in line with prior studies (e.g., Lepetit et al. 2008a), which provide evidence that banks that diversify their incomes are riskier than those primarily focusing on traditional banking activities. Likewise, a higher loan ratio is associated with lower bank stability. The ratio of loans to total assets (*loan ratio*) is considered a solvency ratio that measures the liquidity risk of banks (Ahamed and Mallick 2019). Hence, a higher level of loan ratio could imply greater liquidity risk and, subsequently, lower bank stability. Finally, we find that well-capitalized banks are associated with a higher stability level since the estimated coefficients of *equity* are always positive and strongly significant. Therefore, our findings are consistent with most previous studies (Bhattacharya and Thakor 1993; Repullo 2004).

### 4.3 Robustness tests

One concern may be that our measure of bank culture (i.e., scores reflecting the frequency of each cultural dimension appearing in the text) can be affected by noise specific to the market in a given year. If that is the case, our measures might not accurately reflect the underlying culture of banks. To ensure the robustness of our main results, we re-estimate our baseline model (Eq. 2) using an alternative measure of bank culture. Specifically, we identify the dominant culture of each bank with respect to its peers. To do so, we replace our original culture measures with four dummies reflecting the *dominant* culture of banks (i.e., *Control Dominant*; *Compete Dominant*; *Collaborate Dominant*; and *Create Dominant*). In this way, we are conceptualizing that banks have a monolithic culture rather than having multiple cultural values (Nguyen et al. 2019). This approach is also consistent with what is proposed by Schein (2009)—large and mature organizations (i.e., BHCs in our case) are more likely to have a dominant organizational culture that reflects all parts of the organization. Overall, our newly constructed dominant culture dummies reflect whether a bank's culture score for a specific cultural dimension is among the highest across all banks in a specific year. For example, we identify a bank as a *Control-dominated* bank in a given year if its score for *Control* belongs to the top quartile among all banks for that year. Similar measures are applied for all other cultural dimensions.

**Table 6** Robustness tests

	(1)	(2)	(3)	(4)	(5)
	Alternative culture measures	Adding corporate governance var	Cluster std. errors at bank level	Aggregated all var. at bank system level	Control for risk culture measure
Dependent variable	<i>Ln (Z-score)</i>	<i>Ln (Z-score)</i>	<i>Ln (Z-score)</i>	<i>Avg-Ln (Z-score)</i>	<i>Ln (Z-score)</i>
<i>Control dominant</i>	0.1130*** (0.0321)				
<i>Compete dominant</i>	0.0658** (0.0320)				
<i>Collaborate dominant</i>	0.0129 (0.0322)				
<i>Create dominant</i>	0.0328 (0.0327)				
<i>Control-oriented</i>		0.2452* (0.1286)	0.3390** (0.1627)		0.2407* (0.1253)
<i>Compete-oriented</i>		0.2010*** (0.0578)	0.1523** (0.0717)		0.1323** (0.0546)
<i>Collaborate-oriented</i>		-0.0298 (0.0755)	-0.0276 (0.0628)		-0.0108 (0.0633)
<i>Create-oriented</i>		-0.0111 (0.1084)	-0.0900 (0.1153)		-0.0581 (0.1069)
<i>Avg-control-oriented</i>				0.9716 (2.4826)	
<i>Avg-competite-oriented</i>				1.6436** (0.7605)	
<i>Avg-collaborate-oriented</i>				-5.7260*** (1.2495)	
<i>Avg-create-oriented</i>				-1.7879* (0.8670)	
<i>Gender diversification</i>		-0.5057* (0.2752)			
<i>Board size</i>		0.2803*** (0.0879)			
<i>Board independent</i>		-0.0458 (0.1837)			
<i>CEO overconfidence</i>		0.0205 (0.0849)			
<i>Crisis return</i>					0.8506*** (0.0876)
<i>Rebound return</i>					0.2314*** (0.0529)
State-year fixed effects	Yes	Yes	Yes	No	Yes
Control variables	Yes	Yes	Yes	Yes	Yes
R-squared	0.3643	0.4058	0.3652	0.8340	0.4267
Observations	6592	3328	6592	25	3969

**Table 6** Continued

This Table reports the results for our robustness tests. Column (1) shows the results of the model to evaluate the impact of culture on bank stability, using alternative measures of bank culture. The main explanatory variables are dummy variables capturing four culture dimensions, including *Control Dominant*, *Compete Dominant*, *Collaborate Dominant* and *Create Dominant*, which equal one if the bank's culture score for each culture dimension is among the top quartile across all banks in a specific year, and zero otherwise. Column (2) reports the results of the baseline regression model (Eq. 2) after adding for a number of board characteristics to estimate the impact of organizational culture on bank stability. *Gender Ratio* is the proportion of male directors on the board of directors. *Board Size* is the natural logarithm of total number of directors on board. *Board Independent* is the proportion of independent directors on the board of directors. *CEO Overconfidence* is a dummy variable which equals one if a CEO postpones the exercisable options that are more than 67% in the money, and zero otherwise. Column (3) reports the results of the baseline regression model (Eq. 2) after clustering the standard errors at the firm level to estimate the impact of organizational culture on bank stability. Column (4) shows the results when all variables are aggregated at banking system level for each year. Column (5) reports the results when we control for two risk culture measure (*Crisis return* and *Rebound return*) in our regression. The definitions for all other variables are outlined in Table 2. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

The regression results utilizing the alternative measure of culture are reported in Column (1) of Table 6. Accordingly, the cultural variables are statistically significant and show similar signs to our main results in Table 5. Specifically, we find that the estimated coefficients of *Control Dominant* and *Compete Dominant* are always positive and significant (Columns 1, 2, and 5), whereas the estimated coefficients of *Collaborate Dominant* and *Create Dominant* remain insignificant (Columns 3–5). Regarding economic significance, the coefficients of *Control Dominant* and *Compete Dominant* in Column (5) are 0.1261 and 0.0864, respectively, suggesting that banks with *Control Dominant* and *Compete Dominant* are 12.61% and 8.64% more financially stable than the average bank. Overall, these results indicate that our findings generally remain consistent when employing alternative measures of bank culture.

Next, we account for the concern that the difference in bank governance can drive our results. Therefore, we reran our regression (Eq. 2) with the inclusion of additional control variables to account for the corporate governance structure of banks. These include *Gender Diversification*, measured as the proportion of male directors on the board of directors; *Board Size*, measured as the natural logarithm of the total number of directors on the board; and *Board Independent*, measured as the proportion of independent directors on the board of directors.

We also control for *CEO Overconfidence* in our regression. Ho et al. (2016) define CEOs as being overconfident if they postpone the exercise of in-the-money stock options when the stock price exceeds the exercise price by more than 67%. When CEOs exhibit this behavior, they have an optimistic bias toward their ability to maintain the rise in stock price (Malmendier and Tate 2005). To identify such behavior, we employ Campbell et al. (2011)'s method and compute the average executive option moneyness as the average realizable value per option divided by the average exercise price of the exercisable options. The average realizable value per option is calculated as the estimated value of the unexercised exercisable options divided by the number of unexercised exercisable options. The average exercise price of the exercisable options held by the CEO is the difference between the average realizable value and the stock price at the fiscal year's end.<sup>5</sup> We then construct a dummy variable, "*CEO Overconfidence*," which indicates whether an overconfident

<sup>5</sup> Board characteristics and CEO's compensation data are retrieved from the ExecuComp database.

CEO manages a firm or not. It equals one if a CEO postpones the exercisable options that are more than 67% in the money (i.e., the average executive option moneyness of CEOs exceeds 67%) and zero otherwise. It is worth noting that once CEOs are categorized as being overconfident, they maintain the same classification for the remaining time in the examined period (i.e., from the year they hold options worth more than 67% of their value onward).

We report the regression results with the inclusion of board and CEO characteristics in Column (2) of Table 6. Overall, the results are qualitatively consistent with our baseline results, with the coefficients of *Control-oriented* and *Compete-oriented* remaining positive and significant across the regressions.

We also examine whether our results remain robust when we cluster the error term at the bank level. The regression results with clustered standard errors are reported in Column (3) of Table 6 and are generally consistent with our main findings regarding sign and significance.

While our main conclusion focuses on the relationship between corporate culture and financial stability at the individual bank level, we also test whether this conclusion holds for the whole banking system. Specifically, we take the annual average value for all variables in our regression model across all banks in the sample. We then reran our regression (Eq. 2) using the aggregated variables and reported the results in Column (4) of Table 6. We find that the coefficients of both *Avg-Control-oriented* and *Avg-Compete-oriented* are positive, but only *Avg-Compete-oriented* is statistically significant. We also find that the coefficients of *Avg-Collaborate-oriented* and *Avg-Create-oriented* are both negative and significant. These results suggest that cultures leaning toward stability and control (i.e., *Control-oriented* and *Compete-oriented* cultures) can better support the financial stability of the banking system as a whole compared to cultures that embrace individuality and flexibility (i.e., *Collaboration-oriented* and *Create-oriented* cultures).

Finally, we follow Fahlenbrach et al. (2012) and use the banks' and rebound stock returns during the global financial crisis as proxies for bank risk culture and control for these measures in our regression. Specifically, we look at the stock price data of each bank during the period from July 1, 2007, to December 31, 2008 (i.e., the crisis period) and identify the date on which the bank reaches its lowest stock price. We then calculate each bank's dividend-adjusted crisis return (*Crisis return*) from July 1, 2007, to the low during the crisis period. Moreover, the bank's rebound return (*Rebound return*) is the six-month dividend-adjusted return following the day with the lowest stock price during the crisis period.<sup>6</sup> We then perform a robustness test to control for these risk culture measures in our regression and report the results in Column (5) of Table 6. Overall, the results are consistent with our main findings in that we still find the coefficients of *Control-oriented* and *Compete-oriented* to be positive and statistically significant.

#### 4.4 Endogeneity issues

While our main results remain consistent across different model specifications to deal with endogeneity (i.e., lagging all independent variables, using fixed solid effects, and employing alternative measures of organizational culture), we acknowledge that the results can still be subject to endogeneity bias. This is because both culture and bank stability can be

<sup>6</sup> All stock data is sourced from the CRSP database.

sticky over time, and thus the regression results using one-year lags for all right-hand side variables may not effectively prove causality.

To mitigate this concern, we follow Barth and Mansouri (2021) and estimate the baseline model using the initial values for the culture measures and all other control variables. Specifically, we modify our baseline model and only utilize the average values over the initial period of 1994–2005 for organizational culture dimensions and all control variables. Regarding the dependent variable, we use the values over the subsequent period of 2006–2020. The results of this modified regression are reported in Column (1) of Table 7 and are broadly consistent with our baseline results.

To allow for a more robust analysis, we follow the method suggested by Fahlenbrach et al. (2012) and Ellul and Yerramilli (2013), which contend that a bank has a persistent risk culture; thus, its performance in past crises could predict its performance in a subsequent crisis. Accordingly, we compute the average value for all culture measures during the Dot-com crisis period (2000–2002) and the average value for our bank stability measure during the global financial crisis period (2007–2008). We reran our regression using these average values together with the value for our control variable in 2006 and reported the results in Column (2) of Table 7. We find that the coefficient of *Control-oriented* is positive and significant at the 10% level. However, the coefficient of *Compete-oriented* is no longer significant, which can be partially explained by the substantial reduction in our sample size. While the results do not closely match our baseline results, they do suggest that banks with cultures that value consistency, monitoring, and control (*Control-oriented*) are more financially stable.

Finally, we employ bank mergers and acquisitions (M&As) as a shock to bank culture and examine whether this shock exerts an impact on the financial stability of affected banks.<sup>7</sup> Specifically, we construct a dummy variable *M&A* that takes the value of 1 if it is within 5 years of a bank's M&A, and 0 otherwise. We then include this dummy variable and its interactions with all culture measures in our regression model (Eq. 2) and rerun the model accordingly. The results reported in Column (3) of Table 7 show that the coefficient of *M&A* is 2.1982, which is significant at the one percent level. This can be explained by our untabulated statistics showing that the acquirer banks experience a cultural shock following the M&As and tend to lean more towards a *control-oriented* and *create-oriented* culture. Since our baseline results show a positive relationship between control-oriented culture and banks' financial stability, this shift of the acquirer banks towards a control-oriented culture following the M&As can explain the positive impact of the M&A shock on the banks' financial stability.

At the same time, we also find that the coefficients of both interactions *M&A* × *Control-oriented* and *M&A* × *Compete-oriented* are statistically significant. This indicates that the direct impact of *control-oriented* and *compete-oriented* on banks' financial stability is less pronounced during the post-M&A period. This can possibly be explained by the fact that most of the impact has been absorbed by the cultural shock in the acquirer banks following the M&As, which is reflected in the positive and significant coefficient of *M&A*.

Overall, the results of this test suggest that the cultural shock following a bank M&A significantly impacts bank culture. These results, therefore, strengthen our conclusion of a causal relationship between bank culture and financial stability.

<sup>7</sup> We thank the anonymous reviewer for this suggestion.

Table 7 Controlling for endogeneity

Dependent variable: <i>LnZ-score</i>		(1)	(2)	(3)
		Use average value of 1994–2005 period for RHS var. and 2006–2020 period for LHS var	Measure culture during Dotcom crisis and bank stability during GFC	Bank M&As as a shock to bank culture
<i>Control-oriented</i>	0.4557* (0.2735)	1.3848* (0.8165)		0.3435*** (0.1071)
<i>Compete-oriented</i>	0.0662 (0.0958)	-0.0686 (0.3017)		0.1653*** (0.0420)
<i>Collaborate-oriented</i>	0.0073 (0.0995)	0.2256 (0.2589)		-0.0334 (0.0492)
<i>Create-oriented</i>	-0.0887 (0.2000)	0.6575 (0.6207)		-0.0743 (0.0810)
M&A				2.1982*** (0.8068)
M&A × <i>Control-oriented</i>				-0.8322* (0.4684)
M&A × <i>Compete-oriented</i>				-0.7958*** (0.2731)
M&A × <i>Collaborate-oriented</i>				0.1311 (0.2241)
M&A × <i>Create-oriented</i>				-0.1245 (0.4711)
State-year fixed effects	Yes		Yes	Yes
Control variables	Yes		Yes	Yes
R-squared	0.4064		0.2516	0.3663



**Table 7** (continued)

Dependent variable: <i>LnZ-score</i>		
(1)	(2)	(3)
Use average value of 1994–2005 period for RHS var. and 2006–2020 period for LHS var	Measure culture during Dotcom crisis and bank stability during GFC	Bank M&As as a shock to bank culture
Observations	243	6592

This Table reports the results of the models to further control for potential endogeneity issues. Column (1) reports the results when using the average values over the initial period 1994–2005 for organizational culture variables and all control variables, and the value over the period 2006–2020 for the dependent variable (*Ln(Z-Score)*). Column (2) reports the results of the models that examine the impact of organizational culture in Dot-com crisis (defined as the bank's average culture values for the period 2000–2002 (Dot-com crisis)) on bank stability during the Global financial crisis years (2007–2008). All control variables use the values of the year 2006. Column (3) documents the results when we examine bank M&As as an exogenous shock to bank culture, in which M&A is a dummy variable taking the value of one if it is 5 years from the year of bank M&As, and zero otherwise. The dependent variable is bank stability, which is proxied as the natural logarithm of Z-score (*Ln(Z-Score)*). The main explanatory variables are the four organizational culture variables in conjunction with the CVF, including *Control-oriented*, *Compete-oriented*, *Collaborate-oriented*, and *Create-oriented*. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

## 5 Additional analyses

### 5.1 The impact of culture on bank risk, asset quality, and performance

So far, we have documented that organizational culture matters in shaping the safety and soundness of a bank. In this section, we attempt to delve deeper and investigate the channels through which culture may affect bank stability. We follow previous literature and use the three most common financial indicators for assessing bank stability: bank risk, asset quality, and financial performance (Goetz 2018).

Specifically, we proxy for bank risk using the volatility of returns on assets (*ROA*) over the three-year rolling time window (i.e., the standard deviation of *ROA* (*SDROA*)). The higher volatility of *ROA* indicates higher bank risk and lower bank stability. To evaluate a bank's *Asset Quality*, we use the ratio of non-performing loans (*NPL*) to total loans. A higher *NPL* ratio might indicate lower asset quality, and vice versa. Banks with lower asset quality are often seen as having financial problems and are thus less stable. Finally, we proxy for bank financial performance using the *ROA* ratio. A higher value of *ROA* would indicate a higher level of a bank's financial performance and, thus, a lower risk of insolvency. We then adjust our baseline models (Eq. 2) by replacing the dependent variable  $\ln(Z\text{-Score})$  with *SDROA*, *Asset Quality*, and *ROA* in that order.

Table 8 reports the regression results of the modified regression model to assess the impact of culture on bank risk, asset quality, and performance. Column (1) shows the regression result when the dependent variable is bank risk (*SDROA*); the results of the models to evaluate the asset quality (*Asset Quality*) and financial performance (*ROA*) of banks are reported in Columns (2) and (3), respectively.

As a result, the estimated *Control-oriented* coefficients are negative and significant in columns (1) and (2). These results indicate that *Control-oriented* banks whose organizational culture emphasizes internal control formalization, consistency, and routinization experience lower risk and better asset quality. In terms of economic significance, a one standard deviation increase in *Control-oriented* (i.e., 0.1672; see Table 3) reduces bank risk and improves asset quality by approximately 5.4% and 4.0%, respectively (i.e.,  $5.4\% = 0.1672 \times 0.0010 / 0.0031$  in which 0.0010 is the coefficient of *Control-oriented* in Column (1) and 0.0031 is the untabulated mean of *SDROA*;  $4.0\% = 0.1672 \times 0.0036 / 0.0151$  in which 0.0036 is the coefficient of *Control-oriented* in Column (2) and 0.0151 is the untabulated mean of *Asset Quality*). Overall, these results reinforce our prior finding that *Control-oriented* banks are more stable.

In terms of *Compete* culture, the estimated coefficient of *Compete-oriented* in Column (2) is significantly negative, while it is significantly positive in Column (3). These results illustrate that *Compete-oriented* banks have better asset quality and higher profitability. Regarding the economic significance, a one standard deviation increase in *Control-oriented* (i.e., 0.3890; see Table 3) improves asset quality and profitability by approximately 11.3% and 8.7%, respectively (i.e.,  $11.3\% = 0.3890 \times 0.0044 / 0.0151$  in which 0.0044 is the coefficient of *Compete-oriented* in Column (2) and 0.0151 is the untabulated mean of *Asset Quality*;  $8.7\% = 0.3890 \times 0.0019 / 0.0085$  in which 0.0019 is the coefficient of *Compete-oriented* in Column (3) and 0.0085 is the untabulated mean of *ROA*). Thus, these results support the prior findings that *Compete-oriented* banks experience a higher level of stability.

We, however, find no significant impact of *Collaborate-oriented* and *Create-oriented* banks on the three indicators of bank stability.<sup>8</sup>

## 5.2 Impact of culture on bank stability: normal versus crisis period

Prior research has shown that during crises, when banks suffer greatly, bank behaviors can change dramatically. What is true for banks during a normal period can become invalid or even reversed during such a turbulent time. For example, Khan et al. (2017) find that banks tend to take more risk during normal times when they have lower funding liquidity risk. However, the opposite is true during a crisis (i.e., banks tend to take less risk when they have lower funding liquidity risk). Similarly, Heryán and Tzeremes (2017) document that banks' reactions to different monetary transmission mechanisms are not the same during non-crisis and crisis periods. Therefore, we question whether the impact of organizational culture on bank stability can change during crisis periods.

To do so, we include in our regression model the interaction between our culture measures and *Crisis*, a dummy variable that equals 1 if the observation is during a crisis period and 0 otherwise.<sup>9</sup> We define crisis periods as the Dot-com crisis of 2000–2002 and the global financial crisis of 2008–2009. These two events offer an excellent structural break for our study, given that the ramifications of the crises for banks were mostly unanticipated (Adhikari and Agrawal 2016). Table 9 provides augmented models' results to examine the impact of organizational culture over time.

We find that only *Control-oriented* culture is homogeneous across different time intervals. Specifically, the estimated coefficients of *Control-oriented* are positive and significant in Columns (1) and (5), whereas the interaction of *Control-oriented* × *Crisis* is not significant in either regression. These results suggest that *Control-oriented* banks can better adapt to a rapidly changing business environment, making them more stable and resilient, even during a crisis.

By contrast, we find that the estimated coefficients of *Compete-oriented* are positive and significant in Columns (2) and (5), and the interaction of *Control-oriented* × *Crisis* is negative and significant in both regressions. The sum of the coefficients of *Compete-oriented* and *Control-oriented* × *Crisis* in Column (5) is not statistically significant. This means that while *Compete-oriented* culture positively impacts bank stability in regular times, it appears to have no significant impact on bank stability during crisis periods. This result illustrates that while aggressive business practices allow *Compete-oriented* banks to experience fast and stable growth in expected business conditions, these practices may not lead to favorable outcomes in turbulent times.

Overall, our results suggest that, while the impact of *Compete-oriented* culture on bank stability is almost undetectable during crisis periods, the organizational culture that leans toward stability and safety (i.e., a *Control-oriented* culture) is proven to be effective in

<sup>8</sup> We also ran several analyses to examine how organizational culture affects other performance measures of banks, including *Tobin's Q*, return on equity (*ROE*), and the standard deviation of *ROE* (*SDROE*). The results show that *compete-oriented* culture positively impacts *Tobin's Q* and *ROE* while lowering banks' *SDROE*. We also find that *Collaborate-oriented* and *Create-oriented* cultures negatively impact *Tobin's Q*. However, *Create-oriented* culture can improve banks' *ROE* and reduce *SDROE*. Results are available upon request.

<sup>9</sup> The variable *Crisis* is also included in the regression model but is omitted after we control for state-year fixed effects.

**Table 8** Impact of culture on bank risk, asset quality and performance

	SDROA (1)	Asset quality (2)	ROA (3)
<i>Control-oriented</i>	-0.0010** (0.0005)	-0.0036*** (0.0014)	-0.0010 (0.0009)
<i>Compete-oriented</i>	-0.0003 (0.0002)	-0.0044*** (0.0006)	0.0019*** (0.0005)
<i>Collaborate-oriented</i>	-0.0000 (0.0002)	0.0005 (0.0005)	-0.0001 (0.0003)
<i>Create-oriented</i>	-0.0005 (0.0003)	-0.0008 (0.0011)	-0.0003 (0.0006)
<i>Bank size</i>	-0.0000 (0.0001)	0.0000 (0.0002)	-0.0001 (0.0002)
<i>Bank age</i>	-0.0001 (0.0001)	-0.0007** (0.0003)	0.0009*** (0.0002)
<i>Loan ratio</i>	0.0004 (0.0007)	-0.0033* (0.0019)	-0.0039*** (0.0014)
<i>Good will</i>	-0.0007 (0.0071)	-0.0309* (0.0184)	-0.0311** (0.0136)
<i>Equity</i>	0.0160*** (0.0044)	-0.0522*** (0.0115)	0.0746*** (0.0089)
<i>NIM</i>	-0.0262* (0.0137)	0.0882** (0.0356)	0.1143*** (0.0269)
<i>Diversification</i>	0.0019** (0.0009)	-0.0047* (0.0026)	0.0127*** (0.0022)
Constant	0.0040*** (0.0014)	0.0338*** (0.0041)	-0.0056** (0.0026)
State-year fixed effects	Yes	Yes	Yes
R-squared	0.3210	0.5622	0.3948
Observations	6592	6410	6592

This Table reports the results of the models to estimate the impact of culture on bank risk, asset quality and financial performance, respectively. Column 1 shows the result when the standard deviation of ROA (*SDROA*) is used as the dependent variable. Column 2 reports the result when *Asset Quality* (measured as nonperforming loans divided by total loans) is used as the dependent variable. Column 3 reports the result when *ROA* is used as the dependent variable. The main explanatory variables are four organizational culture variables in conjunction with the CVF, including *Control-oriented*, *Compete-oriented*, *Collaborate-oriented*, and *Create-oriented*. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

supporting bank stability in both non-crisis and crisis periods. This finding is consistent with the conclusions by Kanagaretnam et al. (2011, 2014) that a culture leaning toward stability and risk minimization could help reduce the financial difficulties experienced by banks during times of crisis.

**Table 9** Impact of culture on bank stability: interacting with crisis

	Dependent variable: $\ln(Z\text{-Score})$				
	(1)	(2)	(3)	(4)	(5)
<i>Control-oriented</i>	0.3925*** (0.1087)				0.3115*** (0.1132)
<i>Control-oriented</i> × <i>Crisis</i>	0.0694 (0.2936)				0.1335 (0.2973)
<i>Compete-oriented</i>		0.2175*** (0.0426)			0.1945*** (0.0449)
<i>Compete-oriented</i> × <i>Crisis</i>		-0.2332** (0.1089)			-0.2596** (0.1118)
<i>Collaboration-oriented</i>			0.0541 (0.0508)		-0.0430 (0.0532)
<i>Collaboration-oriented</i> × <i>Crisis</i>			-0.0441 (0.1106)		0.0700 (0.1138)
<i>Create-oriented</i>				-0.0897 (0.0870)	-0.1244 (0.0882)
<i>Create-oriented</i> × <i>Crisis</i>				0.2277 (0.2104)	0.2412 (0.2112)
<i>Bank size</i>	-0.0303** (0.0118)	-0.0417*** (0.0118)	-0.0360*** (0.0119)	-0.0341*** (0.0118)	-0.0350*** (0.0120)
<i>Bank age</i>	0.0495** (0.0250)	0.0560** (0.0250)	0.0505** (0.0250)	0.0500** (0.0250)	0.0535** (0.0251)
<i>Loan ratio</i>	-0.2951** (0.1378)	-0.3103** (0.1381)	-0.3164** (0.1384)	-0.3164** (0.1383)	-0.2996** (0.1382)
<i>Good will</i>	0.2359 (1.2137)	-0.4926 (1.2132)	0.0178 (1.2094)	-0.0502 (1.2118)	-0.3121 (1.2250)
<i>Equity</i>	4.8598*** (0.8192)	4.9260*** (0.8204)	4.9081*** (0.8212)	4.9180*** (0.8216)	4.8955*** (0.8216)
<i>NIM</i>	0.7182 (2.3097)	-0.2470 (2.3387)	0.7914 (2.3192)	0.9274 (2.3190)	-0.0302 (2.3309)
<i>Diversification</i>	-0.3151** (0.1585)	-0.3656** (0.1600)	-0.3118* (0.1600)	-0.3001* (0.1597)	-0.3543** (0.1595)
Constant	4.0786*** (0.2297)	4.2230*** (0.2232)	4.4005*** (0.2136)	4.4531*** (0.2278)	4.0608*** (0.2453)
State-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.3637	0.3645	0.3619	0.3620	0.3659
Observations	6592	6592	6592	6592	6592

This Table provides additional analysis of the model to estimate the impact of culture on bank stability (Eq. 2) after incorporating the interaction terms between *Crisis* and each of the four organizational culture variables (*Control*, *Compete*, *Collaborate*, *Create*). *Crisis* is a dummy variable equals one for the period 2000–2002 (Dot-com crisis) and the period 2007–2008 (Global financial crisis), and zero otherwise. The dependent variable is bank stability, which is proxied as the natural logarithm of Z-score ( $\ln(Z\text{-Score})$ ). The main explanatory variables are four organizational culture variables in conjunction with the CVF, including *Control-oriented*, *Compete-oriented*, *Collaborate-oriented*, and *Create-oriented*. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

**Table 10** Impact of culture on bank stability: interacting with bank size

	Dependent variable: $\ln(Z\text{-score})$				
	(1)	(2)	(3)	(4)	(5)
<i>Control-oriented</i>	0.5108*** (0.1152)				0.4063*** (0.1193)
<i>Control-oriented</i> × <i>Large Bank</i>	-0.4236** (0.1809)				-0.4238** (0.1838)
<i>Compete-oriented</i>		0.2969*** (0.0481)			0.2532*** (0.0512)
<i>Compete-oriented</i> × <i>Large Bank</i>		-0.3702*** (0.0767)			-0.3265*** (0.0797)
<i>Collaborate-oriented</i>			0.1193** (0.0584)		-0.0079 (0.0614)
<i>Collaborate-oriented</i> × <i>Large Bank</i>			-0.0217 (0.0900)		-0.0474 (0.0944)
<i>Create-oriented</i>				-0.1119 (0.0946)	-0.1129 (0.0964)
<i>Create-oriented</i> × <i>Large Bank</i>				0.1861 (0.1395)	0.1339 (0.1443)
<i>Bank size</i>	0.4057*** (0.1332)	0.9037*** (0.1722)	0.3025*** (0.0893)	-0.0854 (0.1681)	0.9794*** (0.2676)
<i>Bank age</i>	-0.0620*** (0.0171)	-0.0715*** (0.0169)	-0.0602*** (0.0173)	-0.0662*** (0.0170)	-0.0695*** (0.0176)
<i>Loan ratio</i>	0.0475* (0.0251)	0.0525** (0.0250)	0.0530** (0.0250)	0.0531** (0.0251)	0.0484* (0.0251)
<i>Good will</i>	-0.3169** (0.1381)	-0.3373** (0.1376)	-0.3199** (0.1381)	-0.3135** (0.1382)	-0.3374** (0.1381)
<i>Equity</i>	0.1364 (1.2157)	-0.8801 (1.2139)	-0.3353 (1.2149)	-0.2609 (1.2154)	-0.6675 (1.2264)
<i>NIM</i>	4.7164*** (0.8216)	4.6366*** (0.8225)	4.7766*** (0.8227)	4.7791*** (0.8243)	4.5859*** (0.8237)
<i>Diversification</i>	0.7528 (2.3123)	0.2640 (2.3209)	1.0434 (2.3193)	0.9933 (2.3198)	0.5004 (2.3184)
Constant	-0.2902* (0.1594)	-0.3323** (0.1593)	-0.2776* (0.1603)	-0.2862* (0.1601)	-0.3200** (0.1594)
State-year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.3648	0.3668	0.3631	0.3627	0.3684
Observations	6592	6592	6592	6592	6592

This Table provides additional analysis of the model to estimate the impact of culture on bank stability (Eq. 2) after incorporating the interaction terms between *Large Bank* and each of the four organizational culture variables (*Control*, *Compete*, *Collaborate*, *Create*). *Large Bank* is a dummy variable equals one if the bank's size belongs to the top quantile in a given year, and zero otherwise. The dependent variable is bank stability, which is proxied as the natural logarithm of Z-score ( $\ln(Z\text{-Score})$ ). The main explanatory variables are four organizational culture variables in conjunction with the CVF, including *Control-oriented*, *Compete-oriented*, *Collaborate-oriented*, and *Create-oriented*. The definitions for all other variables are outlined in Table 2. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively

### 5.3 The effect of size on the relationship between culture and bank stability

Extant literature documents that the size of an institution can matter in shaping its economic decisions and, subsequently, its financial outcomes (Li et al. 2013). In fact, larger banks are more closely followed by market participants, the media, and the general public (Haq et al. 2018). They are also subjected to heightened regulations and supervisory oversights (Boot et al. 2008; Leuz et al. 2008). In this regard, the behavior (and subsequent economic outcomes) of larger and more established banks are more likely to be shaped by the strict supervision of regulators and market participants than by their embedded culture. In addition, larger organizations tend to have more controlled management systems and better corporate governance. Thus, any business decisions of those organizations are subject to stricter internal control, thereby hindering the effect of culture on the organizations' business decisions and subsequent performance (Li et al. 2013). These arguments are consistent with the view that cultural values may not be as prominent in shaping the economic decisions of large organizations (Haq et al. 2018; Li et al. 2013). Therefore, we suspect culture's impact on bank stability may be less prominent in larger banks.

To test this prediction, we introduce a dummy variable (*Large Bank*) indicating large banks and its interaction term with each of the four culture measures into the model specification. Specifically, *Large Bank* equals 1 if a bank's size is in the top quantile in a given year and 0 otherwise. The results of the model to test for the contingent impact of bank size on the culture–bank stability nexus are provided in Table 10.

As can be seen from the table, the estimated coefficients of the interaction terms involving *Control-oriented* and *Compete-oriented* have opposite signs relative to their respective organizational culture dimensions. Column (5) shows that the sum of the coefficients of *Control-oriented* and *Control-oriented* × *Large Bank* is  $-0.0175$  (i.e.,  $-0.0175 = 0.4063 - 0.4238$ ), which is not statistically significant. Similarly, the sum of the coefficients of *Compete-oriented* and *Compete-oriented* × *Large Bank* is  $-0.0733$  (i.e.,  $-0.0733 = 0.2532 - 0.3265$ ), which is insignificant. These provide evidence that bank size mitigates the effect of organizational culture on bank stability. In other words, organizational culture plays a more important role in explaining bank stability for smaller banks, but the impact of culture on bank stability diminishes for larger banks.

## 6 Conclusion

In the aftermath of the global financial crisis and high-profile bank failures, bank culture has received significant attention from banking regulators, academic scholars, and the general public because of its perceived contribution to the banking turbulence. Many people now believe that culture is the underlying cause of excessive risk-taking, moral hazard incentives, and misconduct that leads to bank failures and system meltdowns.

In this paper, we examine to what extent organizational culture affects the stability of US banks. We use the Competing Values Framework and textual analysis approach to classify bank culture into four dimensions: *Control*, *Compete*, *Collaborate* and *Create*. Our results show that *Control*- and *Compete*-oriented banks exert higher stability. We also find that *Control*-oriented banks have better asset quality and are exposed to a lower level of risk, whereas *Compete*-oriented banks experience better asset quality and greater financial performance. Finally, we document that the effects that culture has on bank stability are more significant during a non-crisis period and for small and medium-sized banks.



Overall, our study highlights the importance of different organizational culture values in explaining bank stability. In this regard, bank culture can be considered an additional layer of monitoring on top of regulatory supervision. From a regulatory perspective, banking regulators and supervisors should consider using regulatory mechanisms to influence bank culture or perform cultural reform across banks to ensure the stability of the entire banking industry. For example, regulators may consider how the existing monitoring tools (for example, capital requirements and deposit insurance) can guide bank culture toward stability and control focus. At the same time, it is equally important to initiate bank culture reform by, for example, providing practical guidelines or frameworks to promote sound culture across a country's banking system, with the main focus being on banks' safety and soundness. Finally, our findings also signal all capital market participants to detect banks with a more stable culture for their transactions.

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