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Adding Stress in Banking: Stress Tests and Risk-Taking Sentiments*

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Abstract

We study the effects of transparency disclosures on U.S. banks' relayed culture. Using bank stress-test regulations and a regression-discontinuity design, we exploit the quasi-experimental properties around bank-size policy thresholds. We find that stress-tested banks improve their communicated risk-taking culture and overall corporate culture by improving the sentiment around drivers of risk-taking culture such as leadership. Stress testing, however, has the unintended consequence of negatively affecting sentiment regarding teamwork and innovation. We find that only banks with strong risk-taking-culture sentiments further reduce their risk-weighted assets and risky loans while increasing profitability, highlighting the distinctive role of the risk subculture in banking.

Keywords: Bank Stress Test, Corporate Risk Culture, Corporate Culture, Transparency Disclosure, Regression Discontinuity

JEL Classification: G20, G21, G28, G30, M14

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1. Introduction

Corporate culture, particularly the risk-taking subculture (or risk culture), plays a crucial role in promoting sound practices and stability in the financial sector. Regulators credit the improved risk culture in banks for enabling them to perform well during the current COVID-19 pandemic.[1] Here banking performance contrasts with that of the 2008 Financial Crisis, for which the then-lax corporate risk culture was held responsible by many stakeholders (Tarullo, 2014; Schuermann, 2014; Song and Thakor, 2019; García and Steele, 2020).[2] Consequently, regulators passed sweeping policy changes among the provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (hereafter the Dodd-Frank Act or DFA), of which Comprehensive Capital Analysis Review (CCAR) stress tests are a crucial component. The CCAR's main objectives include improving banks' capitalization and risk-taking cultures by incorporating forward-looking transparency requirements on large bank holding companies (BHCs). Although the banking literature has recently addressed the impact of stress-testing on bank risk (Braouezec and Wagalath, 2016; Acharya et al., 2018a; García and Steele, 2020), the credit supply (Bonner and Eijffinger, 2015; Acharya et al., 2018a; Bassett and Berrospide, 2017; Cortés et al., 2020; Calem et al., 2020; Doerr, 2021; Schneider et al., 2022; Clark and Li, 2021), and bank supervision (Hirtle et al., 2020; Schneider et al., 2022), little scholarly empirical work has focused on understanding bank culture or the impact of the Dodd-Frank Act's wide-ranging regulations on financial firms' culture, in particular how banks communicate corporate culture and the corresponding risk-taking subculture to stakeholders and the general public.

This paper fills this gap by providing an in-depth empirical analysis of the behavioral implications of stress tests on the communicated bank culture. The relevance of our study is highlighted by the role that risk-taking culture plays in financial firms and its interac-

[1] See "Dodd-Frank has softened the blow of pandemic, its authors say," in American Banker (June 30th, 2020) available at https://www.americanbanker.com/news/dodd-frank-has-softened-blow-of-pandemic-its-authors-say.

[2] In 2018, Jamie Dimon, the CEO of JP Morgan Chase & Co., cited a "strong risk management culture" as one of the primary reasons his bank withstood the financial crisis and came out essentially unscathed. See *Dimon says JP Morgan's actions during '08 crisis were done to 'support our country'—Read full memo to employees* (September 14th, 2018) available at `https://www.cnbc.com/2018/09/14/memo-dimon-says-jp-morgans-actions-during-crisis-were-done-to-support-our-country.html`.

tion with corporate culture overall in organizations shaped by unforeseen contingencies or incomplete contracts (Grossman and Hart, 1986; O'Reilly, 1989; Li et al., 2021a); such interaction is rarely examined in the literature. We argue that banks collectively constitute a special type of firm with distinctive features. First, as financial intermediaries, banks can, by simply increasing their liabilities, receive and lend withdrawable deposits without necessarily risking their own assets. Second, and consequently, managing their liabilities and risk is a central focus of a bank's operations—facing a trade-off between higher profits (or growth) and lower downside risk (or greater safety) (Song and Thakor, 2019). Last but not least, banks are generally highly regulated (e.g., through capital requirements and deposit insurance) to ensure proper risk management and trust in the banking system. These three main bank features directly affect bank culture, further underlining its importance. Given their reputation for opaqueness, it is critical to understand how banks communicate their bank culture to stakeholders, including investors and regulators. The CCAR, which mandated fuller and more frequent transparency disclosures, was passed in an attempt to reduce excessive risk-taking. Hence, in response to CCAR, it would benefit banks to operate more transparently, specifically regarding how they communicate both their risk-taking culture and their overall corporate culture.

A firm's founders or leadership largely determine its culture and consequently it is typically slow to change (Guiso et al., 2015; DeBacker et al., 2015; Gorton et al., 2022). A firm can influence cultural change in part by communicating its values to its stakeholders (Grennan, 2020). In this paper, we study how banks change the way they communicate their bank cultures to stakeholders under transparency requirements accompanying stress tests. We employ textual analysis of bank 10-K documents to obtain our *communicated risk-taking culture* variables, much as in (Owusu and Gupta, 2023).

To define corporate culture and risk-taking culture, we rely on recent literature. The literature defines *corporate culture* as a system of shared values and norms that defines the attitudes and behaviors of individuals involved in an organization (Guiso et al., 2015; Graham et al., 2022; Li et al., 2021b; Gorton and Zentefis, 2022; Gorton et al., 2022). For its part, *risk-taking culture* is defined as consisting of the norms and repeated behavior of individuals within an organization that shapes how individuals assess, inform, report, and

act on the risks faced and taken by the organization that would interest investors, regulators, and other stakeholders (McConnell, 2013; Owusu and Gupta, 2023).[3]

Identifying how firm-level transparency requirements affect how bank culture and behavior are communicated to stakeholders presents several empirical challenges. First, it requires empirically sound measures of both risk and corporate cultures. We overcome this challenge by analyzing the full panel of publicly traded U.S. bank holding companies' orally communicated and written risk-taking culture sentiments and corporate culture values using machine-learning techniques (textual analysis) to analyze conference calls and 10-K reports, respectively.[4] By focusing on cultural-sentiment measures instead of other forms of textual analysis, such as word counts, we are able to identify changes in broadcast cultural sentiments as opposed to evidence of stricter reporting under the DFA.[5] To focus sharply on how the risk-taking culture in banks that involves "assessing, informing, reporting, and acting" on the risk faced and taken is communicated to regulators, investors, and other stakeholders in the context of added transparency under stress-testing, we create measures for the risk-taking cultural sentiments of U.S. banks using natural language processing (NLP) from unstructured texts in 10-K filings.

We measure risk-taking culture using five sentiments—*positive*, *negative*, *uncertain*, *litigious*, and *constraining*—as identified by Loughran and McDonald (2011), and associate those sentiments with seven key risk-taking culture drivers—*Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward* and *Portfolio*. The first six of these risk-taking culture drivers were adopted from the risk-taking-culture framework developed by FSA (2007) while we draw the seventh from Owusu and Gupta (2023), who proposed it for tracking specific portfolio-

[3]In this paper, we use the terms "bank culture" or "culture" alone as inclusive terms for both corporate culture and corporate risk-taking culture. We use "organizational culture" interchangeably with "corporate culture" and the term "risk-taking culture" interchangeably with"risk subculture."

[4]The extant evidence shows that professionally prepared filings as well as other forms of professionally prepared corporate communications such as websites, social media pages, and corporate presentations, among others, can provide textual data with which to identify corporate culture (Zingales, 2015; Guiso et al., 2015; Loughran and McDonald, 2016; Graham et al., 2022; Grennan, 2020, 2019; Li et al., 2021b; Call et al., 2021; Francis et al., 2020b,a). In this paper, we claim that our measures proxy for "communicated" or broadcast risk-taking culture or corporate culture, not the culture itself.

[5]It is also important to note that DFA and the CCAR stress tests do not regulate tone or sentiments in reporting.

related risk sentiments.[6] One advantage we enjoy in using these risk-taking culture-driving sentiments is that we use Loughran and McDonald (2011) financial sentiments and the FSA (2007) culture framework, both of which pre-date the DFA and CCAR stress-testing, which allays concerns regarding whether the Dodd-Frank regulations influence our choices of seeding words or culture frameworks.

Improvement (deterioration) in textually conveyed risk-taking culture is not determined by an increase (decrease) in positive sentiments alone, but also by changes in uncertainty, litigious, and constraining sentiments. Litigiousness, according to Loughran and McDonald (2011), denotes the propensity of a firm to engage in 'legal contest,' hence playing an important role in a firm's risk culture. Uncertainty suggests imprecision, as evidenced by such keywords as "ambiguity," "arbitrary," "imprecise," and "tentative." Constraint represents stipulations and limits within a firm. We hypothesize that an improvement in a firm's communicated risk-taking culture is characterized by improved positive sentiments and reduced uncertainty, litigiousness, and constraint.

The FSA reports that its financial-firm culture framework is based on learned experience, concepts, and methods taken from the organizational-culture literature (FSA, 2007; McConnell, 2013). The framework is based on fundamental principles according to which: "Leadership at all levels sets the tone of an organization, driving the behavior of staff and the quality of decisions. Strategy sets the direction and priorities of the business and the focus for management. Controls, including management information (MI), are essential to satisfy managers (including senior managers) that the firm is delivering fair outcomes for consumers. An organization's approach to performance management and reward drives the behavior of staff and enables management to assess the quality of the performance of an individual" (FSA, 2007).[7]

Regarding verbally communicated corporate culture, we use corporate-culture value measures proposed by Li et al. (2021b), where the authors score the five most popular corporate

[6]For this study, we use the relative positive sentiment, in which we divide the score for positive sentiments by the total score of the sum of positive and negative sentiments.

[7]A similar framework was later recommended and adopted by the Financial Stability Board, an international body that monitors and makes recommendations to its G20 country members regarding the global financial system. See FSB (2014).

cultural values of *Integrity*, *Teamwork*, *Innovation*, *Respect*, and *Quality* according to Guiso et al. (2015), using machine learning to analyze earnings-call transcripts. One advantage of using the Li et al. (2021b) corporate-values measures is that they were created for and validated using firms of all types, not just financial institutions.

A second empirical challenge involves finding variation in the implementation of the transparency requirement at the firm level. We take advantage of a unique exogenous event, the implementation of CCAR stress tests, which were designed to play a disciplinary role by closely monitoring the characteristics, viability, and overall functioning of the governance and balance sheets at tested banks in simulated adverse economic scenarios. BHCs carrying total assets exceeding $100B for the two-year 2011–2012 period or $50B for the 2013–2016 period were required to comply during our study period. This requirement gives us a quasi-experimental scenario in which to exploit the variation in stress-test requirements for regional banks (carrying between $10 billion and $50 billion in assets) and large banks (carrying greater than $50 billion in assets).

Recent literature shows that stress tests help reduce risk-taking behavior on the part of stress-tested banks by reducing the supply of credit to risky corporate, commercial real estate, and small business borrowers (Acharya et al., 2018a; Cortés et al., 2020; Calem et al., 2020; Bassett and Berrospide, 2017). Additionally, García and Steele (2020) show that bank-level measures such as risk-weighted assets drop immediately following the implementation of stress tests and that this reduced risk reflects the shifting of assets by stress-tested banks to assets that fall into lower risk-weight categories. Given empirical evidence in the extant literature of the impact of the CCAR stress tests on bank risk-taking, it seems likely that a bank's leadership would want to be more transparent and improve how they communicate their firm's risk-culture-related values.

Does such improvement in risk-taking following stress-testing translate into overall improvement in how banks perceive and consequently communicate their cultures? If so, how do stress tests impact sentiments related to drivers of bank risk-taking and corporate cultural values? To answer these questions, we first construct aggregate communicated cultural indexes, one for risk subculture and another for corporate culture. Our event studies reveal improvement in both measures under stress-testing. Using our primary econometric

approach, a regression discontinuity design, we find that, for drivers of risk-taking culture, the relative *positive* sentiments for Leadership, Strategy, Control, and Reward improve in an equivalent range of 0.13 to 0.82 standard deviations for treated banks relative to that occurs in non-stress-tested banks, while the sentiments for Decision, Recruitment, and Portfolio fall 0.25 to 1.8 standard deviations. There is evidence of broader industry effects, notably an improvement in the Leadership, Control, and Reward sentiments and deterioration in the Recruitment sentiment, as documented by bank official filings. The evidence is further supported by findings that show stress-testing and the additional supervisory attention helps reduce *uncertainty*, *litigious*, and *constraining* sentiments, mainly through improvement in Leadership, Strategy, and Control. These results are in accordance with anecdotal evidence of a constrained risk culture in some of the largest BHCs, such as Citigroup, SunTrust, and JP Morgan Chase & Co., under the Dodd-Frank Act.[8]

Regarding sentiments associated with corporate values, stress-tested banks alter how they verbally communicate sentiment measures for Integrity, Respect, and Quality to a significantly higher degree than non-stress-tested banks. We find, however, that stress-testing has the unintended consequence of driving Innovation and Teamwork (or collaborative spirit) sentiments down, likely because the DFA discourages certain risky practices (such as lending to risky borrowers and acquiring off-balance-sheet assets, among others), directly affecting incentives and hindering innovation.

Finally, we investigate the bank performance implications of a strong communicated risk subculture and corporate culture. The evidence shows that stress-tested banks with strong risk-taking cultures (those in the top tercile of our culture indexes prior to the DFA) effectively reduce their risk-weighted assets/total assets by 14% and more than double their tier 1 ratios relative to other banks by reallocating their assets to lower risk categories. Such effects do not exist, however, when we examine only the subset of banks with strong communicated corporate cultures. These results highlight the distinctive role corporate risk

[8]During seminars and conference presentations, we received numerous comments and feedback from individuals who had worked or work at some of these organizations. The experiences they shared were consistent with our findings of improved bank culture. The results corroborate anecdotal evidence from regulators at the Federal Reserve (the Fed) and the Office of the Comptroller of the Currency (the OCC), who observed improvements in the overall culture and bank performance during the stress-test years.

culture plays in banking.

Our main contributions to the literature are thus twofold. Our findings reveal that stress tests affect how stress-tested banks communicate their bank cultures, particularly risk-taking subcultures, relative to non-tested banks. Hence, we add to the existing corporate-culture literature (Guiso et al., 2015; Zingales, 2015; Owusu and Gupta, 2023; Graham et al., 2022; Grennan, 2020; Song and Thakor, 2019; Li et al., 2021b,a; Bianchi et al., 2021; Gorton et al., 2022). We extend this literature by revealing the distinct role of risk subcultures within financial organizations and the capacity of those subcultures to mitigate bank-sector risk and misconduct, complementing the work on culture and misbehavior of Calori and Sarnin (1991), Davidson et al. (2015), Biggerstaff et al. (2015), and DeBacker et al. (2015). Second, we also contribute to the stress-test and regulatory-attention literatures (Gambacorta and Shin, 2018; Bassett and Berrospide, 2017; Acharya et al., 2018a; Goldstein and Leitner, 2018; García and Steele, 2020; Clark et al., 2020; Hirtle et al., 2020; Francis et al., 2022; Abbassi et al., 2023), by analyzing the effects of bank stress tests and other regulations on bank culture and behavior.

The rest of our paper is organized as follows. In Section 2 we provide background information on stress-test regulations. In Section 3 we survey the extant literature related to our theoretical arguments. In Section 4 we introduce our data sources and variable definitions. In Section 5 we present our empirical strategy. In Section 6 we discuss our findings and the implications of a strong communicated risk-taking culture and corporate culture. In Section 7 we present robustness checks and summarize the corresponding results. We conclude in Section 8.

2. Dodd-Frank Act and CCAR Stress Test Background

Excessive risk-taking in financial institutions increased sharply in the years leading up to the 2008 Financial Crisis, a sign of deterioration in bank-risk culture. Policymakers moved quickly to pass sweeping policy changes as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. The overarching goal of the Dodd-Frank Act is to protect taxpayers and reduce the likelihood of bailouts of "too-big-to-fail" banks by minimizing systemic risk. A critical component of the DFA is the establishment of annual CCAR

stress tests for large BHCs and selected non-bank financial institutions. These stress tests involve simulation-based examinations of the health and long-term viability of a bank's balance sheets. Bank stress tests are believed to be instrumental in enforcing stricter capital requirements and cultivating a sound risk-taking culture in the banking sector.[9]

The Federal Reserve first initiated stress tests to assess capital ratios for all banks carrying at least $100 billion in assets as of 2008Q4.[10] This measure was known as the Supervisory Capital Assessment Program (SCAP); it later evolved in 2011 into the more formal CCAR stress tests. In 2013 CCAR was expanded to include all banks carrying at least $50 billion in total assets. Beginning in 2017 under the new Republican administration, new policy changes were introduced, including changing the stress-test threshold to $250B starting in 2019, ensuring that only the largest banks would be included.[11] Federal Reserve-run stress tests typically simulate baseline, adverse, and severely adverse scenarios based on a multitude of assumptions regarding distressed economic variables such as GDP, unemployment, equity prices, interest rates, and housing prices, among others. The specifics of the scenarios are subject to change each year to ensure that they remain unpredictable to the banks (Goldstein, 2017).[12]

American banks currently must meet five capital requirements—the capital ratio, the tier 1 ratio, the common equity tier 1 (CET1) ratio, the leverage ratio, and the supplemental leverage ratio. All banks must satisfy minimum requirements that apply to these ratios at all times, with stress-tested banks having also to meet the same requirements in annual stress-test simulations. These stress tests essentially freeze a bank's balance sheet and examine whether its capital ratios remain above the required levels in simulated adverse macroeconomic conditions.[13] Stress-test results are disclosed to the public annually and are

[9]Recent theoretical research demonstrates that mandatory transparency regulations coupled with capital-structure requirements can substitute for trust, improve welfare, and minimize adverse selection (Thakor, 2015; Goldstein and Leitner, 2018; Thakor and Merton, 2023; Biswas and Koufopoulos, 2022).

[10]Federal Reserve Report: The Supervisory Capital Assessment Program: Design and Implementation (April 24, 2009).

[11]In 2020, the bank stress-test threshold reverted to $50B. To avoid any issues related to multiple subsequent policies and administration changes, our analysis focuses on the 2000–2016 period.

[12]Recent literature demonstrates, however, that stress-test scenarios, stringency, and outcomes are somewhat predictable given macroeconomic uncertainty (Sahin et al., 2020; Ahnert et al., 2018; Schuermann, 2014).

[13]For this paper, we focus on traditional capital requirements—the capital ratio, the tier 1 ratio, and

of interest to a range of stakeholders, including analysts and investors.

In addition to the CCAR stress tests imposed on large banks, several other measures were taken to curb risk-taking in the financial industry, such as added regulations of derivatives markets, annual audits of credit-rating agencies, and caps on the Federal Reserve's emergency lending powers. The Financial Stability Oversight Council was instituted expressly to react to 'emerging financial risks' and report policy recommendations to Congress, such as alterations of leverage and liquidity in financial firms. Additionally, the Consumer Financial Protection Bureau was created as an oversight committee to monitor financial institutions and protect consumers from unfair lending practices as well as fraudulent mortgage and credit card practices.

In summary, the DFA, particularly its stress-testing regime, has imposed more stringent prudential standards on large banks, covering risk-based capital requirements, leverage and short-term debt limits, liquidity requirements, risk management, resolution plans, credit-exposure reporting, executive compensation and rewards, and enhanced public disclosure. The added financial safeguards have brought about greater transparency and attention, not only from regulators but also from investors, analysts, bank managers, and CEOs, among others, and are likely to impact financial conduct and risk cultures in financial firms as well as how these factors are communicated in public filings and reporting.

3. Theoretical Arguments

Recent literature on corporate culture and risk culture interprets culture as a long-term, mostly fixed identity often established by founders, CEOs, or executive teams (Graham et al., 2013, 2015; Pan et al., 2017, 2020; Nguyen et al., 2018; Gorton et al., 2022; Gorton and Zentefis, 2022). We argue that, while corporate culture can be intractable and slow to change, the communication of either risk culture or corporate culture can be adapted quickly in highly regulated firms like banks. Hence, while we might not see culture change

the leverage ratio. The supplemental leverage ratio has little effect on our study as it was implemented in the last year of our sample period, 2016, and applied only during stress tests. Similarly, the CET1 ratio was implemented in several phases, starting with some banks in 2014 and others in 2015. Refer to Federal Reserve Press Releases and corresponding stress-test results. See, for example, 2015 results at https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20150311a1.pdf.

immediately after a transparency regulation takes effect, we can capture changes in how the banks now convey culture in their SEC filings as these filings are likely to reflect current perceptions of a bank's leadership.

For theoretical guidance regarding the role of regulations in altering bank culture, we rely on the Song and Thakor (2019) bank-culture model based on which we interpret the provision of a "strong safety net" (deposit insurance, capital requirements, too-big-to-fail guarantees, etc.) as the role of regulators. This safety net influences bank culture directly, but also the manner in which a bank's culture is communicated has potentially long-term effects (as opposed to short-term effects that reverse quickly or result from window-dressing to impress regulators) as well as spillover effects on other banks. Consistent with this view, research has also shown that regulatory transparency disclosures, such as stress tests and the regulatory attention that comes with them, can affect firm-level behavior (Goldsmith-Pinkham et al., 2016; Mas, 2017; Bouwman et al., 2018; Goldstein and Leitner, 2018; Goldstein and Yang, 2018; García and Steele, 2020; Bindal et al., 2020; Heitz and Wheeler, 2021; Hirtle et al., 2020).[14]

We extend the Song and Thakor (2019) framework by breaking down communicated corporate culture into two subcultures—a risk subculture and a non-risk subculture—and argue that a communicated risk-taking subculture can be influenced directly by fixed regulatory requirements and, as such, is key to driving bank performance, further highlighting the role regulations play in complementing bank culture and performance. Our framework is consistent with approaches adopted in the management literature on cultural change, which defines corporate culture as an amalgamation of subcultures, each of which can be influenced by external and internal catalysts (Meyerson and Martin, 1987). Our main theoretical framework focuses primarily on the channel through which stress tests affect bank culture as communicated in formally prepared documentation such as 10-K filings and earnings calls, as illustrated in Figure 1. Recent literature has shown that an exogenous stress-test regulation with transparency requirements and attention from regulators reduces riskiness in

[14]When it comes to banks, the benefits of greater disclosure are theoretically unclear (Goldstein and Leitner, 2018; Vashishtha et al., 2021). Focusing on communicated bank culture, we shed some light on another dimension through which transparency disclosures can affect banks.

banks (Acharya et al., 2018a; Bassett and Berrospide, 2017; Cortés et al., 2020; Calem et al., 2020; García and Steele, 2020). We argue that such regulations also affect the communicated bank culture through changes in the perception of risk, risk standards, best practices, and overall risk management—these effects are denoted by arrows A and B in Figure 1. Improving treated banks' perceptions of culture can further help reduce and maintain a reduced level of risky activities, as manifested in lower risk densities and higher risk-to-capital ratios, particularly in adverse economic conditions (arrow C in Figure 1). Additionally, a strong risk-taking culture can enhance bank financial performance (arrows D and E depict the impact of bank risk and bank culture on bank characteristics).

Notably, an environment featuring a strong communicated risk-taking and corporate culture can incentivize higher risk-taking, potentially causing moral hazard through corporate 'cultural capital' insurance. Such bank behavior can hurt bank performance and profitability. Moreover, strong improvements in a communicated corporate culture and risk subculture may have opposite effects on bank behavior, highlighting the distinctive roles organizational culture and a risk subculture may play in mitigating bank risk.

Consequently, interest in understanding the risk-management principles that have governed financial firms since the early 2000s and before the 2008 Financial Crisis is growing. The Financial Services Authority developed the 'Treat Customers Fairly – Culture Framework' that lays down the six key drivers of risk culture in large and small financial firms (FSA, 2007). Our risk-taking culture drivers are based on the FSA (2007) framework that predated the DFA. The Financial Stability Board later adopted a similar framework (FSB, 2014).

Very few studies have linked bank culture and performance. Aebi et al. (2012) find that BHCs that practice sound corporate risk-governance measures perform better than those that eschew such measures. Moreover, Bonaccorsi di Patti and Kashyap (2017) find that improving risk management and strengthening internal controls helps banks recover quickly from crises. Our paper is most closely related to concurrent work by Bianchi et al. (2021), who use quantitative text analysis to define corporate culture, finding that in a sample of European banks strong culture is related to stronger performance. Our paper differs from these studies in that we measure risk subcultures across multiple sentiment dimensions and

estimate the causal effects of stress-testing on risk subculture and corporate culture as it is communicated by management in formally prepared documents and earnings calls. We also assess the behavioral and performance implications of risk subcultures.

4. Data and Variable Definitions

We focus our analysis on BHCs using data from 2000 through 2016. We define stress-tested (or treated) banks as the subset of banks that were required to comply with CCAR stress tests during the 2011–2016 period. Of the approximately 4,000 BHCs in the United States, only the largest 35 banks were stress tested for at least one of the sample years. Table A1 in our Online Appendix lists the relevant banks for our study, which on average carry $10B or more in assets, and indicates which banks were stress-tested in each year of the sample period.[15]). The list includes regional banks (those carrying assets valued between $10B and $50B) and large banks (those carrying assets valued at $50B and above), for a total of 97 BHCs.[16]

We obtained BHC characteristics from the FR Y-9C Consolidated Statements for Financial Companies data report generated by the Federal Reserve to help us analyze the sampled banks' financial status and performance. Table 1 provides the summary statistics for our bank variables for our baseline period of analysis (2011–2016). The summary statistics show that stress-tested banks tend to exhibit, on average, lower risk densities, tier 1 ratios, leverage ratios, loan percentages, return on assets, and return on equity but higher capital ratios, consumer loans, cash-on-hand, off-balance-sheet assets, and federal funds assets than non-stress-tested banks.

Our communicated risk-taking subculture and corporate culture measures were obtained using textual analysis from several sources. Textual analysis of professionally prepared com-

[15]The list of stress-tested banks comes from the Federal Reserve's annual publications of CCAR results (see `https://www.federalreserve.gov/publications/comprehensive-capital-analysis-and-review-publications.htm`

[16]In our analysis we are interested in capturing all BHCs, commercial and non-commercial banks, traditional and non-traditional banks, and foreign and domestic banks, among others, because the Dodd-Frank Act and stress testing apply equally to all banks if they meet size requirements. The incorporation of bank fixed effects in our analysis should help ease concerns related to the inclusion of some of these banks. For example, the effects of foreign banks that must comply with other international regulations would be absorbed by the bank fixed effects, easing concerns that foreign regulations drive our results.

pany documents and reports, such as 10-K filings, have been used in the literature to capture qualitative sentiments and are considered an important source of information in management for understanding the health of a firm (Loughran and McDonald, 2011; Huang and Li, 2011; Zingales, 2015; Loughran and McDonald, 2016; Dyer et al., 2017; Friberg and Seiler, 2017; Ott, 2020). While culture is thought to be slow to change, the textual measures we use capture variable aspects of culture that can be communicated by bank managers.

We apply textual analysis and unsupervised machine learning to define risk-taking culture in BHCs using their 10-K filings.[17] The approach builds on the FSA (2007) risk-culture framework that identifies key risk drivers: *Leadership*, *Strategy*, *Control*, *Decision*, *Recruitment*, *Reward*, and *Portfolio*.[18] *Leadership* measures a firm's senior management's core values and behavior; these factors can influence the firm's risk assessment and risk-taking culture. *Strategy* captures a firm's strategic risk perspective and includes the risk appetite and risk framework developed within the firm. *Control* tracks well-defined and implemented risk reporting, review, delegation, and stress-testing. *Decision* measures decision-making, focusing on informed and competent decisions made within a firm that, directly or indirectly, impact the firm's risk-taking culture. *Recruitment* proxies for staff recruitment and training to enable bank employees to monitor and assess risk effectively. *Reward* tracks the compensation component, capturing salaries, profit-sharing, bonuses, and commissions, which are included to define incentives that affect a firm's risk-alignment and risk-adjustment cultures. Lastly, $Portfolio$ captures a firm's relevant balance-sheet components related to risk-taking and management culture.

The five sentiment types from the Loughran and McDonald (2011) dictionary—namely *positive*, *negative*, *uncertain*, *litigious*, and *constraining*—are used to define a bank's attitude toward factors associated with risk-taking culture.[19]

[17] See Owusu and Gupta (2023) for additional details on the approach used to capture the measures and sentiments.

[18] See Table A2 in our Online Appendix for additional details on the risk-taking culture framework proposed and deployed in FSA (2007).

[19] In Table A3 in the Online Appendix we list definitions of risk-taking culture sentiments. In Table A5 we offer examples of words drawn from the larger Loughran and McDonald (2011) sentiment word list that comprises an aggregate dictionary of words related to the five sentiments used in our study. Find the original source of the sentiment word list and master dictionary at `https://sraf.nd.edu/textual-analysis/resources/#LM\%20Sentiment\%20Word\%20Lists`.

We combine *positive* and *negative* sentiments to create a *relative positive* sentiment by dividing positive sentiments over the sum of positive and negative sentiments. In our analysis we used the *relative positive* sentiment measure (to which we refer, for simplicity, simply as *positive* sentiment). This generates 28 risk-taking culture sentiments when we combine the four sentiments with seven risk-taking-culture drivers. We define risk-taking culture in our sample of banks by reference to these risk-taking-culture–sentiment features. For instance, observing a significant increase in our quantified *positive* sentiment for the *Leadership* risk-culture feature would indicate a statistically significant positive increase in a bank's conscious attempts to communicate its core values, integrity, operations, and leadership as risk drivers in stress-tested banks. To take another example, a statistically significant decrease in the litigious sentiment related to the *Control* risk-culture driver would indicate a significant reduction in language related to reviews, reporting, risk delegation, and stress-testing in 10-K filings of treated banks relative to the language observed in control-group filings.

Panel A of Table 2 presents the summary statistics for our seven drivers of risk culture below and above the $50B CCAR stress-test threshold. Generally speaking, when comparing treated and control banks around the $50B policy cutoff, we observe higher positive sentiment for the following risk-taking culture drivers: Decision, Control, Recruitment, and Reward. Additionally, when focusing on bank leadership, which is largely responsible for setting the tone regarding a bank's risk-taking culture, we observe less litigious sentiments. We note reduced uncertainty, litigious, and constraining sentiments for Reward.

We obtain our communicated corporate-culture value measures from Li et al. (2021b). Corporate culture (organizational culture), as opposed to national culture, can be thought of as a control system with shared norms and values that create a bond between a firm's strategy and employee commitment (O'Reilly, 1989; O'Reilly and Chatman, 1996). Li et al. (2021b) use the five most frequently used cultural values in Guiso et al. (2015): *Integrity*, *Teamwork*, *Innovation*, *Respect*, and *Quality*.[20] They then create scores for these measures using machine-learning techniques, such as natural language processing (NLP), from banks' earnings call transcripts.[21] *Innovation* relates to seed words such as "creativity," "efficiency,"

[20]See Table A4 in our Online Appendix for examples of seed words for each of the corporate-culture values.
[21]Li et al. (2021b) find that, in the years preceding the financial crisis (2001–2006), Citigroup Inc. was

and "excellence." *Integrity* captures accountability, transparency, and ethics. *Quality* refers to dedication and the quality of products or services to customers. *Respect* relates to dignity, consistency, and empowerment, while *Teamwork* correlates with recruiting, collaboration, cooperation, and a healthy work environment. The summary statistics for corporate-culture values reported in *Panel B* of Table 2 show improvement, particularly in the values of Integrity (0.53 for stress-tested versus -0.01 for non-stress-tested banks), Teamwork, and Quality, with deterioration in Respect when comparing stress-tested and non-stress-tested banks.

5. Empirical Strategy

To estimate the causal impact of stress-testing on communicated risk-taking culture and the larger corporate-culture umbrella, we use a sharp regression discontinuity design (RDD) to exploit the quasi-experimental feature of the regulation that allows us to measure the local average treatment effect at the strictly defined treatment cutoff or policy threshold (Imbens and Lemieux, 2008; Cattaneo et al., 2019). As discussed in Section 2, this cutoff is \$100B for 2011–2012 and \$50B for 2013–2016. To ensure flexibility of the functional form, we implement both linear and quadratic specifications of the RDD. For the sake of brevity, we show the quadratic specification below:[22]

$$\begin{aligned} Y_{it} = \beta_0 + \beta_1 StressTest_{it} + \beta_2 Assets_{it} + \beta_3 StressTest_{it} * Assets_{it} \\ + \beta_4 Assets_{it}^2 + \beta_5 StressTest_{it} * Assets_{it}^2 + \boldsymbol{\beta}_6 \mathbf{X}_{i,t-1} + \boldsymbol{\delta} + \epsilon_{it}, \end{aligned} \tag{1}$$

where Y_{it} is the driver of textually communicated bank risk-taking culture or the verbally communicated corporate-culture value of interest for BHC i at time t. $Assets_{it}$ are normalized assets, the natural log of total assets minus the natural log of the policy cutoff asset value.

among the ten lowest-ranked firms for *integrity* among S&P 500 firms. M&T Bank and HSBC also received unfavorable rankings— featuring among the ten S&P 500 firms earning the least *respect*. Fannie Mae was allotted the third-lowest ranking for *respect* in the 2007–2012 period (a period that includes the recession and the implementation of the DFA). For the years 2013–2018, U.S. Bancorp was among the highest-ranked firms for *integrity*, while Citigroup Inc. ranked third-lowest for *respect*.

[22] We do not use high-order polynomials because estimations using with such polynomials can be misleading (Gelman and Imbens, 2019).

$StressTest_{it}$ is a dummy variable that equals 1 if a bank's asset value is above the policy cutoff. $Assets_{it}^2$ and the interaction terms, $StressTest_{it} * Assets_{it}$ and $StressTest_{it} * Assets_{it}^2$, allow for functional-form flexibility around the policy threshold when estimating the treatment effect or our coefficient of interest, β_1. To reduce variability in our estimation and to control for unobservable characteristics, we include covariates ($\mathbf{X}_{i,t-1}$) and fixed effects ($\boldsymbol{\delta}$), as recommended by (Pettersson-Lidbom, 2012; Lee and Lemieux, 2010). For example, it is possible that some banks accept higher risk levels because they also adopt business practices that enable them to better manage this risk. In the vector of bank characteristics, $\mathbf{X}_{i,t-1}$, we include a range of performance variables (net income, equity, deposits, total costs, loan-loss reserves, and problem loans) and lending ratios (for commercial real estate loans, residential real estate loans, agricultural loans, commercial and industrial loans, consumer loans, and foreign government loans). We include one-period lags of bank characteristics as controls to avoid reverse causality. Given that stress tests and bank-level financial conditions may both be responding to overall economic conditions, in the vector of fixed effects, $\boldsymbol{\delta}$, we include bank and year fixed effects, as in recent literature (García and Steele, 2020). These fixed effects help us control for unobserved attributes fixed at the bank and year levels and control for macroeconomic and financial conditions, such as changes in GDP growth, expected inflation, and market volatility, that may impact financial markets—including credit demand and lending behavior.[23] Lastly, ϵ_{it} are the corresponding error terms.

In executing the RDD regressions, as is customary, we use a triangular kernel to allocate more weights to observations near the cutoff and address the potential for boundary problems to arise (Fan and Gijbels, 1996), and we cluster standard errors at the bank level. Furthermore, we follow standard RDD practices by reporting regression results at varying bandwidths to analyze bandwidth size sensitivity. First, we use an optimal bandwidth estimator that selects the optimal bandwidth and window using all banks. We use the mean square error (MSE) optimal bandwidth estimator, which takes the minimum opti-

[23]Among our robustness checks, we included direct controls for macroeconomic and financial conditions, such as GDP growth, expected inflation, and annualized market volatility, which can influence the riskiness of bank assets, and find consistent results. We also perform a covariate sensitivity analysis (by removing some of the controls) and include state-year fixed effects as robustness checks, and the results generally remain consistent. We omit these latter results from the paper to avoid redundancy.

mal bandwidth of the most common MSE-optimal procedures, as described in Imbens and Kalyanaraman (2012) and Calonico et al. (2014); and in the cross-validation we adopt the algorithm proposed by Ludwig and Miller (2007).[24] A limitation involved in employing optimal bandwidths is that the function chooses varying bandwidths for distinct dependent variables of interest, making them difficult to compare across variables and functional-form specifications. To circumvent this issue and maintain the consistency and reliability of the results, we require the optimal bandwidth to employ a minimum of 50 observations. Doing so gives us a somewhat balanced sample with sufficient stress-tested and non-stress-tested banks.[25]

Given that our RDD specification suggests randomized variation in treatment assignment at values sufficiently close to the threshold, it is then by design that those banks would drive the estimates. To analyze how pervasive these effects are in our sample of BHCs, we also study the broader impacts of the regulation by setting fixed windows in our RD design based on the assignment variable (total assets) to include other banks: a subsample of banks carrying over \$25B in assets and another subsample of banks carrying \$10B-\$200B in assets.[26] These sub-samples span all of the BHCs covered in the stress-testing literature (Cortés et al., 2020; Hirtle et al., 2020; García and Steele, 2020).

To assess the soundness of our RDD execution in our quasi-experimental setting, we conduct a McCrary (2008) manipulation test and several other tests of the RDD assumptions that we discuss further in Section 7. A fundamental assumption of RDD is local continuity in the running variable. Recent stress-test studies find no evidence that banks manipulate their asset size precisely so as to come in just below the threshold (García and Steele, 2020). Our McCrary (2008) manipulation test confirms that there is no evidence of bank-

[24]In untabulated results, we also used the coverage error (CER) optimal bandwidth, which takes the minimum bandwidth of the various coverage error procedures, following Calonico et al. (2016), and the results are generally consistent. These optimal bandwidth measures can be easily implemented in Stata using the *rdrobust* command and setting *msecomb1* and *cercomb1* as the bandwidth selectors.

[25]To put this point into perspective, a bandwidth with 50 observations is slightly larger than the ±10% bandwidth of the natural log of the bank-size policy threshold, which corresponds to an asset range of -\$16B to +\$24B around a bank-size threshold of \$50B. Asset bandwidths vary on each side of the threshold because of the logged nature of total assets.

[26]We cap this threshold at \$200B given that regulators regard banks carrying assets above \$200B as the largest of the large banks and their business patterns vary widely from regional banks carrying assets between \$10B and \$50B.

size manipulation (see Figure 2 and Table A9 in our Online Appendix).[27]

Inasmuch as stress tests affect both risk-taking and risk-taking culture, it is difficult to cleanly isolate the effects of bank stress tests and changes in communicated bank culture on performance. Therefore, we use a causal-interaction approach, or a triple difference-in-differences design, to investigate whether developing a robust communicated risk-taking subculture or corporate culture adds value beyond the effects of regulatory supervision via stress tests. One advantage of using a difference-in-differences design is that we can apply it across all banks, not just those operating relatively close to the policy cutoff, which increases the number of observations. Using this methodology, we study some implications of strong communicated risk-taking culture and corporate culture on bank risk and other performance characteristics. For simplicity, we define a strong communicated-culture bank as a bank that belongs to the top tercile of the corresponding relayed culture index.[28] Our triple DiD specification is shown in Equation 2. α_6 is the coefficient of interest in the following regressions:

$$Y_{it} = \alpha_0 + \alpha_1 T_{it} + \alpha_2 StressTest_{it} + \alpha_3 T_{it} * StressTest_{it} + \alpha_4 T_{it} * Culture_{it} + \alpha_5 StressTest_{it} * Culture_{it} + \alpha_6 T_{it} * StressTest_{it} * Culture_{it} + \boldsymbol{\alpha_7} \mathbf{X}_{i,t-1} + \boldsymbol{\delta} + \varepsilon_{it}, \quad (2)$$

where the definitions of Y_{it}, $StressTest_{it}$, $\mathbf{X}_{i,t-1}$, and $\boldsymbol{\delta}$ are the same as above. $Culture_{it}$ refers to one of the following: (1) the top tercile of banks with the strongest risk cultures as communicated in their 10-K filings; or (2) the top tercile of the strongest corporate-culture banks as measured using transcripts of earnings calls. T_{it} is a dummy variable that equals 1 if a bank was stress-tested that year and 0 otherwise—for the pre-test period and for the non-stress-tested banks. While ε_{it} are the corresponding error terms. Our event study results discussed in Section 6 confirm the parallel trend assumption for the difference-in-differences analysis.

[27] See McCrary (2008) and García and Steele (2020) for a description of the test procedure.

[28] This definition is consistent with the various "strong" culture frameworks discussed in O'Reilly (1989) and Chatman and O'Reilly (2016) and more recently implemented in Li et al. (2021b,a).

6. Results

Recent literature shows that stress tests help reduce risk-taking behavior in stress-tested banks by reducing the credit supply to risky borrowers and shifting assets to lower risk-weight categories in ways that do not affect non-stress-tested banks (Acharya et al., 2018a; Cortés et al., 2020; Calem et al., 2020; Bassett and Berrospide, 2017; García and Steele, 2020). Consistent with this literature, our event study of risk-weighted assets reveals that, to a large extent, stress-tested and non-stress-tested banks follow parallel trends before the implementation of stress tests. After 2011, the first year of stress tests, however, treated banks reduced their risk densities to a greater extent than banks in the control group, and these densities remain lower for the rest of the analysis period (see the top panel of Figure 3).[29]

In this paper, by considering how stress tests impact the ways in which the C-Suite communicates bank culture (namely, risk-culture-driver sentiments and corporate-culture values communicated either through formally written 10-K documentation or orally in earnings conference calls), we examine another channel through which stress tests might affect riskiness in banks and the implications thereof. Our event-study graphs (Figure 3) show both the aggregate communicated corporate culture and risk-subculture indexes. For our risk-culture index, we take the weighted average of the seven drivers of risk culture associated with positive sentiments based on the re-scaled weights from Graham et al. (2022) (see Table A8 in the Online Appendix), with the highest weight being allocated to Leadership.[30] We follow Li et al. (2021b) and create a corporate-culture index by summing the scores of all corporate-culture values in our analysis—namely, the observed values of Integrity, Teamwork, Innovation, Respect, and Quality.

The middle panel in Figure 3 exhibits the relative trends in our communicated corporate-culture index for banks in the treated and control groups. The figure shows that, leading up to the recession years, the communicated corporate culture in stress-tested banks was weaker

[29]See García and Steele (2020) for detailed results pertaining to the effects of stress tests on bank-level risk ratios such as the tier 1 ratio, the capital ratio, and the leverage ratio.

[30]Leadership is considered the primary driver of risk culture in firms (see FSA (2007), McConnell (2013), Graham et al. (2013), Pan et al. (2017), and Graham et al. (2022), among others, for a summary of the literature).

than that in non-stress-tested banks. A year after the implementation of the stress tests, in 2012, we see greater improvement in overall corporate culture in stress-tested banks than in banks in the control group. Below, we formally test, estimate, and discuss the impact of stress tests on our risk-taking culture drivers and corporate culture values.

The bottom panel of Figure 3, highlighting the relative trends in the risk-culture index between stress-tested and non-stress-tested banks, shows that, in the early 2000s, the stress-tested banks had improved with respect to the overall risk-taking culture sentiment after the implementation of the Sarbanes-Oxley Act of 2002. From 2005 until the onset of the recession years, stress-tested banks showcased a risk-taking culture sentiment that grew more negatively annually than in non-stress-tested banks. After the implementation of the stress tests, we see a sharp increase in positive risk-taking culture sentiment beyond that in banks in the control group; the level remains stable through the end of our period of analysis, 2016.[31] Our local-mean smoothing graphs (Figure 4) further confirm the improvement in risk behavior and positive Leadership sentiment around the stress-test policy thresholds, demonstrating that stress-tested banks reduce risk-weighted assets while increasing the communicated positive Leadership sentiment to a greater extent than non-stress-tested banks.

6.1. The Effects of Stress Tests on Communicated Risk-Taking Culture and Corporate Culture

We begin our discussion by first studying the impact of the CCAR stress tests on *positive* sentiment with respect to each of our seven risk-taking culture drivers (Leadership, Strategy, Control, Decision, Reward, Recruitment, and Portfolio) as communicated by banks in their prepared 10-K filings. In Table 3 we report the RDD results, with coefficients measured in standard deviations. We find that the local average treatment effect of the tests on positive Leadership sentiment significantly increases by 0.13 standard deviations relative to the effects on Leadership sentiment in non-stress-tested banks. Positive sentiment improves for Strategy and Control, while it diminishes for Decision, Recruitment, Reward, and Portfolio. Regarding the broader effects, we find evidence of consistent effects only on positive

[31] Although they are not shown here, we also find upward trends in positive sentiments for each of the individual culture drivers—Leadership, Strategy, Control, Recruitment, Reward, and Portfolio.

sentiments for Strategy, Control, Recruitment, and Reward, but the magnitude of the RD coefficients tends to be smaller.

We next analyze the impact of bank stress tests on communicated corporate culture, using the alternative corporate-culture values that appear in Li et al. (2021b). The regression discontinuity results are shown in Table 7. Using our MSE optimal estimates, we find that stress-tested banks significantly increase their scores for Integrity, Respect, and Quality, with the effect ranging from 0.68 to 2.37 standard deviations higher than scores for banks in the control group. These results are consistent with the presence of an improved risk-taking culture sentiment. We do find evidence, however, that the scores for Teamwork and Innovation drop by 0.50 to 1.25 standard deviations, demonstrating that the DFA and stress tests have an unintended negative impact on collaborative environments and innovation. Interestingly, we find evidence primarily of negative effects on Innovation among our broader effects, suggesting that these unintended consequences are more prevalent in our full sample of banks. These findings are consistent with our baseline risk-culture results, in which we find that stress tests negatively affect sentiment for Recruiting and Portfolio, two of the risk-taking culture drivers that are more likely to affect the sentiment for corporate-culture values of Teamwork and Innovation.[32]

Next, we briefly discuss the impact of the CCAR stress tests on risk-taking culture drivers related to the *uncertainty*, *litigious*, and *constraining* sentiments (The tables are available in the Online Appendix). The increase in transparency and attention from the regulator depresses the *uncertainty* sentiments in stress-tested banks for Leadership, Strategy, and Control, while raising *uncertainty* sentiments for Decision, Recruitment, Reward, and Portfolio, as expected, given that one of the main goals of the regulation is to discourage risk-taking, which directly affects portfolio and reward decisions (Table 4). The implementation of the stress tests also seems to contribute to depressing the *litigious* sentiments for the

[32]Although we include bank and year fixed effects in our baseline specification to help control for unobserved attributes fixed at the bank and year levels and control for macroeconomic and financial conditions, to demonstrate robustness we conduct an analysis with additional macroeconomic control variables that may impact financial markets, such as GDP growth, expected inflation, and annualized volatility. Our results remain consistent with the main analysis for both risk-taking culture corporate-culture values (see Tables A6–A7).

Leadership, Strategy, Decision, Control, and Recruitment drivers in the treated banks while raising the *litigious* sentiments only for Reward and Portfolio, as expected given that the DFA directly impacts risk-taking incentives (Table 5). Lastly, our *constraining* sentiment results reported in Table 6 show depressed sentiments for Leadership, Strategy, Decision, Control, Recruitment, and Reward, but more positive *constraining* sentiments for Portfolio.

6.2. Implications of Strong Risk Culture and Corporate-Culture Sentiments

The question, then, is whether a strong risk subculture and positive corporate-culture sentiments (as communicated by bank leadership) enhance bank performance and stability under increased regulatory attention. To answer this question, in this section we implement a triple difference-in-differences methodology using all banks carrying at least $25B in total assets to capture the 'causal interaction' effects of bank culture in our experimental setting.

To identify banks with strong corporate-culture and risk-culture sentiments before the implementation of CCAR stress tests, we take the average of the corresponding bank-culture index for each bank for the five years immediately preceding the DFA for the 2006–2010 period. We identify banks with strong corporate-culture or strong risk-culture sentiments if they appear in the top tercile of their assignment groups among stress-tested banks and non-stress-tested banks, respectively.

6.2.1. Capital Ratios and Risk-Weight Asset Allocation

Using our difference-in-differences approach, we find that stress tests encourage banks to reduce risk-weighted assets scaled by total assets (Panel A in Table 8). However, we find no effect on capital ratios or evidence of asset-weight category reallocation. The results reported in Panel B demonstrate that stress-tested banks with strong risk cultures as communicated in textual filings, however, reduce their risk-weighted assets as a proportion of total assets by 14%, while they more than double their tier 1 ratios. The banks do this by reallocating assets from the highest (100%) risk-weight category into one of the lowest risk-weight categories (20%). Interestingly, we do not observe similar behavior for stress-tested banks with only strong positive communicated corporate cultures (Panel C). Given that our bank-culture measures are calculated at the bank-year level, we do not include bank-year fixed effects. As described in our specification, we include a set of bank-level controls and bank and year fixed

effects. Therefore, we interpret our results as prima facie evidence of reduced risk-taking, which is consistent with findings reported in recent literature (Braouezec and Wagalath, 2016; Acharya et al., 2018b; García and Steele, 2020).

6.2.2. Bank Performance

We find that stress-tested banks earn levels of profitability similar to those of non-stress-tested banks, as evidenced by statistically nonsigificant changes in problem loans, return on equity, return on assets, net interest margin, and net non-interest margin under stress-testing, based on our difference-in-differences results reported in Table 9. The results reported in Panel B show, however, that stress-tested banks with strong communicated risk-taking cultures reduce their problem loans by 1.1% and increase their return on assets by 1.3%, while no significant impact on net interest margin or net non-interest margin was found. The reverse is true for stress-tested banks with strong communicated corporate cultures only—return on equity and return on assets drop following CCAR stress tests while rising for net non-interest margin (Panel C). This evidence highlights that a sound communicated risk-taking culture, rather than a sound overall communicated corporate culture, is more critical to enhancing performance in financial firms under the DFA, adding to the literature on culture and financial performance (Calori and Sarnin, 1991; Aebi et al., 2012; Bianchi et al., 2021).

6.2.3. Bank Lending and Portfolio Allocation

Table 10 presents the difference-in-differences results for bank lending. The results reported in Panel A demonstrate that stress tests do not significantly affect aggregate bank-level lending behavior. We find that stress-tested banks with strong communicated risk-taking cultures reduced lending by 5.7%, with commercial real estate (CRE) loans being the main contributor to an overall drop in lending, which itself dropped 10.5%, as seen in Panel B. Panel C shows that banks with only a strong communicated corporate culture did not act differently from those that lack such a communicated corporate culture.

Regarding a bank's total portfolio, the results reported in Table 11 reveal that stress-tested banks reduced their off-balance-sheet assets and increased their held-to-maturity (HTM) securities (Panel A). There were no differential effects at the aggregate level on

held-for-sales (HFS) loans, available-for-sales (AFS) securities, cash and deposits due, federal funds, or other assets as a percentage of total assets. We find, however, that banks with strong communicated risk-taking cultures or strong communicated corporate cultures did not change their portfolios in a statistically significant way. This finding is not surprising, given that recent evidence suggests that stress-testing and the associated regulatory requirements create incentives for banks to carry very similar asset holdings in their portfolios (Steele, 2019).

7. Robustness Checks

Our baseline results withstand a series of robustness checks presented in our Online Appendix.[33] First, we perform pre-tests to ensure that our results did not exist before the DFA was enacted, showing results for the full pre-sample period (2000–2010) and for the pre-recession years (2000–2007), which is arguably a better comparison period that excludes the recession years (Table A11). Generally speaking, we find that the pre-sample-period test results are statistically nonsignificant—and the exceptions that show significance have the opposite sign, further validating our baseline results. Second, we conduct falsification tests at false policy cutoffs. As suggested by Lee and Lemieux (2010), we execute Equation (1) at several false thresholds, ±10% of the true policy thresholds. We conducted this exercise to help us investigate whether the true CCAR policy thresholds drive our main results. We find that the coefficients, when compared with our baseline results, show either opposite signs, loss of statistical significance, or high sensitivity to the specification-bandwidth choice, further strengthening the argument that the effects at the true thresholds reflect the implementation of stress tests (Table A12).

Lastly, because the policy threshold changes two years into our sample period, as highlighted in Section 5, some may be concerned that the first set of stress tests implemented using the $100B threshold drive the results. To address this concern, we restrict our sample

[33]For the sake of brevity, we focus our discussion and provide the results of robustness checks for drivers of positive sentiment risk-taking culture using only the MSE optimal bandwidth. Although the results are not shown in the paper, we also conducted robustness checks for corporate-culture values, and all our robustness checks corroborate our baseline results.

period to 2013 to 2016, when the threshold is constant at $50B in assets. We find that the results are consistent with our corresponding baseline results (Table A13).[34]

8. Conclusion

Jamie Dimon, the CEO of JP Morgan Chase & Co., cited a "strong risk management culture" as one of the primary reasons his bank withstood the financial crisis and came out essentially unscathed. More recently, regulators and other stakeholders have credited the DFA and the improved risk culture in banks for their performance during the current COVID-19 Pandemic. The new evidence presented in this paper supports this hypothesis—in the context of communicated risk-taking culture.

This paper studies the effects of transparency disclosures on the culture communicated by bank holding companies textually in 10-K filings and orally in earnings calls. Exploiting the variation around the CCAR stress-test bank-size policy thresholds and textual data obtained in our analysis of sentiments to measure risk-taking culture and corporate culture, we document that stress-tested banks substantially boost their communicated risk-taking culture and corporate culture while reducing risk and improving performance. Additionally, we find that the *uncertainty*, *litigious*, and *constraining* sentiments improve for stress-tested banks to a greater extent than for non-stress-tested banks. One of the unintended consequences of stress tests is deterioration in the Teamwork and Innovation sentiments. Our findings suggest these effects are more pervasive and broader than originally thought and are not driven by the behavior of only a handful of banks.

Our work advances our understanding of corporate culture in banks, the role of risk-taking culture, how these cultures are communicated to stakeholders, and their behavioral implications. We find that, when exposed to stress tests, banks with strong communicated risk-taking culture further reduce their risk densities and lending involving risky loans while increasing capital risk ratios and profitability. Surprisingly, these effects disappear when examining banks with strong communicated corporate culture only. Our results underscore

[34] As discussed in Section 7, the results reported in Figure **??** and Table A9 in our Online Appendix indicate that the standard RDD assumption of no manipulation of the running variable hold in this setting as well.

the distinct role of risk-taking subculture and how it is communicated in mitigating bank risk and improving performance. Importantly, the evidence reveals that the conveyed sentiments pertaining to corporate-culture values might sometimes work with or against communicated risk-taking subculture, highlighting the need to adequately address how financial institutions communicate their risk-taking cultures.

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9. FIGURES

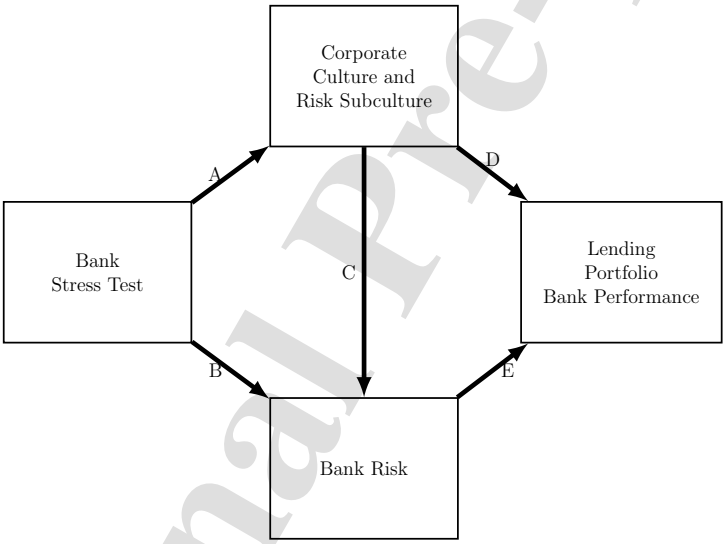

Fig. 1. Theoretical framework: Stress tests, bank culture, and bank characteristics.
This figure shows the channels through which CCAR stress tests impact bank corporate culture and risk culture as communicated in their formal textual filings and earnings calls as well as risk, lending, portfolio characteristics, and performance.

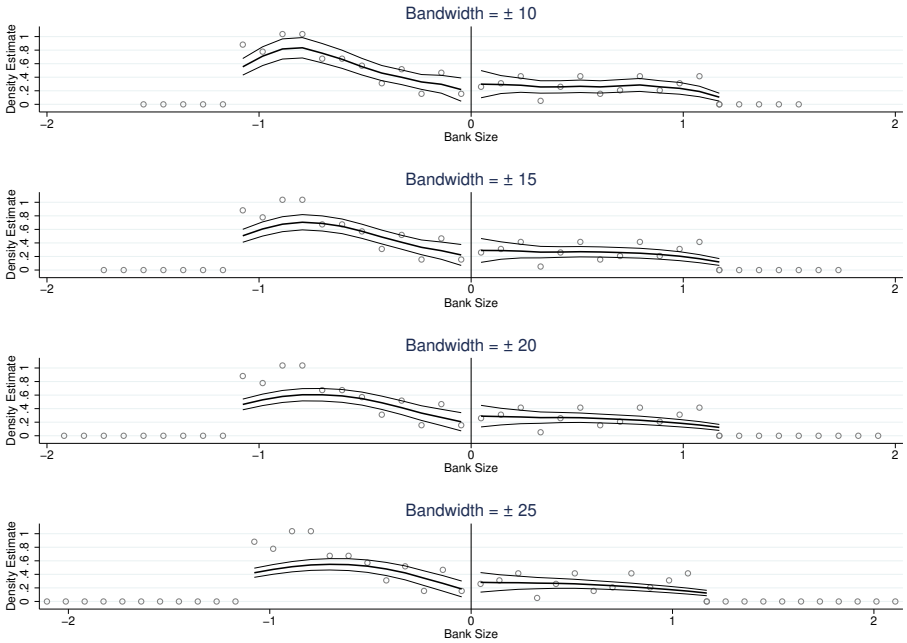

Fig. 2. McCrary (2008) discontinuity tests for bank stress tests (2011–2016).
McCrary (2008) discontinuity test results are shown for various bandwidths (±10%, ±15%, ±20%, and ±25%) of the natural logarithm of the bank stress test policy threshold for 2011-2016. The McCrary (2008) procedure tests for discontinuity at the cutoff using the density of the assignment variable (bank size) separately on both sides of the bank stress test threshold as suggested in McCrary (2008). We follow the steps in McCrary (2008), where circles indicate the estimated density within each bin. Solid black lines are estimates from the local linear regressions in various bandwidths, and light gray lines are 95% confidence interval bands.

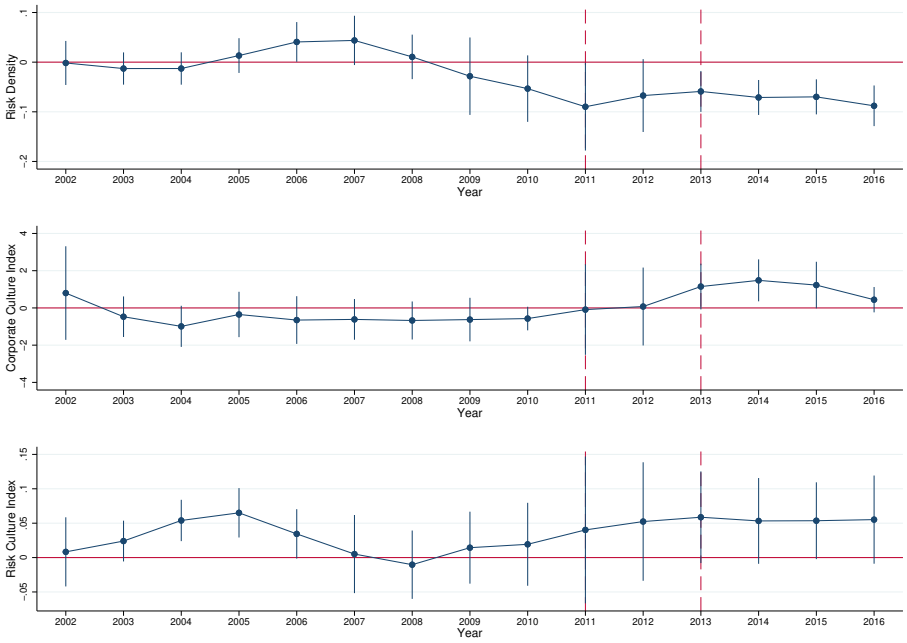

Fig. 3. Trends in risk ratios, risk-taking culture, and corporate culture indexes: Stress-tested vs. non-stress-tested banks.
This figure compares the relative annual trends for risk-weighted assets/total assets, risk culture, and corporate culture indexes for CCAR banks with the same trends for non-CCAR banks over the period of analysis. The top panel shows the *Risk Density*, which is defined as the risk-weighted assets divided by total assets, while the middle panel shows the *Risk Culture* index created by summing the communicated risk-taking culture drivers (Leadership, Strategy, Decision, Control, Recruitment, Reward, and Portfolio) using the adjusted weights from the survey of Graham et al. (2022). The bottom panel shows values of the *Corporate Culture* index and the sum of the five cultural values (Integrity, Teamwork, Innovation, Respect, and Quality) as described in Li et al. (2021b). To obtain the trend differences between CCAR stress-tested banks and non-stress-tested banks, we use a regression with bank fixed effects, $y_{it} = \alpha_0 + \alpha_1 I_i + \epsilon_{it}$, where I is a vector of interactions between the CCAR treatment dummy and each of the years. The bandwidth size is ± 25% of ln($50B). The first vertical dashed line represents the first year of the implementation of CCAR stress tests for large banks carrying $100B or more in total assets. The second vertical dashed line represents the year that CCAR stress test implementation was expanded to include all large banks carrying $50B or more in total assets. The year 2001 was omitted to avoid multicollinearity.

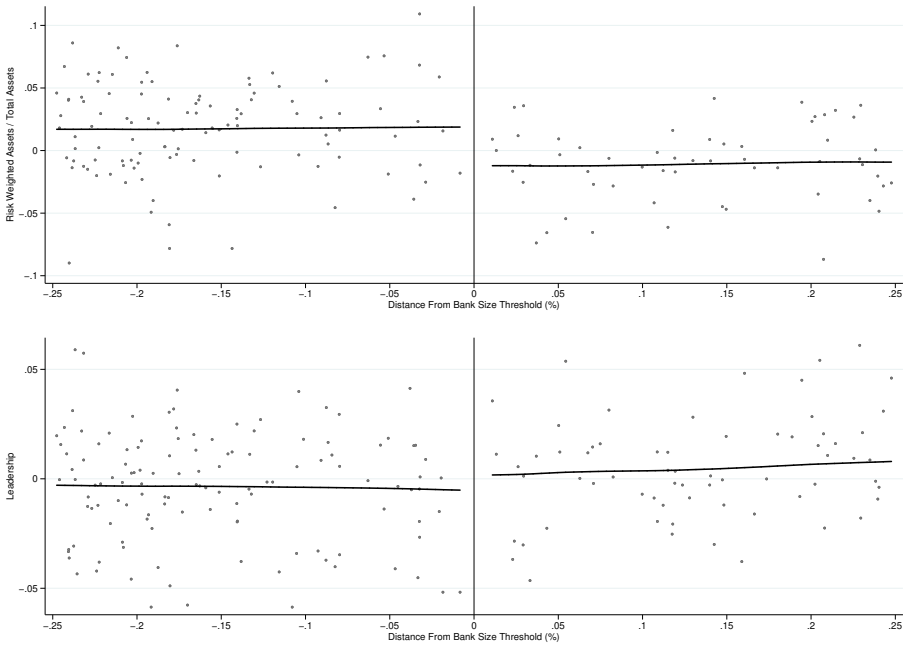

Fig. 4. Risk-weighted assets/total assets and leadership sentiment: Stress-tested vs. non-stress-tested banks.
This figure shows local-mean smoothing (degree of smoothing is zero) for risk-weighted assets divided by total assets (first panel) and for the positive Leadership sentiment (second panel) with a triangular kernel and bandwidth size of ± 25% of the normalized corresponding policy threshold. The number of points used for the smoothing was the minimum between the number of observations within the bandwidth and 50. Risk-weighted assets divided by total assets is plotted net of bank fixed effects and a constant.

10. TABLES

Table 1
Summary statistics for bank characteristics.
This table reports summary statistics for publicly traded bank holding companies over the 2011–2016 period. The sample is restricted to large and regional banks that carry at least $10B in assets, the Federal Reserve minimum threshold for regional banks. Balance sheet data come from FR Y-9C reports. Dollar amounts are reported in thousands of 2010 dollars. Risk-weighted assets divided by total assets is the ratio of risk-weighted assets to total assets. All other variables have their standard definitions. Banks are stress-tested banks if they carry at least $100B in assets in 2011 and 2012 or if carry at least $50B in assets for 2013–2016.

	All Banks			Stress Test			Non-Stress Test		
Variable	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Risk Weight Assets/Assets	0.711	0.150	403	0.695	0.186	135	0.719	0.128	268
Capital Ratio	15.317	3.521	403	15.395	2.158	135	15.278	4.040	268
Tier 1 Ratio	13.46	3.738	403	12.99	2.081	135	13.70	4.323	268
Leverage Ratio	9.790	2.224	403	9.337	1.757	135	10.01	2.397	268
Loans / Assets	0.537	0.191	394	0.441	0.223	130	0.585	0.152	264
CRE Loans / Assets	0.179	0.137	420	0.075	0.074	135	0.228	0.133	285
RRE Loans / Assets	0.160	0.112	420	0.119	0.083	135	0.179	0.118	285
C&I Loans / Assets	0.133	0.088	420	0.123	0.090	135	0.138	0.087	285
Consumer Loans / Assets	0.052	0.068	420	0.094	0.090	135	0.033	0.041	285
Off Balance Sheet Assets / Assets	0.141	0.124	394	0.233	0.150	130	0.096	0.075	264
Other Assets / Assets	0.059	0.031	394	0.061	0.027	130	0.058	0.033	264
Loans HFS / Assets	0.007	0.016	394	0.006	0.010	130	0.007	0.019	264
AFS Securities / Assets	0.136	0.093	394	0.108	0.053	130	0.149	0.105	264
HTM Securities / Assets	0.040	0.062	394	0.024	0.028	130	0.047	0.072	264
Cash and Deposits Due / Assets	0.054	0.045	394	0.075	0.054	130	0.043	0.035	264
Federal Funds / Assets	0.008	0.024	394	0.018	0.038	130	0.003	0.009	264
Return on Equity	0.200	0.126	420	0.183	0.120	285	0.236	0.133	135
Return on Assets	0.025	0.032	420	0.024	0.037	285	0.027	0.0175	135
Net Interest Margin	0.068	0.029	420	0.070	0.023	285	0.063	0.038	135
Net Non-Interest Margin	-0.026	0.049	420	-0.030	0.056	285	-0.017	0.027	135

Table 2

Summary statistics for risk-taking culture drivers and corporate culture values.

In this table, in Panel A we report summary statistics for the seven drivers of risk culture as communicated by banks in textual form and in Panel B we report summary statistics for the five corporate-culture values as communicated by banks in earnings calls, namely *Integrity, Teamwork, Innovation, Respect,* and *Quality*, for publicly traded bank holding companies over the 2011–2016 period. Our risk-taking culture drivers of interest are *Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward*, and *Portfolio*. The sentiments are *relative positive* (first one listed), *uncertainly*, *litigious*, and *constraining*. See Owusu and Gupta (2023) for additional details on the construction of risk-culture measures. The sample is restricted to banks that carry between \$10B and \$200B in assets. The drivers of risk culture and corporate-culture values are reported in standard deviations. Banks are stress-tested if they carry at least \$100B in assets in 2011 and 2012 or if they carry at least \$50B in assets for 2013–2016.

	All Banks			Stress Test			Non-Stress Test		
Variable	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Panel A: Risk-taking culture Culture Drivers									
Leadership	0.254	0.6404	362	0.074	0.5814	80	0.305	0.6481	282
Leadership Uncertainty	0.060	0.0122	362	0.064	0.0133	80	0.059	0.0117	282
Leadership Litigious	0.048	0.0183	362	0.048	0.0216	80	0.048	0.0173	282
Leadership Constraining	0.031	0.0085	362	0.030	0.0088	80	0.032	0.0084	282
Strategy	-0.115	0.8477	362	-0.345	0.5928	80	-0.050	0.8973	282
Strategy Uncertainty	0.068	0.0197	362	0.081	0.0160	80	0.065	0.0192	282
Strategy Litigious	0.067	0.0241	362	0.072	0.0223	80	0.066	0.0245	282
Strategy Constraining	0.024	0.0096	362	0.026	0.0082	80	0.024	0.0099	282
Decision	0.064	0.7647	349	0.224	0.7070	79	0.017	0.7758	270
Decision Uncertainty	0.007	0.0037	349	0.007	0.0042	79	0.007	0.0036	270
Decision Litigious	0.003	0.0027	349	0.003	0.0027	79	0.004	0.0027	270
Decision Constraining	0.001	0.0013	349	0.001	0.0011	79	0.001	0.0013	270
Control	0.032	0.8603	362	0.168	0.7791	80	-0.006	0.8795	282
Control Uncertainty	0.036	0.0101	362	0.039	0.0085	80	0.035	0.0104	282
Control Litigious	0.078	0.0246	362	0.077	0.0279	80	0.078	0.0236	282
Control Constraining	0.039	0.0135	362	0.037	0.0122	80	0.040	0.0137	282
Recruitment	-0.026	1.0674	356	0.011	0.9042	80	-0.037	1.1114	276
Recruitment Uncertainty	0.005	0.0029	356	0.005	0.0028	80	0.005	0.0029	276
Recruitment Litigious	0.004	0.0037	356	0.004	0.0024	80	0.004	0.0040	276
Recruitment Constraining	0.002	0.0018	356	0.002	0.0020	80	0.001	0.0017	276
Reward	0.001	0.7943	362	0.024	0.6875	80	-0.005	0.8230	282
Reward Uncertainty	0.030	0.0112	362	0.025	0.0093	80	0.032	0.0113	282
Reward Litigious	0.025	0.0120	362	0.020	0.0072	80	0.027	0.0127	282
Reward Constraining	0.019	0.0086	362	0.013	0.0053	80	0.021	0.0085	282
Portfolio	0.105	0.6213	362	-0.107	0.7364	80	0.165	0.5719	282
Portfolio Uncertainty	0.058	0.0172	362	0.058	0.0169	80	0.058	0.0173	282
Portfolio Litigious	0.027	0.0107	362	0.029	0.0110	80	0.027	0.0106	282
Portfolio Constraining	0.029	0.0090	362	0.024	0.0079	80	0.030	0.0088	282
Panel B: Corporate Culture Values									
Integrity	0.194	0.9093	337	0.525	0.9277	129	-0.011	0.8362	208
Teamwork	0.062	0.8793	337	0.225	0.8474	129	-0.039	0.8855	208
Innovation	0.547	1.1258	337	1.039	1.2552	129	0.242	0.9159	208
Respect	-0.069	0.8927	337	-0.304	0.5580	129	0.076	1.0225	208
Quality	0.386	1.0489	337	0.859	1.0706	129	0.094	0.9230	208

Table 3
The effect of stress tests on risk-taking culture drivers: Positive sentiment. The regression discontinuity coefficients are shown below. In this table we report *Localized Effects* for both the local linear and quadratic regression discontinuity coefficients using the MSE optimal bandwidth measure. *Broader Effects* are reported using a sample of banks with at least $25B in total assets as well as a sample of *All Relevant Banks* that include banks carrying between $10B and $200B in total assets. We report the results for the impact pertaining to positive sentiments for *Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward*, and *Portfolio*. Regressions are triangular kernel-weighted with at least 50 observations within the selected optimal bandwidths. Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses while observation counts are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Localized Effects		Broader Effects			
	MSE Optimal		Above $25B		All Relevant Banks	
Variable	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Leadership	0.125**	-0.111	0.086	0.021	0.106	0.146
	(0.055)	(0.125)	(0.065)	(0.095)	(0.066)	(0.102)
	[72]	[72]	[179]	[179]	[206]	[206]
Strategy	0.038	0.053	0.094	0.341**	-0.117	-0.137
	(0.092)	(0.207)	(0.101)	(0.150)	(0.102)	(0.132)
	[72]	[72]	[179]	[179]	[244]	[206]
Decision	-0.693***	-0.609*	-0.015	0.037	-0.034	-0.049
	(0.183)	(0.326)	(0.086)	(0.137)	(0.122)	(0.174)
	[72]	[65]	[176]	[176]	[203]	[203]
Control	0.671***	0.824***	0.359***	0.230	0.258**	0.375**
	(0.083)	(0.125)	(0.107)	(0.163)	(0.117)	(0.179)
	[72]	[72]	[179]	[179]	[206]	[206]
Recruitment	-1.369***	-1.786***	-0.379*	-0.979***	-0.709***	-1.582***
	(0.154)	(0.267)	(0.200)	(0.286)	(0.196)	(0.214)
	[71]	[71]	[163]	[163]	[202]	[202]
Reward	-0.252***	0.139	-0.187**	0.074	-0.194**	0.030
	(0.062)	(0.137)	(0.091)	(0.097)	(0.080)	(0.090)
	[72]	[72]	[179]	[179]	[206]	[206]
Portfolio	-0.589***	-1.589***	-0.129	-0.134	0.130	-0.086
	(0.068)	(0.140)	(0.090)	(0.131)	(0.079)	(0.108)
	[72]	[72]	[178]	[178]	[244]	[142]
Controls	Y	Y	Y	Y	Y	Y
Fixed-Effects	Y	Y	Y	Y	Y	Y

Table 4
Effects of stress tests on risk-taking culture drivers: Uncertainty sentiment.
The regression discontinuity coefficients are shown below. In this table we report *Localized Effects* for both the local linear and quadratic regression discontinuity coefficients using the MSE optimal bandwidth measure. *Broader Effects* are reported using a sample of banks carrying at least $25B in total assets as well as a sample of *All Relevant Banks* that include banks carrying between $10B and $200B in total assets. The table reports the results for the impact pertaining to the uncertainty sentiment for *Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward*, and *Portfolio*. Regressions are triangular kernel-weighted with at least 50 observations within the selected optimal bandwidths. Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses while observation counts are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Localized Effects		Broader Effects			
	MSE Optimal		Above $25B		All Relevant Banks	
Variable	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Leadership	-0.220***	-0.422***	0.002	-0.041	0.006	0.054
	(0.015)	(0.043)	(0.023)	(0.038)	(0.029)	(0.035)
	[72]	[72]	[179]	[179]	[277]	[291]
Strategy	-0.282***	-0.402***	-0.072	-0.218***	-0.092**	-0.160**
	(0.034)	(0.065)	(0.049)	(0.060)	(0.041)	(0.066)
	[72]	[94]	[179]	[179]	[206]	[206]
Decision	0.045**	0.010	0.004	0.005	0.031	0.048**
	(0.021)	(0.023)	(0.011)	(0.019)	(0.019)	(0.024)
	[72]	[63]	[179]	[179]	[206]	[248]
Control	-0.255***	-0.258***	-0.027	-0.058	-0.063**	-0.070
	(0.025)	(0.051)	(0.028)	(0.044)	(0.030)	(0.045)
	[72]	[92]	[179]	[179]	[206]	[206]
Recruitment	0.088***	0.207***	0.011	-0.004	0.009	0.038
	(0.018)	(0.033)	(0.012)	(0.021)	(0.020)	(0.030)
	[72]	[61]	[179]	[179]	[206]	[206]
Reward	0.256***	0.152***	0.139***	0.124**	0.195***	0.339***
	(0.055)	(0.048)	(0.038)	(0.058)	(0.053)	(0.062)
	[72]	[63]	[179]	[179]	[206]	[206]
Portfolio	0.183***	0.761***	0.050	0.209***	0.218***	0.464***
	(0.049)	(0.111)	(0.048)	(0.063)	(0.062)	(0.069)
	[72]	[72]	[179]	[179]	[206]	[206]
Controls	Y	Y	Y	Y	Y	Y
Fixed-Effects	Y	Y	Y	Y	Y	Y

Table 5
Effects of stress tests on risk-taking culture drivers: Litigious sentiment.
The regression discontinuity coefficients are shown below. In this table we report *Localized Effects* for both the local linear and quadratic regression discontinuity coefficients using the MSE optimal bandwidth measure. *Broader Effects* are reported using a sample of banks carrying at least $25B in total assets as well as a sample of *All Relevant Banks* that include banks carrying between $10B and $200B in total assets. In the table we report the results for the impact pertaining to the litigious sentiment for *Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward*, and *Portfolio*. Regressions are triangular kernel-weighted with at least 50 observations within the selected optimal bandwidths. Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses while observation counts are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Localized Effects		Broader Effects			
	MSE Optimal		Above $25B		All Relevant Banks	
Variable	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Leadership	-0.104**	-0.095	-0.020	0.041	-0.002	-0.091*
	(0.041)	(0.059)	(0.047)	(0.055)	(0.046)	(0.055)
	[72]	[71]	[179]	[145]	[206]	[206]
Strategy	-0.034	-0.048	-0.073*	-0.057	-0.029	-0.153***
	(0.034)	(0.043)	(0.037)	(0.060)	(0.044)	(0.050)
	[72]	[72]	[179]	[179]	[206]	[206]
Decision	-0.069***	-0.177***	-0.030***	-0.015	-0.007	-0.012
	(0.007)	(0.010)	(0.007)	(0.010)	(0.008)	(0.008)
	[72]	[66]	[179]	[179]	[206]	[206]
Control	0.028	-0.059	-0.014	0.023	-0.013	-0.142***
	(0.031)	(0.048)	(0.024)	(0.037)	(0.031)	(0.040)
	[72]	[72]	[179]	[179]	[206]	[206]
Recruitment	-0.084***	-0.280***	-0.104***	-0.090***	-0.044	-0.071*
	(0.020)	(0.025)	(0.020)	(0.030)	(0.029)	(0.041)
	[72]	[72]	[179]	[179]	[206]	[206]
Reward	0.180***	-0.087	0.019	0.095	0.001	0.105
	(0.042)	(0.071)	(0.054)	(0.066)	(0.054)	(0.068)
	[72]	[72]	[179]	[179]	[206]	[206]
Portfolio	0.612***	0.685***	-0.004	0.415***	0.130	0.251**
	(0.093)	(0.159)	(0.078)	(0.089)	(0.081)	(0.100)
	[72]	[72]	[179]	[179]	[206]	[206]
Controls	Y	Y	Y	Y	Y	Y
Fixed-Effects	Y	Y	Y	Y	Y	Y

Table 6
Effects of stress tests on risk-taking culture drivers: Constraining sentiments.
The regression discontinuity coefficients are shown below. In this we report *Localized Effects* for both the local linear and quadratic regression discontinuity coefficients using the MSE optimal bandwidth measure. *Broader Effects* are reported using a sample of banks carrying at least $25B in total assets as well as a sample of *All Relevant Banks* that include banks carrying between $10B and $200B in total assets. We also report results pertaining to the impact on the constraining sentiment for *Leadership*, *Strategy*, *Decision*, *Control*, *Recruitment*, *Reward*, and *Portfolio*. Regressions are triangular kernel-weighted with at least 50 observations within the selected optimal bandwidths. Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses while observation counts are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Localized Effects		Broader Effects			
	MSE Optimal		Above $25B		All Relevant Banks	
Variable	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Leadership	-0.288***	-0.316***	-0.176***	-0.249***	-0.069*	-0.097**
	(0.025)	(0.031)	(0.037)	(0.052)	(0.038)	(0.048)
	[72]	[72]	[179]	[179]	[206]	[206]
Strategy	0.046	-0.602***	-0.142***	-0.196**	-0.040	-0.172**
	(0.043)	(0.090)	(0.053)	(0.083)	(0.045)	(0.069)
	[72]	[72]	[179]	[179]	[206]	[206]
Decision	0.051	0.044	-0.047*	-0.059	-0.080*	-0.148**
	(0.031)	(0.130)	(0.029)	(0.053)	(0.042)	(0.062)
	[72]	[41]	[179]	[179]	[206]	[206]
Control	-0.162***	-0.203***	-0.068***	-0.125***	-0.067***	-0.155***
	(0.019)	(0.025)	(0.023)	(0.040)	(0.021)	(0.031)
	[72]	[74]	[179]	[179]	[206]	[206]
Recruitment	-0.076***	-0.118***	0.003	-0.064**	-0.004	-0.022
	(0.022)	(0.044)	(0.020)	(0.028)	(0.022)	(0.024)
	[72]	[72]	[179]	[179]	[206]	[206]
Reward	-0.442***	0.175	0.001	-0.418***	-0.032	-0.224*
	(0.089)	(0.139)	(0.090)	(0.104)	(0.095)	(0.123)
	[72]	[72]	[179]	[179]	[206]	[206]
Portfolio	0.392***	0.497***	-0.082*	-0.100	0.051	0.094
	(0.037)	(0.071)	(0.042)	(0.068)	(0.056)	(0.084)
	[72]	[66]	[179]	[179]	[206]	[206]
Controls	Y	Y	Y	Y	Y	Y
Fixed-Effects	Y	Y	Y	Y	Y	Y

Table 7
Effects of stress tests on corporate-culture values.
In this table we report *Localized Effects* for both the local linear and quadratic regression discontinuity coefficients using the MSE optimal bandwidth measure. *Broader Effects* are reported using a sample of banks carrying at least $25B in total assets as well as a sample of *All Relevant Banks* that include banks carrying between $10B and $200B in total assets. We also report the results for the Li et al. (2020) corporate-culture variables: *Integrity*, *Teamwork*, *Innovation*, *Respect*, and *Quality*. Regressions are triangular kernel-weighted with at least 50 observations within the selected optimal bandwidths. Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses while observation counts are reported in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Localized Effects		Broader Effects			
	MSE Optimal		Above $25B		All Relevant Banks	
Variable	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Integrity	2.020***	2.366***	-0.307	0.069	-0.061	0.391
	(0.114)	(0.254)	(0.194)	(0.312)	(0.207)	(0.349)
	[62]	[89]	[179]	[179]	[206]	[206]
Teamwork	-1.248***	0.538	-0.564***	-0.356	-0.653***	-0.702***
	(0.161)	(0.460)	(0.175)	(0.237)	(0.155)	(0.233)
	[63]	[66]	[179]	[179]	[206]	[206]
Innovation	-0.508***	0.098	-0.125	-0.291	-0.490***	-0.404*
	(0.062)	(0.215)	(0.132)	(0.201)	(0.175)	(0.235)
	[62]	[74]	[179]	[179]	[206]	[206]
Respect	0.677***	1.365***	0.150	0.077	-0.022	-0.150
	(0.092)	(0.118)	(0.107)	(0.184)	(0.122)	(0.181)
	[62]	[65]	[179]	[179]	[206]	[206]
Quality	0.957***	2.325***	0.137	-0.071	-0.085	-0.148
	(0.115)	(0.179)	(0.136)	(0.236)	(0.231)	(0.307)
	[54]	[63]	[179]	[179]	[206]	[206]
Controls	Y	Y	Y	Y	Y	Y
Fixed-Effects	Y	Y	Y	Y	Y	Y

Table 8

Implications of strong bank culture on capital ratios and risk weight asset allocations.

The difference-in-differences coefficients of interest are shown below. In this table we report the effects of bank stress tests on *Risk Weight Assets/Assets*, *Capital Ratio*, *Tier 1 Ratio*, and *Leverage Ratio* and risk weight asset categories (100%, 50%, 20%, and 0% Risk Weights) over total assets. We also examines the implications of strong risk culture and corporate culture on risk ratio performance in the presence of stress tests. *T* is a dummy that equals 1 for the period after stress-testing began and zero otherwise. *C* is a dummy variable that equal 1 for a CCAR stress-tested banks and zero for Non-CCAR stress-tested banks. Panel A shows the effects of stress tests. Panel B shows the implications of developing a strong risk culture as communicated in a bank's filings, *Strong Risk Culture* is a dummy that equals 1 if the average of the *Risk Culture Index* for 2006–2010 fall into the top tercile for the corresponding group of banks (large banks or regional banks). Panel C shows the implications of developing a strong corporate culture as communicated in earnings-call transcripts, *Strong Corporate Culture* is a dummy that equals 1 if the average of the *Corporate Culture Index* for 2006–2010 falls into the top tercile for the corresponding group of banks (large banks or regional banks). The *Risk Culture Index* is created by summing the risk-taking culture drivers (Leadership, Strategy, Decision, Control, Recruitment, Reward, and Portfolio) using the adjusted weights from Graham et al. (2022) survey. The *Corporate Culture Index* is the sum of the five cultural values (Integrity, Teamwork, Innovation, Respect, and Quality) as described in Li et al. (2021b). Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include banks carrying at least $25B in total assets and include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Risk Density	Capital Ratio	Tier 1 Ratio	Leverage Ratio	100% Risk Weight Assets/Assets	50% Risk Weight Assets/Assets	20% Risk Weight Assets/Assets	0% Risk Weight Assets/Assets
Panel A: Difference-in-Differences								
T=1 × C=1	-0.062**	0.534	0.620	-0.438	-0.046	-0.008	-0.011	-0.025
	(0.029)	(0.809)	(0.764)	(0.377)	(0.031)	(0.011)	(0.023)	(0.082)
Observations	487	487	487	487	408	408	408	408
Adjusted R^2	0.937	0.840	0.873	0.854	0.945	0.887	0.831	0.862
Panel B: Strong Risk Culture								
T=1 × C=1 × Strong Risk Culture=1	-0.141***	1.697	2.551**	1.169	-0.134**	-0.009	0.087***	0.304
	(0.035)	(1.404)	(1.107)	(0.732)	(0.052)	(0.020)	(0.031)	(0.200)
Observations	487	487	487	487	408	408	408	408
Adjusted R^2	0.940	0.841	0.877	0.854	0.947	0.887	0.835	0.862
Panel C: Strong Corporate Culture								
T=1 × C=1 × Strong Corporate Culture=1	0.051	0.716	0.957	1.067*	0.036	0.024	-0.042	-0.087
	(0.040)	(1.028)	(1.132)	(0.581)	(0.030)	(0.020)	(0.037)	(0.206)
Observations	487	487	487	487	408	408	408	408
Adjusted R^2	0.937	0.840	0.873	0.855	0.945	0.888	0.830	0.866

Table 9
Implications of strong bank culture on bank performance.
The difference-in-differences coefficients of interest are shown below. In this table we report the effects of bank stress tests on percent of *Problem Loans*, *Return on Equity*, *Return on Assets*, *Net Interest Margin*, and *Net Non-Interest Margin*. We also examine the implications of strong risk culture and corporate culture on bank performance in the presence of stress tests. T is a dummy that equals 1 for the period after stress-testing began and zero otherwise. C is a dummy variable that equal 1 for a CCAR stress-tested banks and zero for Non-CCAR stress-tested banks. Panel A shows the effects of stress tests. Panel B shows the implications of developing a strong risk culture as communicated in a bank's filings, *Strong Risk Culture* is a dummy that equals 1 if the average of the *Risk Culture Index* for 2006–2010 fall into the top tercile for the corresponding group of banks (large banks or regional banks). Panel C shows the implications of developing a strong corporate culture as communicated in earnings-call transcripts, *Strong Corporate Culture* is a dummy that equals 1 if the average of the *Corporate Culture Index* for 2006–2010 falls into the top tercile for the corresponding group of banks (large banks or regional banks). The *Risk Culture Index* is created by summing the risk-taking culture drivers (Leadership, Strategy, Decision, Control, Recruitment, Reward, and Portfolio) using the adjusted weights from Graham et al. (2022) survey. The *Corporate Culture Index* is the sum of the five cultural values (Integrity, Teamwork, Innovation, Respect, and Quality) as described in Li et al. (2021b). Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include banks carrying at least $25B in total assets and include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Problem Loans	Return on Equity	Return on Assets	Net Interest Margin	Net Non-Interest Margin
Panel A: Difference-in-Differences					
T=1 × C=1	-0.000	-0.050	-0.004	0.000	0.002
	(0.004)	(0.038)	(0.004)	(0.005)	(0.006)
Observations	493	540	540	540	540
Adjusted R^2	0.708	0.515	0.543	0.815	0.656
Panel B: Strong Risk Culture					
T=1 × C=1 × Strong Risk Culture=1	-0.011**	0.060	0.013**	0.003	-0.006
	(0.005)	(0.064)	(0.006)	(0.012)	(0.013)
Observations	493	540	540	540	540
Adjusted R^2	0.707	0.512	0.542	0.816	0.654
Panel C: Strong Corporate Culture					
T=1 × C=1 × Strong Corporate Culture=1	0.007	-0.203***	-0.015***	-0.008	0.021***
	(0.005)	(0.049)	(0.005)	(0.007)	(0.008)
Observations	493	540	540	540	540
Adjusted R^2	0.710	0.518	0.544	0.818	0.657

Table 10
Implications of strong bank culture on bank lending.
The difference-in-differences coefficients of interest are shown below. In this table we report the effects of bank stress tests on *Total Loans/Assets*, *Commercial Real Estate (CRE)/Assets*, *Residential Real Estate (RRE) Loans/Assets*, *Commercial and Industrial (C&I) Loan/Assets*, and *Consumer Loans/Assets*. We also examine the implications of a strong risk culture and a strong corporate culture on bank lending in the presence of stress tests. T is a dummy that equals 1 for the period after stress tests began and zero otherwise. C is a dummy variable that equals 1 for CCAR stress-tested banks and zero for non-CCAR stress-tested banks. Panel A shows the effects of stress tests. Panel B shows the implications of developing a strong risk culture as communicated in a bank's filings, *Strong Risk Culture* is a dummy that equals 1 if the average of the *Risk Culture Index* for 2006–2010 falls into the top tercile for the corresponding group of banks (large banks or regional banks). Panel C shows the implications of developing a strong corporate culture as communicated in earnings-call transcripts, *Strong Corporate Culture* is a dummy that equals 1 if the average of the *Corporate Culture Index* for 2006–2010 falls into in the top tercile for the corresponding group of banks (large banks or regional banks). The *Risk Culture Index* is created by summing the risk-taking culture drivers (Leadership, Strategy, Decision, Control, Recruitment, Reward, and Portfolio) using adjusted weights from the survey in Graham et al. (2022). The *Corporate Culture Index* is the sum of the five cultural values (Integrity, Teamwork, Innovation, Respect, and Quality) as described in Li et al. (2021b). Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include banks carrying at least $25B in total assets and include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Loans / Assets	CRE Loans / Assets	RRE Loans / Assets	C&I Loans / Assets	Consumer Loans / Assets
Panel A: Difference-in-Differences					
T=1 × C=1	-0.016	-0.026	-0.012	-0.004	-0.001
	(0.020)	(0.023)	(0.012)	(0.009)	(0.005)
Observations	476	493	493	493	493
Adjusted R^2	0.968	0.973	0.950	0.958	0.987
Panel C: Strong Risk Culture					
T=1 × C=1 × Strong Risk Culture=1	-0.057*	-0.105***	0.003	0.019	-0.001
	(0.029)	(0.025)	(0.025)	(0.020)	(0.018)
Observations	476	493	493	493	493
Adjusted R^2	0.969	0.977	0.950	0.958	0.987
Panel B: Strong Corporate Culture					
T=1 × C=1 × Strong Corporate Culture=1	0.039	0.054	-0.025	-0.016	-0.008
	(0.034)	(0.033)	(0.017)	(0.012)	(0.007)
Observations	476	493	493	493	493
Adjusted R^2	0.968	0.974	0.952	0.958	0.988

Table 11

Implications of strong bank culture on bank portfolios.

In this table we report the effects of bank stress tests on *Off-Balance Sheet Assets/Assets*, *Held-for-Sale Loans/Assets*, *Available-for-Sale Securities/Assets*, *Held-to-Maturity Securities/Assets*, *Cash & Deposits Due/Assets* and *Federal Funds/Assets*. We also examined the implications of developing a strong risk culture and a strong corporate culture on bank portfolios in the presence of bank stress tests. T is a dummy that equals 1 for the period after stress tests began and zero otherwise. C is a dummy variable that equals 1 for CCAR stress-tested banks and zero for non-CCAR stress-tested banks. Panel A shows the effects of stress tests on banks. Panel B shows the implication of developing a strong risk culture as communicated in a bank's filings, *Strong Risk Culture* is a dummy that equals 1 if the average of the *Risk Culture Index* for 2006–2010 falls into in the top tercile for the corresponding group of banks (large banks or regional banks). Panel C shows the implications of developing a strong corporate culture as communicated in earnings-call transcripts, *Strong Corporate Culture* is a dummy that equals 1 if the average of the *Corporate Culture Index* for 2006–2010falls into the top tercile for the corresponding group of banks (large banks or regional banks). The *Risk Culture Index* is created by summing the risk-taking culture drivers (Leadership, Strategy, Decision, Control, Recruitment, Reward, and Portfolio) using adjusted weights from Graham et al. (2022) survey. The *Corporate Culture Index* is the sum of the five cultural values (Integrity, Teamwork, Innovation, Respect, and Quality) as described in Li et al. (2021b). Control variables include all bank characteristics as shown in the balanced covariates tests reported in Table A10. All regressions include banks carrying at least $25B in total assets and include bank and year fixed effects. Standard errors are clustered at the bank level and are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Off Balance Sheet Assets / Assets	Loans HFS / Assets	AFS Securities / Assets	HTM Securities / Assets	Cash & Deposits Due / Assets	Federal Funds / Assets	Other Assets / Assets
Panel A: Difference-in-Differences							
T=1 × C=1	-0.037*	-0.007	0.025	0.020**	0.014	-0.005	0.002
	(0.021)	(0.007)	(0.018)	(0.010)	(0.010)	(0.007)	(0.007)
Observations	476	476	476	476	476	476	476
Adjusted R^2	0.925	0.806	0.810	0.861	0.734	0.779	0.963
Panel B: Strong Risk Culture							
T=1 × C=1 × Strong Risk Culture=1	-0.052	0.011	0.049	0.020	0.002	0.028	0.003
	(0.040)	(0.022)	(0.035)	(0.018)	(0.017)	(0.022)	(0.014)
Observations	476	476	476	476	476	476	476
Adjusted R^2	0.925	0.812	0.812	0.865	0.740	0.779	0.963
Panel C: Strong Corporate Culture							
T=1 × C=1 × Strong Corporate Culture=1	-0.053	0.003	-0.019	0.025	0.019	-0.021	0.012
	(0.054)	(0.011)	(0.032)	(0.020)	(0.021)	(0.016)	(0.009)
Observations	476	476	476	476	476	476	476
Adjusted R^2	0.926	0.805	0.815	0.863	0.740	0.779	0.963