Does corporate culture affect bank risk-taking?

DOES CORPORATE CULTURE AFFECT BANK RISK-TAKING? EVIDENCE FROM LOAN-LEVEL DATA

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Forthcoming in the British Journal of Management

Abstract

Using comprehensive corporate and retail loan data, we show that the corporate culture of banks explains their risk-taking behaviour. Banks whose corporate culture leans towards aggressive competition are associated with riskier lending practices: higher approval rate, lower borrower quality, and fewer covenant requirements. Consequently, these banks incur larger loan losses and make greater contributions to systemic risk. The opposite behaviour is observed among banks whose culture emphasises control and safety. Our findings cannot be explained by heterogeneity in a bank's business model, CEO compensation incentives, and CEO characteristics. We use an exogenous shock to the US banking system during the 1998 Russian default crisis to support a causal inference.

JEL Classifications: G21, G34, M14

Key words: Corporate culture; Bank risk-taking; Bank loans; Financial crisis; Financial stability

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1. Introduction

As part of the debate on banking industry reform, the corporate culture of banks is seen by many as a root cause of excessive bank risk-taking behaviour and the consequent instability in the financial system. The recent Wells Fargo scandal, for example, illustrates how the competitive culture of the bank induces its employees to take excessive risk to meet sale targets.[1] The scandal echoes the common narrative among the press, regulators and practitioners that bank culture lies at the heart of bank risk-taking behaviour and plays a key role in influencing financial stability.[2] Despite this popular narrative, empirical evidence on the relation between bank culture and its risk-taking behaviour remains scarce.

Therefore, the objective of our study is to examine whether bank culture influences a specific risk-taking process – bank lending decisions. In this way, we seek to contribute to the management literature that studies *how* corporate culture affects firm performance (e.g., Bezrukova et al., 2012; Chatman and Spatero, 2005; Ogbonna and Harris, 2000). In line with this literature, we focus on a specific industry (banking) and a specific behavioural process (lending decisions) to understand how bank culture operates to affect bank risk-taking and, ultimately, performance.

Our focus on lending is motivated by several factors. First, despite technological advances, lending decisions remain inherently subjective. Banks still require credit officers to process, collate, and evaluate borrowers' soft information.[3] This implies that lending decisions can be heavily influenced by the norms around how loan applications are decided. Second, this setting enables us to exploit the granular nature of our corporate and retail loan datasets and provide micro-level evidence on how bank culture affects decision-making within the bank. Finally, as lending is the most fundamental activity of a bank, how lending decisions are made is likely to have a significant influence on the health of the bank and the financial system.

Our measure of corporate culture is based on the Competing Value Framework (CVF). Developed by Quinn and Rohrbaugh (1983), the CVF identifies four corporate culture dimensions: *compete, create, control* and *collaborate*. These four cultural dimensions compete for a company's limited financial, time and human resources. How the firm responds to the tension created by these competing values shapes its culture and, ultimately, the way people in the firm behave.

Figure 1: Four cultural dimensions (Cameron et al., 2006)

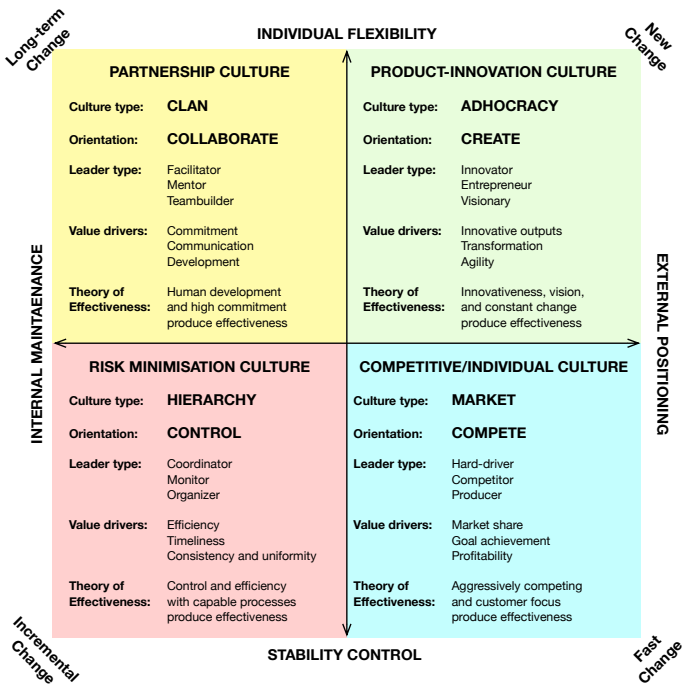

Figure 1 summarises the attributes of these four cultural orientations. Compete and create cultures share a growth focus and place an emphasis on risk-taking, adaptability, competitiveness, and aggressiveness. *Compete-oriented* firms embrace risk-taking through aggressive competition and focus on customer demand. *Create-oriented* firms, while also embracing risk-taking, focus on innovation, vision, and constant change. On the other hand, collaborate and control cultures share a safety focus and place an emphasis on predictability, conformity, and compliance. These two dimensions can be seen as less focused on risk-taking. *Control-oriented* firms achieve predictability through a focus on control, efficiency, and process capability. *Collaborate-oriented* firms achieve predictability through harmony of people within the organisation.

As lending is a major source of bank revenue and is characterised by high uncertainty, we hypothesise that banks with a growth focus (compete and create) are more aggressive when originating loans in exchange for revenue and growth. In contrast, we expect to find the opposite results in banks with a safety focus (control and collaborate). We examine the influence of these culture measures on two key lending channels: corporate lending (syndicated loans) and retail lending (mortgage loans).

To test this hypothesis, we measure corporate culture by applying textual analysis on the annual reports of all publicly-listed US banks (see Fiordelisi and Ricci (2014) for similar approaches). The premise of textual analysis is that the words used in the annual reports mirror the corporate culture that a company has developed over time. Specifically, we identify a set of keywords and their synonyms for each cultural dimension and compute the frequency that each set of words appears in the annual reports. [4]

Our analysis begins with corporate loans. We use the credit ratings of a bank's borrowers to measure bank risk-taking in lending. Credit ratings reflect the borrower's creditworthiness and ability to repay loans and, therefore, are key inputs that banks use to

evaluate their borrowers. Consistent with our hypothesis, we find that banks with a growth focus culture are more likely to have borrowers with poorer credit ratings, while those with a safety focus are less likely to do so, with the effects concentrated on compete- and control-dominant banks. Specifically, borrowers of compete-dominant banks are 3.0% more likely to be sub-investment grade borrowers (or "risky borrowers", defined as unrated borrowers or those rated below BBB), while borrowers of control-dominant banks are 6.6% less likely to have sub-investment grade ratings. Our results are robust to controlling for many factors that could influence bank risk-taking, including a bank's business models, CEO compensation, and CEO characteristics (e.g., demographic, education or career history), as well as borrower's industry[5] and state fixed effects.

We also perform additional tests to buttress our interpretation that bank culture matters to its lending behaviour. Specifically, we find that bank culture also explains the changes in lending behaviour around an exogenous shock to the US banking sector during the 1998 Russian default crisis (Section 4.2.1), and bank risk-taking in mortgage lending (Section 4.2.2). These tests allow us to alleviate the concern that our results are influenced by endogenous bank-borrower matching and to show that our results hold for the sample of all public banks.

We further show that bank culture also affects the terms of loans. Consistent with our expectations that compete-dominant banks are more willing to assume default risk in exchange for revenue, we find that they require significantly fewer covenants from their borrowers while charging them a higher loan spread. In contrast, in line with their focus on safety, control-dominant banks on average impose a higher number of covenant conditions, especially when the borrower is risky (i.e., unrated or rated below BBB).[6] Overall, our findings imply that a bank's culture influences how it trade-offs between lending standards and revenue.

We next evaluate the overall risk and performance of these banks. First, we find that compete-dominant banks exhibit higher loan growth in normal times, and incur greater loan

losses in distressed times.[7] These results can be attributed to their riskier lending standards. Second, consistent with compete-dominant banks squeezing their capital buffer to facilitate their aggressive lending, we find that compete-dominant banks hold a significantly lower level of Tier-1 capital. Finally, we find that compete-dominant banks exhibit a significantly greater contribution to systemic risk, measured using ΔCoVaR developed by Adrian and Brunnermeier (2016)[8]. This link between culture and systemic risk can potentially be explained by the interbank lending channel. That is, banks that incur a high-level of non-performing loans but do not have sufficient capital to absorb the incurred losses may have to borrow more frequently from the interbank markets and consequently create large risk spillovers to the financial system.

In contrast, control-dominant banks incur a significantly lower level of non-performing loans, hold a higher level of Tier-1 capital, and thus, make a smaller contribution to systemic risk. Overall, our evidence shows that not only does a bank culture influence its individual risk but it also has the potential to affect the overall stability of the financial system.

Our study contributes to the literature that explores *how* corporate culture influences performance (e.g., Sackman, 2011; Schneider, Ehrhart, and Macy, 2013; Wilderom, Glunk, and Maslowski, 2000). This literature focuses on the specific processes through which culture influences performance, for instance, through facilitating effective acquisition processes (Weber and Menipaz, 2003) or fostering inter-firm relationships (Beugelsdijk, Koen, and Noorderhaven, 2009). We contribute to this literature by illuminating a new channel through which culture affects performance: bank credit decisions. By focusing on firms operating in a single industry (banking) in one country (the US), we are able to control for confounding social, economic and political factors (Chatman and Jehn, 1994; Scheneider et al., 2013). This allows us to obtain a more credible estimation of the effect of bank culture on its risk-taking and performance outcomes.

Next, to the best of our knowledge, our paper provides the first micro-level evidence showing that corporate culture matters in many aspects of bank lending decisions, ranging from loan approvals, loan terms, to loan pricing. Therefore, our study adds to empirical evidence on corporate culture of financial service firms (Chatman and Spatero, 2005; Dwyer, Richard, and Chadwick, 2003; Xenikou and Simosi, 2006). We show that the influence of corporate culture on bank lending transcends traditional characteristics of a bank's business model, CEO compensation incentives and CEO characteristics. Our findings are in line with the call from regulators to look beyond observable factors such as CEO pay in studying bank behaviour. Further, our results highlight the novel channels through which bank culture affects the overall stability of the financial system and therefore, have significant implications for bank managers, financial regulators, governance activists and policy-makers.

Finally, we join recent works on corporate culture that use natural language processing on large datasets in order to measure corporate culture (e.g., Bianchi, Fariana, and Fiordelisi, 2016; Fiordelisi and Ricci, 2014; Moniz, 2016; Popadak, 2013; Srivastava et al., 2016). This approach allows us to measure corporate culture of a large cross-sectional sample of banks compared to studies that survey small samples of firms (Chatman and O'Reilly, 2016).

2. Literature and hypothesis

2.1. Corporate culture – definitions and key perspectives

Corporate culture is commonly defined as a set of beliefs, values, and assumptions shared among organisational members, which facilitates shared meaning and guide behaviour of organisational members (e.g., Hofstede, Neuijen, Ohayv, and Sanders, 1990; Schein, 1985).[9]

Schein (1992) classifies the manners in which corporate culture can manifest itself into three levels: basic underlying assumptions, espoused beliefs and values, and artefacts.[10] At the core level, culture consists of basic assumptions. These assumptions represent interpretive

schemes that people use to make sense of ongoing situations, activities and human relationships and thereby establishing the basis for collective actions. Specific cultures exist when groups adopt similar interpretive schemes. At the second level, culture represents a set of values that define how organisational members interact and communicate. Therefore, compared to basic assumptions which tend to be invisible, values are more visible with individuals having a greater awareness of them. At the third level lie the most visible manifestation of culture – artefacts. These are visible and audible patterns, including language, technology, and rituals. For example, the language used in a firm's annual reports can be considered as a cultural artefact that reflects the firm's values and its basic assumptions.

An important discussion in the corporate culture literature is whether firms have a monolithic culture or whether they have multiple subcultures, each with a distinct set of values. Martin (1992) draws this distinction in her discussions on three perspectives – integration, differentiation and fragmentation perspectives – of corporate culture.

According to the *integration perspective*, corporate culture is a homogeneous collection of values that holds together a potentially diverse group of organisational members. It is a monolithic view of corporate life in which culture is considered to be harmonious and homogenous. In contrast, the *differentiation perspective* questions the idea of cultural homogeneity. Researchers writing from this perspective believe there are various local cultures that could co-exist within the firm, with each having its own distinctive values (e.g., Meyerson and Martin, 1987). Finally, the *fragmentation perspective* recognises that corporate cultures consist of multiple and competing interpretations that do not coalesce into a clear picture.

In this paper, corporate culture is conceptualised from an integration perspective. This conceptualisation is consistent with Schein's (2009) life-cycle theory which proposes that large and mature companies tend to have a corporate culture that reflects all parts of the firm as well as multiple subcultures that reflect different functions within the firm. Since banks in our

sample are large and mature, this implies that they are likely to have an overarching corporate culture. Our conceptualisation is further supported by Aldrich and Ruef (2006), who argue that while firms could develop subcultures, it does not necessarily imply that these firms do not simultaneously develop an overall culture. Furthermore, viewing banks as having a monolithic culture is also practically in line with our approach of measuring bank culture by applying textual analysis on the bank's annual reports. Since the annual reports are at the bank-level, culture is naturally measured at the bank-level.

2.2. The Competing Value Framework

We construct our measures of corporate culture based on the Competing Value Framework or the CVF (Quinn and Rohrbaugh, 1983). While the CVF was initially constructed within the climate literature by Campbell (1977), subsequent scholars argue that the CVF also forms the typology of a corporate culture construct as it encapsulates "the different patterns of shared values, assumptions, and interpretations that typify organisations" (Cameron and Freeman 1991, p. 27). This argument essentially relabels the CVF as a corporate culture construct (Chatman and O'Reilly, 2016), resulting in the CVF being operationalised as a culture construct in most subsequent studies (Hartnell, Ou, and Kinicky, 2011).

Under the CVF, corporate culture is classified into four quadrants: compete, create, control, and collaborate. Each of these cultural quadrants is associated with different corporate orientations, value drivers, and effectiveness criteria as shown in Figure 1.

The *create* and *compete* cultural dimensions share a *growth* focus. Firms that belong to these two quadrants place an emphasis on risk-taking, adaptability, competitiveness, and aggressiveness. Typically, firms in the *compete* dimension compete aggressively, with speed being an essential factor in maintaining the firm's competitive advantage. In contrast, firms in the *create* cultural dimension are associated with continuous change, entrepreneurship, and

vision. The *collaborate* and *control* cultural dimensions share a *safety* focus. Firms that belong to these two dimensions place an emphasis on predictability, compliance, and safety. Organisational effectiveness of control-oriented firms is associated with capable processes, substantial predictability, and control. In contrast, firms in the *collaborate* dimension place emphasis on employee development and empowerment (Cameron et al., 2006).

2.3 Bank culture and lending decisions

We hypothesise that the corporate culture of banks matters to their lending decisions. Despite advances in credit-scoring technologies, credit decisions remain by and large activities that require substantial human inputs (Brown et al., 2012; Campbell, 2012; Filomeni, Udell, and Zazzaro, 2016). For instance, in order to make approval decisions, credit officers need to collate and evaluate borrowers' soft information, such as the quality of their management team or the likelihood that their research and development activities will materialise and generate profits. Such decisions are inherently complex, subjective and therefore, cannot be regulated ex ante. To cope with such subjectivity, credit officers would need to rely on the norms within their own bank on what constitutes appropriate lending decisions (Rojot, 2009). Therefore, we hypothesise that the corporate culture of banks could affect their lending decisions.

In what way does bank culture matter to lending behaviour? In lending to clients, banks consume various types of risk, most notably default risk, in exchange for revenue, market share, and growth. Default risk is a major concern for banks because it renders the bank's ability to recover the payments. As a result, banks will not lend to marginal borrowers whom they deem unable to repay the loans. We hypothesise that compete-dominant banks are most willing to consume default risk in making lending decisions in exchange for immediate growth and revenue. In contrast, control-dominant banks focus on safety and therefore, will be least willing to take risk in making lending decisions even if this comes at the expense of slower growth.

Furthermore, we expect that create-dominant banks share some similar lending behaviour with compete-dominant banks as they both share a *growth* focus, while collaborate-dominant banks will behave similarly to *safety* focus control-dominant banks.

Hypothesis 1A: Banks with compete- and create-dominant cultures are *more* likely to take risk in making lending decisions.

Hypothesis 1B: Banks with control- and collaborate-dominant cultures are *less* likely to take risk in making lending decisions.

3. Data and variables

3.1. Measuring bank corporate culture

Our objective is to identify corporate culture at the bank-level according to the CVF. We follow Fiordelisi and Ricci (2014) and employ textual analysis on bank annual reports (10-K reports). This approach allows us to identify culture for a substantially larger set of banks than we would using the survey measurement methods (Chatman and O'Reilly, 2016).[11]

Our textual analysis approach is motivated by the idea that the words and expressions used by members of a firm are artefacts of corporate culture that has been developed over time (Kramsch, 1998; Lazear, 1999; Levinson, 2003; Schein, 2010).[12] To avoid any subjectivity, we follow Fiordelisi and Ricci (2014) and use a set of synonyms for each cultural dimension from those described in Cameron et al. (2006) and the Harvard IV-4 Psychosocial Dictionary (see Figure 2).[13] For example, words like "fast, expand, performance, win" are to be associated with compete, words like "envision, freedom, venture" are to be associated with create, words like "cooperate, human, partner" are to be associated with collaborate and words like "monitor, competence, long-term" represent control. In Section 4.1, we augment these bags of words with additional bank-specific keywords and find consistent results.

Figure 1: Bag of words (Fiordelisi and Ricci, 2014)

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

We first download annual (i.e., 10-K) reports from the Edgar website (www.sec.gov) for all listed US banks over the period 1993-2007 (1993 is the earliest year for which annual reports are available and 2007 is the final year the Dealscan version we have access to). We include one filing per bank per calendar year. We then parse the annual reports into vectors of words (excluding tables and exhibits). The score of each cultural dimension is the frequency of its keywords associated with that culture scaled by the total number of words in the annual report. For instance, if 634 compete-related keywords are mentioned in a 27,110-word annual report, the *compete* score would be 2.34%.

We obtain four scores for each bank in each year, one for each cultural dimension. For instance, SVB Financial Group's scores in 2002 for *compete*, *control*, *create* and *collaborate* are 3.62%, 0.72%, 1.01%, and 1.39% respectively. These scores tend to fluctuate over time and can be "contaminated" with noises specific to the market or industry in a given year. Thus, they do not necessarily reflect the long-term overarching culture that mature firms like banks in our sample are likely to have (Schein, 2009). [14]

Therefore, we identify banks with a dominant culture in each dimension by transforming these raw scores into four time-invariant dummy variables – compete-dominant,

create-dominant, control-dominant, and collaborate-dominant. Each variable equals one for banks whose respective score in that dimension is among the highest across all banks throughout the sample period. That is, a bank will be classified as, for instance, compete-dominant if its raw compete culture score falls in the top quartile across all banks in at least half of its sample period. Our results are not sensitive to how these thresholds for cultural strength are defined.[15]

3.2. Sample construction

We obtain data on loan contracts from LPC-Reuters' Dealscan database. Our loan sample includes all dollar-denominated loans made by US lenders to US borrowers. We hand-clean the lender's name in Deaslcan to identify their holding company using a procedure similar to Schwert (2017). Some loan packages or deals consist of several facilities for the same borrower. Following Faleye and Krishnan (2017), we collapse the loan data to bank-borrower-year level.

We next merge the Dealscan data with the commercial banks and bank holding company call reports (FFIEC 031/041 and FR Y-9C) to obtain financial information on the banks. We then merge the dataset with our culture variables using the PERMCO-RSSD link table from the Federal Reserve Bank of New York. In the final step, we merge the dataset with the Compustat database using the link table from Chava and Roberts (2008) to obtain financial information on the borrowers.

From an initial sample of 97 publicly-listed US banks[16] extracted from the Dealscan database, we further lose nine banks due to missing financial data and 10 banks due to missing annual report data. Our final sample comprises 78 unique banks that lend to 5,482 unique borrowers between 1993 and 2007. Our final sample is in line with Faleye and Krishnan (2017), who identify 80 unique US banks from the Dealscan database. Table 1 presents various summary statistics: Panel A shows our sample selection procedure, Panel B shows descriptive

statistics for the full sample, Panel C for different subsets of bank cultures, and Panel D presents examples of top-ranked banks in each dominant culture category.

Table 2 presents the yearly breakdowns of our bank and loan samples. Panel A distinguishes banks according to their dominant culture (compete, create, control, collaborate) while Panel B distinguishes loans according to the borrower's credit ratings (BBB and above; rated but below BBB; unrated) and bank dominant culture. As shown in Panel A, the breakdown of banks into different dominant culture remains stable over the sample period. The cultural category that has the most number of banks is compete-dominant and one with the least number of banks is control-dominant. This distribution is consistent with the popular narrative that competitive culture is more prevalent while control culture is less represented in the banking sector. It is also in line with the findings in the academic literature that the banking and finance industry tends to attract individuals with a higher propensity to take risks relative to other industries (Kristof-Brown, Zimmerman, and Johnson, 2005; Piasentin and Chapman, 2006).

Panel A also shows that many banks are classified as having no dominant culture. In these banks, all elements of the four dimensions co-exist but no particular dimension is dominating. Similar to Panel A, Panel B shows that the breakdown of loans into different borrower's credit ratings and bank's dominant culture tends to be stable over the sample period. Therefore, our results are unlikely to be driven by events specific to an individual year over the sample period.

Table 1: Summary statistics

This table presents various summary statistics. Panel A shows the selection criteria for banks to be included in the sample. Panel B presents various summary statistics for the full sample, which comprises 41,313 loan observations (borrower-bank-years) made by 78 banks to 5,482 unique borrowers between 1993 and 2007. Panel C presents the sample means of all variables for different subsets based on bank dominant culture. Panel D shows examples of top-ranked banks in each dominant culture category.

Panel A: Selection criteria for banks to be included in the sample

	Number of banks
Publicly-listed US banks identified from the Dealscan database	97

Less:	
Banks with missing financial data from Calls Reports	(9)
Banks with missing annual reports data to measure culture	(10)
Final sample	**78**

Table 1: Summary statistics (cont.)

	Panel B: Full Sample				Panel C: Sample means by dominant culture				
Variable	Mean	p25	p50	p75	Compete	Create	Control	Collaborate	No culture
Dominant bank culture variables									
Compete-dominant	0.138	0.000	0.000	0.000					
Create-dominant	0.169	0.000	0.000	0.000					
Control-dominant	0.010	0.000	0.000	0.000					
Collaborate-dominant	0.071	0.000	0.000	0.000					
Bank characteristics									
Bank size	11.688	10.855	11.850	12.868	11.314	12.642	11.653	11.541	11.556
Bank charter value	2.203	1.709	2.045	2.538	2.481	2.331	2.146	2.050	2.125
Bank leverage	0.881	0.902	0.886	0.872	0.846	0.870	0.809	0.875	0.891
Bank ROA	0.032	0.026	0.029	0.036	0.039	0.035	0.041	0.032	0.029
Borrower characteristics									
Borrower size	7.699	6.477	7.582	8.918	7.599	7.959	8.143	7.404	7.691
Borrower market-to-book	1.721	1.357	2.086	3.354	1.191	2.099	2.556	2.686	1.622
Borrower leverage	1.947	0.980	1.612	2.781	1.721	1.986	0.695	2.338	1.914
Borrower ROA	0.129	0.084	0.125	0.172	0.114	0.127	0.124	0.132	0.133
Deal characteristics									
Sub-investment grade	0.637	0.000	1.000	1.000	0.675	0.571	0.575	0.723	0.635
Ln(Deal amount)	5.851	5.017	5.861	6.746	5.710	5.979	5.998	5.658	5.872
Deal maturity (months)	41.986	19.886	41.000	60.000	45.175	41.907	56.063	46.498	41.012
Relationship lending	0.275	0.000	0.000	1.000	0.178	0.308	0.111	0.157	0.301
Same culture	0.058	0.000	0.000	0.000	0.173	0.159	0.288	0.140	0.000
Observations		41,313			5,689	6,969	424	2,918	25,897

Panel D: Top-ranked banks in each corporate culture quadrant

Compete	Create	Control	Collaborate
PNC Financial Services	Wells Fargo	Valley National Corp	National City Corp
US Bancorp	Citigroup	UMB Financial Corp	BB&T
Corestates Financial Corp	JPMorgan & Chase	Merrill Lynch & Co Inc.	Keycorp

Table 2: Annual breakdown of bank and loan samples

Table 2 presents the annual breakdown of our bank and loan samples. Panel A distinguishes banks according to their dominant culture. Panel B distinguishes loans according to borrower's credit ratings (rated BBB and above; rated below BBB; unrated) and bank dominant culture (compete, create, control, collaborate).

Panel A: Breakdown of bank sample

year	total	compete	control	collaborate	create	unrated
1993	38	4	1	3	7	34
1994	43	6	1	4	7	38
1995	46	8	1	4	7	41
1996	49	10	2	5	7	42
1997	48	12	2	4	7	42
1998	52	10	3	6	7	43
1999	54	11	3	6	6	45
2000	50	11	3	6	4	41
2001	47	11	3	6	3	38
2002	43	9	3	5	5	35
2003	43	10	3	7	3	33
2004	41	9	2	5	2	34
2005	34	7	2	4	2	28
2006	29	6	2	3	2	24
2007	23	5	0	2	2	21

Panel B: Breakdown of loan sample

		Split by borrower credit rating			Split by bank-dominant culture				
year	total	BBB and above	rated but below BBB	unrated	compete	control	collaborate	create	unrated
1993	915	398	318	199	97	2	30	205	786
1994	1440	718	338	384	148	4	52	333	1236
1995	1732	681	371	680	193	5	56	359	1478
1996	2636	721	667	1248	403	12	94	505	2127
1997	3567	998	943	1626	641	43	181	671	2702
1998	3276	867	915	1494	466	32	199	552	2579
1999	3738	1280	997	1461	586	38	180	578	2934
2000	3712	1473	953	1286	508	28	195	482	2981
2001	3701	1676	859	1166	515	58	256	475	2872
2002	3716	1711	876	1129	617	74	320	1,046	2705
2003	3174	1272	917	985	678	86	375	434	2035
2004	3436	1270	1063	1103	459	19	419	442	2539
2005	3112	965	1095	1052	234	18	389	365	2471
2006	2200	681	687	832	122	4	161	333	1913
2007	958	296	399	263	22	0	11	189	925

4. Corporate culture and bank credit decisions

Our first goal is to establish the link between the corporate culture of banks and the credit quality of their approved borrowers. To test our hypothesis, we run the following Probit model:

$$\begin{aligned}\Pr(\text{Risky borrower}_{i,j,t}) &= \Phi(\alpha_0 + \alpha_1 \textit{Compete-dominant}_i + \alpha_2 \textit{Create-dominant}_i \\ &+ \alpha_3 \textit{Control-dominant}_i + \alpha_4 \textit{Collaborate-dominant}_i + \mathbf{CONTROL}_{i,j,t}\boldsymbol{\Gamma} \\ &+ \varepsilon_{i,j,t})\end{aligned} \tag{1}$$

where *i* indexes banks, *j* indexes borrowers and *t* indexes years. The dependent variable *Risky borrower* is a dummy variable that equals one if the borrower does not have a long-term Standard and Poor's credit rating or its credit rating is rated below BBB. [17] If a bank approves loans requested by sub-investment grade borrowers, it is willing to assume significant default risk. Therefore, this variable reflects the bank's propensity to take risk in originating loans.

The four key independent variables are the four CVF cultural dimensions. We include various control variables in all our estimations. To isolate the impact of bank culture from traditional determinants of a bank's business models, we control for several bank characteristics. These include bank size, charter value, leverage and return on assets (ROA). Furthermore, we also control for several borrower characteristics, including borrowers' size, market-to-book ratio, leverage and return on assets.

In addition, several loans characteristics are included: *Ln (Deal amount)*, the natural logarithm of the loan's amount and *Ln (Loan duration),* the natural logarithm of maturity period. We also control for qualitative factors that could affect lending outcomes*: relationship lending*, a dummy that equals one if the borrower has taken out a prior loan from the bank in the last three years; and *same culture*, a dummy variable that equals one if the borrower and the lender have identical dominating corporate culture.[18] All regressions include year, borrower's SIC-2 industry and borrower's state fixed effects to control for differences in loan

characteristics across time, industries, and states. Standard errors are clustered at the borrower-level.

Table 3 presents our baseline results, with the marginal effects (evaluated at the mean values) for the four cultural variables reported in squared brackets. Consistent with our hypothesis, we find that banks with a growth focus are more likely to have borrowers with poorer credit ratings, while those with a safety focus are less likely to do so. The effects are concentrated on compete- and control-dominant banks. The marginal effects in Column 5 indicate that borrowers of compete-dominant banks are 3.0% more likely to be rated as risky (i.e., unrated or rated below BBB) compared to borrowers of banks with no dominant culture. Given that approximately 63.7% of the loans in our sample are made to sub-investment grade borrowers, this means that loans made by compete-dominant banks are 4.7% (=0.030/0.637) more likely to be risky. In contrast, loans made by control-dominant banks are 10.4% (=0.066/0.637) less likely to be risky. Furthermore, these magnitudes imply that bank culture has a greater impact on borrowers' creditworthiness compared to other characteristics of the bank, including size (0.5%), charter value (2.7%), or profitability (2.4%)[19]. We do not find the coefficients for collaborate-dominant and create-dominant to be statistically significant.

The control variables have the expected signs. Borrowers of small, profitable and highly-leveraged banks are more likely to be risky, consistent with these banks adopting expansionary business strategies. This highlights the importance of controlling for these bank characteristics to separate a bank's culture from characteristics reflecting its business strategies. It also suggests that bank culture has a first-order effect on risk-taking beyond any business model related characteristic.

Table 3: Bank culture and borrower's credit quality

This table reports Probit estimation results, where the dependent variable (Risky Borrower) equals one for unrated borrowers or those rated below BBB, zero for borrowers rated BBB or above. Marginal effects (evaluated at the mean values) for the four cultural variables are reported in squared brackets. Definitions of all variables are included in Appendix I. All models include year, borrower's industry and state fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Dummy equals one for unrated borrowers or those rated below BBB					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	0.088***				0.095***
	(2.657)				(2.670)
	[0.027]				[0.030]
Create-dominant		-0.006			0.025
		(-0.229)			(0.881)
		[-0.002]			[0.008]
Control-dominant			-0.211**		-0.211**
			(-2.352)		(-2.302)
			[-0.066]		[-0.066]
Collaborate-dominant				0.026	0.065
				(0.657)	(1.516)
				[0.008]	[0.020]
Bank size	-0.016**	-0.019***	-0.020***	-0.019***	-0.017***
	(-2.529)	(-3.019)	(-3.385)	(-3.124)	(-2.792)
Bank charter value	-0.085***	-0.083***	-0.085***	-0.083***	-0.085***
	(-6.534)	(-6.369)	(-6.525)	(-6.384)	(-6.540)
Bank leverage	0.001	0.004	0.005	0.004	0.001
	(0.294)	(1.265)	(1.570)	(1.235)	(0.422)
Bank ROA	7.926***	8.683***	8.764***	8.638***	7.820***
	(7.071)	(8.017)	(8.134)	(7.990)	(6.962)
Borrower size	-0.821***	-0.821***	-0.821***	-0.821***	-0.820***
	(-21.273)	(-21.302)	(-21.274)	(-21.271)	(-21.290)
Borrower market-to-book	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
	(-2.895)	(-2.890)	(-2.889)	(-2.890)	(-2.895)
Borrower leverage	0.004**	0.004**	0.004**	0.004**	0.004**
	(2.560)	(2.558)	(2.552)	(2.557)	(2.553)
Borrower ROA	-2.523***	-2.523***	-2.522***	-2.521***	-2.517***
	(-6.545)	(-6.540)	(-6.538)	(-6.537)	(-6.533)
Ln (Deal amount)	-0.008	-0.008	-0.008	-0.008	-0.008
	(-0.259)	(-0.251)	(-0.277)	(-0.249)	(-0.278)
Deal maturity	0.008***	0.008***	0.008***	0.008***	0.008***
	(6.258)	(6.211)	(6.315)	(6.209)	(6.336)
Relationship lending	0.043*	0.041	0.040	0.042	0.044*
	(1.664)	(1.597)	(1.552)	(1.626)	(1.700)
Same culture	-0.036	-0.021	-0.015	-0.026	-0.043
	(-0.529)	(-0.307)	(-0.223)	(-0.388)	(-0.593)
Year FE	Yes	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	Yes	Yes	Yes	Yes
Borrower state FE	Yes	Yes	Yes	Yes	Yes
Observations	41,313	41,313	41,313	41,313	41,313
Pseudo- R^2	0.492	0.492	0.492	0.492	0.492

4.1. Robustness checks

Table 4 reports various robustness checks on the relation between a bank's culture and its borrower's credit quality. Unless otherwise stated, all models use probit estimation with similar set of controls and fixed effects. Results in Panel A provide some validation of our bank culture construct. We start by relaxing the assumption that bank culture is time-invariant. For the purposes of comparison, Column 1 displays our baseline estimation results using time-invariant measures of corporate culture while Columns 2 and 3 display the re-estimation results using time-varying measures. In Column 2, we use Probit estimation and in Column 3, we use a linear probability model with bank fixed-effects to exploit only within-bank variations.

As shown in Panel A, the coefficient estimates in Column 2 are largely similar to those in Column 1, albeit having smaller magnitudes. In contrast, except for the coefficient of compete-dominant that is marginally significant at 10% level, all coefficients for other culture variables are close to zero (Column 3). These results lend strong support to our conceptualisation of culture, implying that it is largely between-bank variations in culture that explain the heterogeneity in bank lending behaviour. The results are also consistent with Fiordelisi and Ricci (2014), who show that cross-sectional variations in corporate culture dimensions are related to management turnovers and successions. Additionally, the results also support the view that within-firm time-variation in culture is driven by noises rather than reflecting permanent shift in culture.[20]

Columns 4-6 of Panel A show that our results are not sensitive to the specific way in which our cultural measures are constructed. In Column 4, we reclassify a bank as having a dominant culture when its raw score falls in the top decile instead of the top quartile. In Column 5, we require that a bank's score has to be in the top quartile for at least two-thirds instead of half of its sample period. In Column 6, we allow for the possibility that a bank's culture may

be associated with its CEO (e.g., Ogbonna and Harris, 2000) by classifying our time cultural measure per bank-CEO. As shown in Columns 4-6, our results remain unchanged.

Table 4: Bank culture and borrower's credit quality – Robustness checks

This table reports various robustness checks. Unless otherwise stated, all models use Probit estimation and include similar controls as those in Table 3. Panel A performs the validity tests on our culture measures. For the purposes of comparison, Column (1) displays our baseline estimation results using time-invariant measures of corporate culture while Columns (2) and (3) display the re-estimation results using time-varying measures. In Column (2), we use Probit estimation and in Column (3), we use a linear probability model with bank fixed-effects to exploit only within-bank variations. Column (4) reclassifies the "dominating" threshold to be in the top 10%. Column (5) reclassifies the "time-invariant" threshold to be two-thirds of the sample. Column (6) reclassifies time-invariant dominating culture per bank-CEO rather than per bank. Panel B incorporates additional bank-specific keywords to the bags of words. Panel C controls for various compensation incentives and observable characteristics of the CEO. Panel D performs other robustness checks. Columns (1) and (2) report results where standard errors are clustered at the bank-year and borrower-year, respectively. Column (3) reports results using OLS estimation. Column (4) includes additional loan type and loan purpose fixed effects. In Column (5), unrated borrowers are excluded, and the dependent variable equals one when borrowers rated below BBB. Column (6) excludes loans made by the top-five largest banks. Column (7) excludes loans made during transitional year after a merger. Definitions of all variables are included in Appendix I. All models include year, borrower's industry and state fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Validity of culture measures						
Dependent variable: dummy that equals one for unrated borrowers or those rated below BBB						
	Time-invariant measures (baseline)	Time-varying measures	Time-varying measures with bank FE	Dominating threshold at 10%	Majority threshold at 67%	Dominating culture per bank-CEO
	(1)	(2)	(3)	(4)	(5)	(6)
Compete-dominant	0.095***	0.055**	0.009*	0.201**	0.072**	0.101**
	(2.670)	(2.475)	(1.708)	(2.179)	(2.231)	(2.168)
	[0.030]	[0.017]		[0.063]	[0.022]	[0.032]
Create-dominant	0.025	0.008	-0.000	-0.099	0.040	0.058
	(0.881)	(0.393)	(-0.107)	(-1.084)	(1.084)	(0.817)
	[0.008]	[0.002]		[-0.031]	[0.012]	[0.015]
Control-dominant	-0.211**	-0.042*	-0.005	-0.274***	-0.225**	-0.237**
	(-2.302)	(-1.804)	(-0.821)	(-2.862)	(-2.408)	(-2.081)
	[-0.066]	[-0.013]		[-0.086]	[-0.070]	[-0.077]
Collaborate-dominant	0.065	-0.004	0.002	-	-0.068*	0.067
	(1.516)	(-0.221)	(0.374)	-	(-1.667)	(1.518)
	[0.020]	[-0.001]		-	[-0.021]	[0.022]
Estimation method	Probit	Probit	LPM	Probit	Probit	Probit
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower state FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,313	41,313	41,313	41,313	41,313	41,313
Pseudo-R2/R2	0.492	0.493	0.454	0.492	0.493	0.492

Table 4: Bank culture and borrower's credit quality – Robustness checks (cont.)

Panel B: Cultural measures using augmented bags of words	
	(1)
Compete-dominant	0.076**
	(2.125)
	[0.021]
Create-dominant	-0.015
	(-0.402)
	[-0.004]
Control-dominant (Augmented)	-0.065*
	(-1.772)
	[-0.019]
Collaborate-dominant	0.078
	(1.557)
	[0.021]
Other controls	Yes
Year FE	Yes
Borrower industry FE	Yes
Borrower state FE	Yes
Observations	43,313
Pseudo- R^2	0.538

Panel C: Control for CEO compensation incentives and observable characteristics		
	(1)	**(2)**
Compete-dominant	0.092**	0.076**
	(2.514)	(2.035)
	[0.028]	[0.024]
Create-dominant	0.024	0.026
	(0.868)	(0.900)
	[0.007]	[0.008]
Control-dominant	-0.347***	-0.335***
	(-2.815)	(-2.729)
	[-0.108]	[-0.104]
Collaborate-dominant	0.059	0.069
	(1.381)	(1.623)
	[0.018]	[0.021]
Bonus/Salary	0.024	0.021
	(0.719)	(0.636)
Equity/(Bonus + Salary)	0.004**	0.004**
	(2.266)	(2.233)
CEO age	-	-0.004*
	-	(-1.929)
Ivy League	-	-0.025
	-	(-1.168)
Experienced CEO	-	0.031
	-	(1.553)
Other controls	Yes	Yes
Year FE	Yes	Yes
Borrower industry FE	Yes	Yes
Borrower state FE	Yes	Yes
Observations	40,351	39,551
Pseudo- R^2	0.492	0.491

Table 4: Bank culture and borrower's credit quality – Robustness checks (cont.)

Panel D: Other robustness tests							
	Cluster by bank-year	Cluster by borrower-year	Linear probability model	Loan type and purpose FE	Exclude unrated loans	Exclude top-five banks	Exclude post-merger year
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Compete-dominant	0.087**	0.087***	0.013**	0.063*	0.119***	0.107***	0.096**
	(2.535)	(2.855)	(1.981)	(1.821)	(2.939)	(2.955)	(2.130)
	[0.028]	[0.028]		[0.019]	[0.045]	[0.032]	[0.030]
Create-dominant	0.028	0.028	-0.006	0.028	0.102***	0.047	0.033
	(0.873)	(1.188)	(-1.096)	(0.996)	(3.230)	(1.308)	(1.121)
	[0.009]	[0.009]		[0.009]	[0.039]	[0.014]	[0.010]
Control-dominant	-0.208*	-0.208**	-0.033*	-0.312***	-0.213**	-0.221**	-0.221**
	(-1.656)	(-2.362)	(-1.845)	(-3.374)	(-2.087)	(-2.436)	(-2.354)
	[-0.066]	[-0.066]		[-0.096]	[-0.081]	[-0.067]	[-0.069]
Collaborate-dominant	0.044	0.044	0.009	0.052	0.043	0.060	0.070
	(1.147)	(1.316)	(0.881)	(1.186)	(0.849)	(1.370)	(1.498)
	[0.014]	[0.014]		[0.016]	[0.016]	[0.018]	[0.022]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower state FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41,088	41,088	40,481	40,997	26,350	28,704	33,836
Pseudo- R^2	0.513	0.513	0.523	0.527	0.431	0.521	0.490

In Panel B, we address the concern that the cultural bags of words may omit important keywords that are specific to the banking sector. Taking the lead from Bianchi, Farina, and Fiordelisi (2016), we manually scan through the 2014 Financial Stability Board's "Guidance on Supervisory Interaction with Financial Institutions on Risk Culture*"* for additional keywords that reflect bank culture. Our search identifies 10 extra keywords that are not included in the original bags of words: *sceptic*, skeptic*, whistleblow, compliance, risk culture, risk management, risk appetite, risk information, risk limit, control functions*.[21] Banks that frequently mention these words in their annual reports are more likely to place heavy emphasis on control matters and as a result, are safer and have better loan quality (Bianchi, Farina, and Fiordelisi, 2016). Therefore, we add these keywords to the "control-oriented" bag. As shown in Panel B, our results using the newly constructed cultural variables remain robust.

Panel C introduces additional control variables that reflect the compensation incentives and characteristics of the CEO. Column 1 controls for the fraction of bonus pay (bonus/salary) and the fraction of equity pay (equity/[bonus+salary]). Columns 2 also also control for various observable CEO characteristics: the age of the CEO, whether the CEO graduates from an Ivy

League university, or whether the CEO has prior work experience as a top executive.[22] Our results are robust to including these additional factors.

By showing that the influence of corporate culture is not driven by these potentially confounding factors, the results in Panel C add to prior studies on corporate culture of financial service firms (e.g., Chatman and Spatero, 2005; Dwyer et al., 2003; Xenikou and Simosi, 2006). Our findings imply that two seemingly similar banks (that is, banks that adopt similar business models, offer comparable compensation incentives to their CEOs, and hire CEOs that are similar in terms of demographics, education and career history) can have different lending behaviour depending on their corporate culture. This is in line with the calls from regulators to look beyond observable factors such as CEO pay in studying bank behaviour.

Panel D presents various other robustness checks. First, instead of clustering the standard errors at the borrower-level, we cluster them at the bank-year (Column 1) and borrower-year level (Column 2). Second, in light of Greene's (2004) concern that the test of coefficient significance could be distorted in Probit estimation when many fixed effects are included, we re-estimate our results using a linear probability model (Column 3). Furthermore, we recognise that loans can have different types and purposes, which may affect the probability of being approved. Following Giannetti and Yafeh (2012), we include in the regressions additional dummy variables for loan types and loan purposes (Column 4). Next, we exclude unrated borrowers from the sample and use a new dependent variable that equals one for sub-investment grade borrowers (rated BBB and below) and zero otherwise (Column 5).

Furthermore, to address the concern that our results are driven by a subset of very large banks, i.e., those perceived as "too-big-to-fail" and thus, are more prone to take risk (Stern and Feldman, 2004), we exclude the top-five largest banks (ranked by assets at the end of 2007)[23] from the sample (Column 6). Finally, in Column 7, we exclude loans made in the year after a bank completes an acquisition to prevent the possibility that information about M&A deals

included in the annual reports may add noise to our cultural measures. Our results remain robust across all columns in Panel D.

4.2 Endogeneity of bank culture measures

4.2.1 Bank behaviour during the Russian Crisis of Fall 1998

While our results are consistent with the view that the cross-sectional differences across bank culture explain the differences in a bank's willingness to absorb default risk from borrowers, they are still subject to endogeneity concerns (see, for instance, Abdallah, Goergen and O'Sullivan (2015)). First, the coefficient estimates can still be biased if there are unobserved factors that are correlated with both our measures of bank culture and borrowers' quality. Second, since we can only observe the approved applications but not the rejected ones, our results could reflect the fact that borrowers do not randomly choose a bank to apply for loans and thus, there can be unobserved heterogeneity that simultaneously affects the borrower pool and our bank culture measure. To alleviate some of these concerns, we begin by examining how the lending behaviour of US banks changes in response to an exogenous event occurred outside the US – the Russian Crisis of Fall 1998.

This Russian Crisis starts with an announcement of the Russian government to default its sovereign debt obligations on 17th August 1998 (Kho, Lee, and Stulz, 2000). This was followed by the suspension of Ruble trading on 28th August 1998 and the massive capital flight from Brazil on 3rd September 1998. Many US banks that have dealings with these countries experienced significant losses, liquidity constraint and worsened stock performance. Gatev, Strahan and Schuermann (2004) show that bank stocks performed very poorly during this period, losing 10% of market capitalisation in a short period.

Crucially, by making the adverse consequences of excessive risk-taking more salient, this event also generated a negative sentiment among *unexposed* US banks (Chava and Purnanandam, 2011). We hypothesise that, if a bank's culture is unrelated to its lending

decisions, all banks should exhibit similar changes in lending behaviour (or lack thereof) after the shock. In contrast, if a bank's culture matters to its willingness to take risk in approving loans, we should observe heterogeneous reactions across banks with different cultures.

Further, since this default event is exogenous to the US economy (Chava and Purnanandam, 2011), it also isolates a bank's willingness to lend from a borrower's decision to apply for a loan or its choice of lenders. Therefore, changes in lending behaviour after the event can be attributed to lenders and not borrowers.

In a difference-in-difference setting, we examine changes in lending behaviour of banks with different cultures before and after the Russian default event. In line with the idea that the Russian event only produced a temporary, short-term negative sentiment rather than creating a permanent, long-term effect, we focus on short-term windows of three, four and five months surrounding the event (i.e., from April 1998 to December 1998).[24] To ensure that our coefficients pick up only the negative sentiment effect, we exclude all banks and borrowers that had direct dealings with Russia and Brazil during this period, i.e., those that had to bear the direct consequences of the event,[25] and focus solely on the lending behaviour of *unexposed* US banks and borrowers.

Our coefficients of interest are the interaction terms between the bank culture variables and *Post-Russian default*, a dummy variable that equals one for all months from August 1998. One concern is that the significance of the interaction terms in Probit estimation can be misleading. This is because the interaction effect in non-linear models is not a constant, but depends on the values of independent variables. Therefore, the marginal effects obtained from the coefficient of the interaction term may fail to reflect the true interaction effect between variables (Ai and Norton, 2003; Powers, 2005). To overcome this issue, we follow Fiordelisi and Ricci (2014) and adopt the methodology developed by Ai and Norton (2003) and Norton, Wang and Ai (2004) to compute the correct marginal effects and their standard errors.

Table 5: 1998 Russian default, bank culture, and borrower's quality

This table reports Probit estimation results where the dependent variable (Risky borrower) equals one for unrated borrowers or those rated below BBB, zero for borrowers rated BBB or above. *Post-Russian default* is a dummy that equals one for all months on and after August 1998. Column (1), (2) and (3) respectively report results using three-month (July 1998 to September 1998), four-month (July 1998 to October 1998) and five-month (June 1998 to October 1998) windows surrounding the Russian default event. Column (4) reports results of a placebo test where the Russian default periods are wrongly defined to occur exactly one year prior to the actual default date. Marginal effects for interaction terms between four cultural variables and Post-Russian default dummy variables (reported in squared brackets) are calculated as shown in Ai and Norton (2003) and Norton, Wang and Ai (2004). Definitions of all variables are included in Appendix I. All models include year, borrower's industry and state fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	3-month	4-month	5-month	Placebo event 1 year prior to August 1998
	(1)	**(2)**	**(3)**	**(4)**
Compete-dominant * Post-Russian default	-0.085**	-0.087**	-0.086**	0.004
	(-2.204)	(-2.091)	(-2.124)	(0.097)
	[0.027]	[0.028]	[0.028]	[0.001]
Create-dominant * Post-Russian default	-0.016	-0.027	-0.030	-0.062
	(-0.346)	(-0.619)	(-0.685)	(-1.505)
	[0.005]	[0.008]	[0.009]	[0.018]
Control-dominant * Post-Russian default	-0.066	-0.091	-0.089	0.101
	(-0.498)	(-0.692)	(-0.711)	(0.635)
	[0.020]	[0.028]	[0.028]	[0.030]
Collaborate-dominant * Post-Russian default	0.041	0.046	0.054	0.005
	(0.699)	(0.828)	(1.050)	(0.080)
	[0.013]	[0.015]	[0.017]	[0.002]
Post-Russian default	-0.005	-0.020	-0.017	-0.091*
	(-0.100)	(-0.461)	(-0.413)	(-1.796)
Compete-dominant	0.077**	0.058	0.065*	0.026
	(2.268)	(1.444)	(1.747)	(0.660)
Create-dominant	-0.046	-0.021	-0.007	0.045
	(-1.179)	(-0.540)	(-0.183)	(1.235)
Control-dominant	-0.015	-0.024	-0.013	0.097
	(-0.140)	(-0.229)	(-0.124)	(0.664)
Collaborate-dominant	0.012	-0.007	-0.013	0.027
	(0.241)	(-0.144)	(-0.281)	(0.533)
Other controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	Yes	Yes	Yes
Borrower state FE	Yes	Yes	Yes	Yes
Observations	1,198	1,582	2,003	2,003
Pseudo- R^2	0.703	0.641	0.604	0.491

Table 5 reports the Probit estimation results. The marginal effects (calculated using the Norton approach) for the four cultural variables are reported in brackets. Across all three event windows, only the coefficient estimates for *Compete-dominant*Post-Russian default* are negative and statistically significant. Across all columns, the marginal effects indicate that compete-dominant banks cut their lending to risky borrowers by 2.7% following the default event. We attribute this response to credit officer's career concerns. Our interpretation is that,

after witnessing peer banks incurring large losses, credit officers at compete-dominant banks (who tend to approve riskier loans) become concerned about their career and refrain from taking excessive risk in the short term.[26] Specifically, they are concerned that if the loan portfolios they underwrite experience negative credit events, they would suffer negative career consequences (Gao, Kleiner, and Pacelli, 2017). In contrast, we do not find any statistically significant change in lending patterns of banks with other cultures.

To confirm that our results are not driven by omitted factors, we construct a placebo test where the Russian default periods are falsely defined to be exactly one year before the actual default date. If omitted factors were to drive our results, we should continue to find significant results even under this inaccurate assignment. As shown in Column 4 of Table 5, all interaction terms are indistinguishable from zero. Overall, this set of results supports our conjecture that a bank's culture explains its lending behaviour.

4.2.2 Evidence from residential mortgage loans

We further address the concern that our results could be driven by unobserved heterogeneity that simultaneously affects the borrower pool and our bank culture measure. This concern arises from the fact that in the Dealscan sample, we can only observe the approved applications but not the rejected ones. To alleviate this concern, we use an alternative sample of retail mortgage loans (instead of corporate loans) where the complete pool of loan applications can be observed.

We obtain data on mortgage applications from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry. Our measure of the bank's risk-taking in making mortgage loans is *Mortgage approval rate*, the fraction of approved loans divided by the total number of applications. Holding other factors constant, a higher approval rate indicates a higher level of willingness to consume default risk by a bank.

To test our hypothesis, we regress *Mortgage approval rate* on our bank culture measures using Ordinary Least Squares (OLS). The data are aggregated at the bank-county-year level so that we can exploit both variations across banks and geographical regions. All models include county-year fixed effects, which control for omitted demand-side factors that could affect the lending behaviour of all banks within a given county-year. This allows us to compare loans originated in a given county in a given year by banks with different cultures. We also control for various bank characteristics (size, leverage, profitability, and charter value) and applicant characteristics (applicant's income, fraction of female applicants, and fraction of minority applicants).

As shown in Table 6, *compete-dominant* banks are associated with a 17% (=0.11/0.66) higher loan approval rate while *control-dominant* banks are associated with a 27% (=0.27/0.66) lower approval rate. The magnitudes of bank culture variables are higher than those of important controls such as bank size (2.0%) or bank charter value (2.3%). Overall, the results indicate that a bank's culture affects its approval decisions, in addition to affecting its borrower's credit quality.

Table 6: Bank culture and mortgage approval rate

This table reports OLS estimation results where the dependent variable is *Mortgage approval rate*, defined as the number of approved loan applications divided by the total number of applications. The data are from the Home Mortgage Disclosure Act (HMDA) Loan Application Registry and are aggregated at the bank-county-year level. Definitions of all variables are included in Appendix I. All models include county-year fixed effects. Robust standard errors are clustered at the county-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Dependent variable: Mortgage approval rate					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	0.187***				0.188***
	(0.052)				(0.050)
Create-dominant		-0.071			-0.078
		(0.058)			(0.048)
Control-dominant			-0.313***		-0.323***
			(0.075)		(0.085)
Collaborate-dominant				0.017	0.015
				(0.031)	(0.032)
Ln(Total Income)	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Fraction of female applicants	-0.095***	-0.095***	-0.095***	-0.095***	-0.095***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Fraction of minority applications	-0.222***	-0.222***	-0.222***	-0.222***	-0.222***
	(0.003	(0.003	(0.003	(0.003	(0.003
Bank size	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Bank charter value	0.015***	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank leverage	-0.214***	-0.214***	-0.214***	-0.214***	-0.214***
	(0.049)	(0.049)	(0.049)	(0.049)	(0.049)
Bank ROA	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
County-year FE	Yes	Yes	Yes	Yes	Yes
Observations	372,457	372,457	372,457	372,457	372,457
R^2	0.122	0.122	0.122	0.122	0.122

4.3 Bank culture and loan contract terms

So far, we find that a bank's culture affects its approval decisions, i.e., whether loans are approved and whether they are extended to marginal borrowers. This section investigates whether a bank's culture also affects the terms in the loan contracts (i.e., loan covenants and loan spreads). We use OLS to regress the number of covenants and loan spreads[27] on the culture variables. We include the same set of control variables and fixed effects as those in Equation (1). Table 7 reports the results.

As shown in Columns 1 and 2 of Table 7, compete-dominant banks impose 1.5% (=0.034/2.33) fewer covenant requirements on their borrowers while charging their borrowers a 5.2% higher loan spread. This is consistent with their focus on revenue and growth and thus, choose to undermine post-lending safety and impose less stringent loan terms in exchange for higher loan spreads. In contrast, control-dominant banks require their borrowers to meet 7.3% higher covenant requirements, suggesting that these banks use loan covenants to reduce post-lending uncertainty.[28]

Columns 3-6 further show that the differences in loan contract terms concentrate on the sub-sample of risky borrowers (i.e., unrated or rated below BBB). These are marginal cases that require banks to exercise more discretion and the ensuing loan outcomes are thus more likely to be affected by a bank's culture. Collectively, our results indicate that a bank's culture not only affects loan approval decisions but also explains the characteristics of the loan contracts.

Table 7: Bank culture and loan contract terms

This table reports OLS results of borrowers' covenants and loan spreads on measures of the bank's corporate culture. Definitions of all variables are included in Appendix I. All models include year, borrower's industry and state fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	All borrowers		**Sub-investment grade**		**Investment grade**	
Dependent variables:	Covenants	Loan spreads	Covenants	Loan spreads	Covenants	Loan spreads
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Compete-dominant	-0.034*	0.052***	-0.043*	0.046***	0.009	0.018
	(-1.900)	(3.992)	(-1.871)	(3.373)	(0.420)	(1.254)
Create-dominant	-0.097***	0.060***	-0.106***	0.091***	-0.014	0.001
	(-5.636)	(5.039)	(-5.003)	(7.173)	(-0.966)	(0.037)
Control-dominant	0.170**	0.026	0.134*	0.130**	0.101*	-0.126
	(2.574)	(0.517)	(1.662)	(2.492)	(1.903)	(-1.528)
Collaborate-dominant	0.050**	0.014	0.052**	-0.011	-0.001	0.043
	(2.438)	(1.118)	(2.166)	(-0.818)	(-0.025)	(1.584)
Bank size	0.003	-0.014***	-0.000	-0.017***	0.002	-0.004
	(0.821)	(-5.776)	(-0.073)	(-6.324)	(0.720)	(-1.353)
Bank charter value	0.008	-0.047***	0.015	-0.039***	-0.009	-0.016***
	(1.053)	(-9.843)	(1.616)	(-7.426)	(-1.372)	(-2.754)
Bank leverage	0.004**	0.007***	0.008***	0.009***	-0.004**	0.007***
	(2.366)	(6.310)	(3.807)	(6.972)	(-2.373)	(4.195)
Bank ROA	-1.156	5.190***	-1.775**	4.865***	1.502**	1.283
	(-1.535)	(12.008)	(-2.463)	(11.266)	(2.325)	(1.491)
Borrower size	-0.118***	-0.233***	-0.085***	-0.153***	-0.165***	-0.081***
	(-7.473)	(-17.840)	(-9.373)	(-12.892)	(-6.040)	(-6.798)
Borrower market-to-book	-0.002	-0.002	-0.002**	-0.002	-0.002	-0.004***
	(-1.434)	(-1.448)	(-2.531)	(-1.338)	(-1.047)	(-4.732)
Borrower leverage	0.001*	0.001	0.001***	0.001	0.009	0.010***
	(1.743)	(1.511)	(2.738)	(1.461)	(1.424)	(4.100)
Borrower ROA	0.337***	-1.742***	0.455***	-1.597***	-0.688***	-1.524***
	(2.676)	(-16.827)	(6.620)	(-16.550)	(-2.810)	(-6.338)
Ln (Deal amount)	0.060***	0.024*	0.064***	0.018	0.044*	-0.005
	(3.720)	(1.788)	(6.618)	(1.547)	(1.812)	(-0.357)
Deal maturity	0.009***	0.003***	0.009***	0.001**	0.001	0.001*
	(12.020)	(5.092)	(23.841)	(2.362)	(1.316)	(1.975)
Ln (Spread)	0.513***	-	0.450***	-	0.360***	-
	(21.710)	-	(35.603)	-	(8.967)	-
Covenants	-	0.226***	-	0.146***	-	0.310***
	-	(22.113)	-	(16.424)	-	(9.636)
Relationship lending	0.025	0.023*	0.003	0.021*	0.009	0.009
	(1.607)	(1.771)	(0.277)	(1.885)	(0.691)	(0.691)
Same culture	-0.026	-0.031	-0.072***	-0.048**	-0.100**	-0.100**
	(-0.723)	(-1.014)	(-3.098)	(-2.147)	(-2.471)	(-2.471)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower state FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,750	24,750	18,137	18,137	6,613	6,613
R^2	0.394	0.280	0.547	0.426	0.519	0.519

5. Bank culture and financial stability

In the previous sections, we show that a bank's culture affects the loan approval decisions and loan contract terms. However, looking at loan-level outcomes alone does not allow an overall assessment of the impact of a bank's culture on its individual risk and its contribution to systemic risk. This section investigates whether a bank's culture, through various lending channels documented earlier, affects its stand-alone risk as well as the bank's contribution to the risk of the financial system.

5.1 Bank culture and loan performance

We begin by analysing whether a bank's culture affects the performance and risk of its loan portfolio. We use OLS to regress loan growth and non-performing loans on the culture variables:

$$y_{i,t} = \alpha_0 + \alpha_1 \textit{Compete-dominant}_i + \alpha_2 \textit{Create-dominant}_i + \alpha_3 \textit{Control-dominant}_i + \alpha_4 \textit{Collaborate-dominant}_i + \mathbf{CONTROL}_{i,t}\boldsymbol{\Gamma} + \varepsilon_{i,t} \quad (2)$$

where *i* indexes bank and *t* indexes years. The dependent variables ($y_{i,t}$) are *Loan growth*, the percentage change in total loans relative to the previous year; and *Non-performing loans*, the fraction of non-performing loans divided by total assets. Following Ellul and Yerramilli (2013), we control for various bank characteristics: bank size, bank leverage, bank ROA, bank capital, bank deposits, bank loans, as well as bank deposit concentration at the state-level (bank HHI).

As shown in Table 8, compete-dominant banks enjoy a 2.6% faster loan growth relative to other banks while exhibiting a 0.9% higher fraction of non-performing loans. Therefore, the aggressive lending practices enable compete-dominant banks to enjoy rapid loan growth but, at the same time, these practices lead to greater losses caused by their defaulting borrowers. In contrast, control-dominant banks have a 1.2% lower fraction of non-performing loans, a reward for their caution when originating and setting up loan contracts.

Table 8: Bank culture and loan outcomes

This table reports OLS results where the dependent variables are *Loan growth*, the percentage change in total assets relative to prior year (Panel A); and *Non-performing loans*, the fraction of non-performing loans divided by total assets (Panel B). Definitions of all variables are included in Appendix I. All models include year fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Bank loan growth					
Dependent variable: Loan growth (%)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	2.541***				2.562**
	(2.675)				(2.207)
Create-dominant		0.520			1.996
		(0.336)			(1.181)
Control-dominant			-1.487		0.417
			(-1.134)		(0.285)
Collaborate-dominant				0.347	0.891
				(0.433)	(1.031)
Bank size	0.240	0.034	0.010	0.092	-0.120
	(0.856)	(0.116)	(0.037)	(0.336)	(-0.342)
Bank leverage	-62.945*	-62.054	-58.257	-62.999*	0.588
	(-1.744)	(-1.637)	(-1.498)	(-1.672)	(0.324)
Bank ROA	-0.247	-0.052	-0.105	-0.050	-0.475
	(-0.221)	(-0.044)	(-0.089)	(-0.043)	(-0.669)
Bank capital	0.544*	0.553*	0.582**	0.560*	-65.758
	(1.936)	(1.906)	(1.997)	(1.914)	(-1.563)
Bank deposits	1.941	0.165	0.257	0.431	0.686
	(0.336)	(0.030)	(0.046)	(0.076)	(0.111)
Bank lending	-16.544***	-18.085***	-18.643***	-18.565***	-20.663***
	(-3.622)	(-3.489)	(-3.666)	(-3.544)	(-3.481)
Bank HHI	-1.622	-1.178	-1.307	-1.194	-2.161
	(-1.066)	(-0.775)	(-0.852)	(-0.784)	(-1.413)
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	317	317	317	317	265
R-squared	0.240	0.221	0.224	0.221	0.282

Panel B: Bank non-performing loans					
Dependent variable: Non-performing loans/Total assets					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	0.927**				0.892**
	(2.344)				(2.058)
Create-dominant		1.436			1.775*
		(1.457)			(1.785)
Control-dominant			-1.560***		-1.234**
			(-3.244)		(-2.264)
Collaborate-dominant				0.329	0.523
				(0.712)	(1.118)
Bank size	0.801***	0.652***	0.653***	0.737***	0.660***
	(4.620)	(3.747)	(3.584)	(4.146)	(3.725)
Bank ROA	-1.441***	-1.429***	-1.442***	-1.440***	-1.459***
	(-2.908)	(-2.932)	(-3.006)	(-3.002)	(-2.929)
Bank capital	0.260	0.264	0.313*	0.267	0.308*
	(1.503)	(1.524)	(1.802)	(1.556)	(1.753)
Bank deposits	-1.522	-1.882	-2.413	-2.164	-0.629
	(-0.569)	(-0.705)	(-0.913)	(-0.808)	(-0.231)
Bank lending	12.443***	11.792***	11.362***	11.470***	11.926***
	(13.889)	(12.582)	(12.664)	(11.942)	(12.249)
Bank leverage	-12.752	-14.999	-8.936	-14.920	-7.947
	(-1.105)	(-1.307)	(-0.746)	(-1.276)	(-0.659)
Bank HHI	-1.101	-0.899	-1.000	-0.898	-0.902
	(-1.454)	(-1.172)	(-1.336)	(-1.183)	(-1.213)
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	290	290	290	290	290
R-squared	0.437	0.435	0.436	0.429	0.451

Given the costs associated with aggressive lending, why would some banks still maintain a compete-dominant culture and issue loans to risky borrowers? One possible explanation is that they may gain immediate benefits from risky lending, but only have to bear the costs when the industry enters distress. We explore how bank culture affects lending decisions and loan performance under different market conditions and find evidence that supports this explanation.

Following Faleye and Krishnan (2017), we define industry distress periods as years in which the number of bank failures[29] is greater than the sample median. We then partition each of the loan-level (borrower's credit ratings) and bank-level (loan growth and non-performing loans) sample into "non-distress" and "distress" subsamples and re-estimate our analyses.

Results in Table 9 demonstrate a sharp contrast in bank lending behaviour and loan performance of banks with different cultures across non-distress and distress time. During non-distress time (Columns 1 to 3), compete-dominant banks continuously extend loans to risky borrowers and, as a result, enjoy a phase of fast lending growth *without* incurring higher non-performing loans. However, when distress hits (Columns 4 to 6), compete-dominant banks start to incur non-performing loans, stop lending to risky borrowers and accordingly their lending growth comes to a halt. Our evidence implies that compete-dominant banks only realise the costs of their risky lending behaviour when the industry enters distress. In contrast, control-dominant banks incur a substantially lower fraction of non-performing loans in periods of distress. Thus, their safe lending practices during normal time pay off when distress hits.

Overall, our results imply that the market condition is an important mechanism that affects the costs and benefits attached to certain types of bank culture in both the way banks behave and the consequences of their behaviour.

Table 9: Bank culture and lending: Distress vs. Non-distress Periods

This table reports the estimation results where we divide the sample into non-distress periods (Columns 1 to 3) and distress periods (Columns 4 to 6). Distress is defined as a dummy that equals one for years when the number of bank failures is greater than the sample median, and zero otherwise. Columns (1) and (4) use Probit model while Columns (2), (3), (5) and (6) use OLS. Definitions of all variables are included in Appendix I. All models include year, borrower industry and state fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	Distress=0			**Distress=1**		
	Sub-investment grade lending	Loan growth	Non-performing loans	Sub-investment grade lending	Loan growth	Non-performing loans
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Compete-dominant	0.110***	2.415**	0.104	0.054	1.134	1.207*
	(2.839)	(1.988)	(0.173)	(1.541)	(0.750)	(1.749)
	[0.028]***			[0.017]		
Create-dominant	0.037	-0.195	6.155***	0.000	3.298	0.130
	(1.238)	(-0.100)	(4.965)	(0.011)	(1.426)	(0.130)
	[0.009]			[0.000]		
Control-dominant	-0.081	-2.545	-1.666**	-0.282***	-0.257	-2.217***
	(-0.658)	(-1.316)	(-2.438)	(-2.664)	(-0.142)	(-2.790)
	[-0.020]			[-0.087]***		
Collaborate-dominant	0.009	-0.016	0.460	0.070	1.336	1.037
	(0.218)	(-0.014)	(0.785)	(1.253)	(1.104)	(1.336)
	[0.002]			[0.022]		
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower industry FE	Yes	-	-	Yes	-	-
Borrower state FE	Yes	-	-	Yes	-	-
Observations	25,897	179	151	28,158	153	139
R-squared	0.497	0.276	0.576	0.500	0.192	0.425

5.2 Bank culture and bank's contribution to systemic risk

Bushman, Hendricks, and Williams (2016) argue that if a bank incurs non-performing loans and does not have sufficient capital buffer to absorb the losses, it may be forced to borrow heavily from the interbank markets and potentially creates large risk spillovers to the financial system. This raises the possibility that a bank's culture, in addition to influencing individual bank risk, also affects the stability of the financial system.

To test this hypothesis and the proposed mechanism, we run an OLS estimation model to examine the relation between a bank's culture and its 1) *Tier-1 capital,* Tier-1 capital divided by total assets; and 2) $\Delta CoVaR$, a measure of a bank's contribution to systemic risk developed by Adrian and Brunnermier (2016). ΔCoVaR captures the estimated change in the Value-at-Risk of all financial institutions when one bank's Value-at-Risk changes from its normal to a distress state. That is, it measures the extent to which the financial system is closer to distress when one bank is becoming distressed. We include the same set of control variables and fixed effects as those in Equation (2). Table 10 reports the results.

As expected, compete-dominant banks hold less capital (Table 10, Panel A). Previously, we also show that these banks incur a significantly higher proportion of non-performing loans (Table 8). As a result, they produce greater contributions to systemic risk (Table 10, Panel B).[30] In contrast, control-dominant banks incur a lower fraction of non-performing loans, hold higher capital cushions, and therefore, their contribution to systemic risk is significantly smaller. Taken together, our evidence indicates that a bank's culture not only influences its stand-alone risk but also produces large risk spillovers to the overall banking industry.

Table 10: Bank culture and systemic risk

This table reports OLS estimation results where the dependent variables are Tier-1 capital divided by total assets (Panel A) and ΔCoVaR (Panel B). ΔCoVaR is developed by Adrian and Brunnermeier's (2016), which is the difference between the CoVaR conditional on a bank being in distress and the CoVaR conditional on a bank operating in its median state. Definitions of all variables are included in Appendix I. All models include year fixed effects. Robust standard errors are clustered at the borrower-level. *t-value* are in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Bank capital					
Dependent variable: Tier-1 Capital/Total assets					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	-0.293**				-0.260*
	(-2.167)				(-1.771)
Create-dominant		0.028			-0.049
		(0.174)			(-0.274)
Control-dominant			0.588***		0.471***
			(3.813)		(2.816)
Collaborate-dominant				-0.207	-0.230
				(-1.181)	(-1.270)
Bank size	-0.366***	-0.349***	-0.332***	-0.353***	-0.355***
	(-5.867)	(-5.443)	(-5.239)	(-5.660)	(-5.576)
Bank leverage	-42.021***	-41.848***	-41.866***	-41.434***	-41.557***
	(-6.827)	(-6.824)	(-6.849)	(-6.830)	(-6.840)
Bank ROA	0.590**	0.596**	0.611**	0.610**	0.619**
	(2.304)	(2.364)	(2.446)	(2.405)	(2.407)
Bank deposits	0.779	0.855	0.706	0.712	0.510
	(0.803)	(0.859)	(0.713)	(0.717)	(0.513)
Bank lending	-0.801*	-0.590	-0.393	-0.462	-0.477
	(-1.758)	(-1.336)	(-0.884)	(-1.024)	(-0.976)
Bank HHI	-1.343***	-1.370***	-1.279***	-1.411***	-1.320***
	(-4.722)	(-4.775)	(-4.422)	(-4.905)	(-4.514)
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	426	426	426	426	426
R-squared	0.491	0.487	0.493	0.488	0.498

Panel B: Systemic risk					
Dependent variable = ΔCoVar (x100)					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Compete-dominant	-0.167**				-0.155**
	(-2.471)				(-2.236)
Create-dominant		0.000			-0.029
		(0.001)			(-0.342)
Control-dominant			0.200***		0.158**
			(3.352)		(2.411)
Collaborate-dominant				0.012	-0.003
				(0.271)	(-0.075)
VaR	3.853*	2.097	3.174	2.100	4.549**
	(1.903)	(1.059)	(1.510)	(1.063)	(2.175)
Bank size	0.022	0.036*	0.042**	0.036*	0.030
	(1.150)	(1.878)	(2.301)	(1.946)	(1.554)
Bank leverage	3.614***	3.688***	3.085**	3.673***	3.140**
	(2.628)	(2.628)	(2.116)	(2.604)	(2.166)
Bank ROA	0.218***	0.213***	0.219***	0.212***	0.223***
	(4.177)	(4.137)	(4.259)	(4.142)	(4.242)
Bank deposits	0.010	0.013	0.006	0.013	0.005
	(0.610)	(0.766)	(0.351)	(0.777)	(0.279)
Bank loans	-0.022	0.051	0.038	0.061	-0.039
	(-0.073)	(0.170)	(0.126)	(0.200)	(-0.127)
Bank capital	-0.667***	-0.565***	-0.503***	-0.573***	-0.618***
	(-4.540)	(-4.274)	(-3.703)	(-4.107)	(-3.759)
Bank HHI	0.256**	0.236**	0.236**	0.238**	0.250**
	(2.361)	(2.150)	(2.152)	(2.154)	(2.285)
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	378	378	378	378	378
R-squared	0.481	0.478	0.484	0.478	0.495

6. Conclusion

Over a short span of two years 2015-2016, The Federal Reserve Bank of New York organised three workshops and dedicated an entire issue of the *Economic Policy Review* on improving bank culture. The UK Financial Conduct Authority and the Dutch Central Bank echo the sentiment that bank culture lies at the heart of bank risk-taking behaviour and has the potential to undermine financial stability. Thus, studying how bank culture affects financial stability is a question of first-order importance.

Our paper provides the first micro-level evidence showing that corporate culture matters in many aspects of bank lending decisions, ranging from loan approvals, loan terms, to loan pricing. Specifically, we find that banks classified as "compete-dominant" are associated with risky lending practices – higher loan approval rate, lower borrower quality, and fewer

covenant requirements. This link remains significant even after taking into account various corporate governance metrics that are found to influence risk-taking behaviour. Our findings imply that the piecemeal regulator responses around governance and executive compensation structure may not be sufficient in curbing a bank's excessive risk-taking.

Linking bank culture to wider economic consequences, our evidence suggests that compete-dominant banks enjoy a higher loan growth in good times, but incur greater level of losses during industry distress. Combined with the evidence that they hold a significantly lower level of capital buffer, we postulate and find that these banks make a significantly greater contribution to systemic risk. Thus, our results show that not only does the culture of banks affects their own performance, but has an impact on the stability of the overall financial system.

Taken together, our results resonate the view of policymakers that bank culture indeed plays an important role in influencing bank behaviour and systemic stability. Thus, at the very least, it serves as a justification for regulators to make corporate culture their regulatory priorities and it is hoped that this work will lead to a better understanding on how corporate culture in the financial sector can influence the overall financial stability.

Appendix I: Definitions of variables

Variable	Definition	Source
Bank characteristics		
Compete-dominant	A dummy that equals to one if the frequency of keywords associated with compete culture is in the top quartile across all banks in more than half of the bank's sample period	Annual reports
Create-dominant	A dummy that equals to one if the frequency of keywords associated with create culture is in the top quartile across all banks in more than half of the bank's sample period	Annual reports
Control-dominant	A dummy that equals to one if the frequency of keywords associated with control culture is in the top quartile across all banks in more than half of the bank's sample period	Annual reports
Collaborate-dominant	A dummy that equals to one if the frequency of keywords associated with collaborate culture is in the top quartile across all banks in more than half of the bank's sample period	Annual reports
Bank size	Natural logarithm of total assets (BHCK2170)	FR Y-9C
Bank charter value	Market value of equity divided by the book value of equity	CRSP, FR Y-9C
Bank leverage	Book value of liabilities divided by book value of total assets	FR Y-9C
Bank ROA (%)	Earnings before interest and taxes (EBIT) divided by book value of total assets (BHCK2170)	CRSP, FR Y9-C
Bank capital (%)	Tier-1 capital (BHCK8274) divided by total assets	FR Y-9C
Bank deposits	Total deposits (BHDM6631+BHFN6631 + BHDM6636 + BHFN6636) divided by total assets	FR Y-9C
Bank lending	Total loans (BHCK2122) divided by total assets	FR Y-9C
Bank HHI	Herfindahl-Hirschman Index measuring the concentration of deposits at state level	FR Y-9C
Bank loan growth (%)	The percentage change in total loans relative to prior year	FR Y-9C
Bank non-performing loans (%)	Loans past due day 90 days or more (BHCK5525) and non-accrual loans (BHCK5526) divided by total assets	FR Y9-C
VaR	Value-at-Risk	Adrian and Brunnermeier (2016)
ΔCoVar	The estimated change in Value-at-Risk of all financial institutions when a bank's Value-at-Risk changes from its normal state to a distress state.	Adrian and Brunnermeier (2016)
CEO pay and characteristics		
Bonus/Salary	CEO bonus compensation divided by CEO salary	ExecuComp, DEF14A
Equity/(Bonus+Salary)	CEO equity compensation divided by the sum of bonus and salary compensation.	ExecuComp, DEF14A
CEO age	The age of the CEO, measured in years.	BoardEx
Ivy League	Equals one if the CEO is a graduate of an Ivy League university	BoardEx
Experienced CEO	Equals one if the CEO has previous executive appointments	BoardEx
Borrower characteristics		
Borrower size	Natural logarithm of total assets (BHCK2170)	Compustat
Borrower market-to-book	Market value of equity divided by the book value of equity	Compustat
Borrower leverage	Book value of liabilities divided by book value of total assets	Compustat
Borrower ROA	Earnings before interest and taxes (EBIT) divided by book value of total assets (BHCK2170)	Compustat
Sub-investment grade	A dummy equals one if the borrower has a sub-investment credit rating grade (i.e., unrated or rated below BBB)	Compustat
Same culture	A dummy equals one if the borrower and the lender have identical dominating corporate culture	Annual reports
Syndicate loan characteristics		
Ln (Deal amount)	Natural logarithm of loan amount	Dealscan

Deal maturity	The number of calendar months between the loan origination date and loan maturity date	Dealscan
Covenants	The number of financial covenants	Dealscan
Loan spreadd	Natural logarithm of the drawn-all-in spreads, which is the coupon spread over LIBOR rate on the drawn amount plus the annual rate.	Dealscan
Relationship lending	A dummy variable that equals to one if a borrower has another loan from the same bank in the three-year period prior to the loan origination.	Dealscan
Mortgage loan characteristics		
Mortgage approval rate	The number of approved loan applications divided by the total number of applications.	HMDA
Ln(Total income)	The average borrower income for applications reviewed in each bank-county-year (excluded 1% tail)	HMDA
Fraction of female applicants	The number of applications from female applicants divided by the total number of applications reviewed in each bank-county-year.	HMDA
Fraction of minority applicants	The number of applications from minority applicants divided by the total number of applications reviewed in each bank-county-year. Minority applicants include all applicants whose reported race is other than white.	HMDA

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END NOTES

[1] "Fed's Dudley Says Wells Fargo Bank Culture Needs Improving", *Bloomberg*, 21 March 2017.

[2] For instance, the UK's Financial Conduct Authority planned to conduct a review on bank culture that is believed to contribute to a string of recent banking scandals (see "UK draws line under "banker bashing" after scrapping assessment" in *Financial Times*, 30 December 2015). Similarly, The Dutch Central Bank argues that the key to preventing financial crises and misconduct scandals may not be stricter regulations but to oversee culture and behaviour (De Nederlandsche Bank, 2015). In addition, Mr. William Dudley, the president and chief executive officer of the Federal Reserve Bank of New York, has repeatedly emphasised that improving the culture of banks is the key to regain public trust on the financial industry.

[3] Although some parts of the lending process are automated, lending decisions need to be approved by credit officers and therefore, are subjected to discretion. The prior literature documents that lending outcomes can be determined by various characteristics of credit officers, including their psychological factors such as mood or emotional state (e.g., Cortes, Duchin, and Sosyura, 2016), compensation incentives (e.g., Cole, Kanz, and Klapper, 2015), or career concerns (Filomeni, Udell, and Zazzaro, 2016).

[4] This set of keywords used for measuring each cultural dimension is from Fiordelisi and Ricci (2014), who compile a large set of synonyms for each cultural dimension from those described in Cameron et al. (2006) and the Harvard IV-4 Psychosocial Dictionary. For instance, words like "fast, expand, performance, and win" are associated with compete culture, words like "envision, freedom, and venture" are associated with create culture, words like "cooperate, human, and partner" are associated with collaborate culture, and words like "monitor, competence, and long-term" are associated with control culture.

[5] Industry classifications are based on two-digit Standard Industrial Classification (SIC) Code.

[6] We find evidence that create- and collaborate-dominant banks behave in a similar way to compete- and control-dominant banks, respectively, but to a lesser extent.

[7] Consistent with this, we also find that compete-dominant banks halt their lending to risky borrowers following industry distress.

[8] $\Delta CoVar$ measures the estimated change in Value-at-Risk (VaR) of all financial institutions (systemic VaR) when one institution's Value-at-Risk changes from its normal state to its distress state. Essentially, $\Delta CoVar$ measures the extent to which the distress of a financial institution contributes to the tail risk of the financial system.

[9] Importantly, the concept of 'culture' is distinct from the concept of 'climate', where the latter is commonly defined as the "shared perceptions of and the meaning attached to the *policies, practices, and procedures employees experience*" (Schneider, Ehrhart, and Macey, 2013, p.362). That is, while corporate culture typifies the firm, corporate climate typifies employees' perceptions of specific policies within the firm. We later explain why our culture measures are more likely to capture culture rather climate constructs.

[10] It is important to note that there are alternative definitions of corporate culture (see e.g., Hofstede et al., 1990; Martin, 1992; Pettigrew, 1979; Smircich, 1983). For instance, Ogbonna and Harris (1998) suggest that culture is currently presented in the literature as a mosaic of deep-rooted assumptions, values, and artefacts. Smircich (1985) proposes that corporations exist as a system of meanings, beliefs and taken-for-granted ideas that are shared by members of groups while Alvesson (2012) argues that culture is best understood by looking at the deep-level, non-conscious sets of meanings, ideas and symbolism. Other scholars whose work focuses on symbolic behaviour in organisations have pursued viewpoints that Schein overlooked (Alvesson, 2012; Kreiner, 1989; Smircich, 1983; Smircich and Morgan, 1982). Despite all these approaches to understanding corporate culture, as well as some of the discrepancies concerning various elements of Schein's work, his framework remains useful for analysing corporate culture in the context of our paper. Specifically, Schein's framework allows us to operationalise corporate culture from the integrationist perspective and compare culture of financial firms.

[11] Furthermore, this approach of using textual analysis on the bank's annual reports allows us to capture the bank's corporate culture rather than its climate. This is because an annual report contains information not only on the bank's lending activities but also on all other activities of the bank, including its expansion strategies, mergers and acquisitions, and other business strategies. Therefore, by analysing the bank's annual reports, we are able to capture **all** values that typify the bank (culture construct), and not just its lending (climate construct). In contrast, climate studies typically employ a more focused/specific set of constructs, such as employees' perception about the safety of their work environment (Beus et al., 2010) or the service quality of the firm (Schneider et al., 2009).

[12] This text analysis approach offers some other advantages over other culture constructs, such as those that rely on annual rankings of companies or employee surveys (e.g., Guiso, Sapienza, and Zingales, 2015). First, these surveys are restricted to a small subset of very large firms, making result generalisation difficult. Second, companies often pay to participate in the survey and therefore, have the incentive to manipulate the survey responses, resulting in significant measurement errors.

[13] The Harvard IV-4 Psychosocial Dictionary is a commonly used source of word classification, in part because its composition is beyond the control of the researcher and the possible impact of research subjectivity is significantly reduced (Loughran and Mcdonald, 2011).

[14] As mentioned earlier, we conceptualise corporate culture based on Schein's (2009) life-cycle theory which argues that mature firms often have an overarching corporate culture that accumulates over generations of managers. Therefore, such culture tends to be consistent and does not easily change because of temporary industry or market shocks. Since most banks in our sample are large and mature, each bank is operationalised as having a homogenous and consistent corporate culture. This cultural construct also implies that it is the differences in corporate culture across firms that explain differential corporate outcomes (e.g., Hofstede, 1991; Schein, 1985). While theoretically sound, this conceptualisation is not without its limitations. We later relax this constraint and study within-bank variation in culture.

[15] We also recognise that there could be occasions when a bank permanently alters its stable culture, such as when it has a new CEO with an entirely different management style (Nguyen, Hagendorff, and Eshraghi 2016) or when it merges with another bank. Therefore, we later perform various sensitivity tests where we relax the thresholds and assumptions imposed in this baseline specification, and find that our results remain consistent. It is worth noting that a bank can be classified as having no dominant culture or having two dominant cultures, although the latter case is rare. In our sample, only 3 out of 78 banks are classified as having more than one dominant culture. Our results are not sensitive to these observations.

[16] Many listed US banks do not lend to corporate borrowers and thus, are not listed in Dealscan. As a result, they are not included in our sample. However, in our analysis on mortgage lending decisions (Section 4.2.2), we are able to use the full sample of all listed US banks.

[17] Credit rating is a readily observable proxy that measures a firm's creditworthiness and predicts its likelihood of default. Relative to other proxies, such as borrowers' size, profitability or Z-score, credit rating is more informative as it encapsulates borrowers' quality from both quantitative aspects (e.g., financial health) and qualitative aspects (e.g., management quality, relationships with suppliers and customers, or any judgement filed against the borrower). Furthermore, credit rating is decided by an independent credit rating agency and thus, is difficult to be manipulated by borrowers. Our results are robust to alternative definitions of borrowers' riskiness.

[18] We use the same textual analysis approach to identify the corporate culture of borrowers in our sample.

[19] Because our results are estimated using Probit, the estimated effects of culture variables on the propensity of risky lending are non-linear. The marginal effects reported are evaluated at the mean values of all independent variables. For brevity, we do not report marginal effects for control variables. These results are available upon request.

[20] As with other empirical works that explore heterogeneity across companies, there remains a possibility that the documented relations are driven by unobserved omitted variables that can explain both our culture variables and risk-taking. To address this issue, in unreported tests, we include additional control variables that proxy for bank balance sheet composition (Deposits/Assets, Loans/Assets, and Tier-1 Capital/Assets), loan portfolio quality (Bad Loans/Assets), off-balance sheet activities (Non-interest income/Total income), and financial derivative uses (Derivative Hedging/Assets and Derivative Trading/Assets). We also control for any remaining effect of bank size by including higher-power term of log total assets and size-decile fixed effects. All of our main findings remain robust to the additional controls.

[21] Similar to Bianchi, Farina, and Fiordelisi (2016), we consider both single (e.g., compliance) and both words (e.g., risk culture).

[22] Due to data limitation, we cannot control for the compensation incentives and characteristics of lower-level credit managers and officers in the bank. However, their pay and characteristics should mirror those of the CEO – the leader of the bank.

[23] Our results are also robust to excluding the top-ten largest banks.

[24] In unreported tests, we also ensure that the parallel trend assumption is met. This assumption requires that in the absence of the shock (i.e., the Russian default event), the coefficient on the DiD estimator is zero. We calculate the changes in borrowers' quality one, two, and three-year *prior* the shock and find no statistical difference across banks with different cultures.

[25] Following Chava and Purnanandam (2011), we obtain geographic segments of banks and borrowers from the Compustat Geographic Segments file and exclude those that report any business activity in Russia, Brazil, Europe, Eurasia, Eastern Europe, or South America.

[26] This idea could be seen as analogous to a traffic accident. When observing a fatal accident on the road, a reckless driver is likely to be concerned and drives more carefully. However, this effect is likely to be short-lived and would not permanently make him a cautious driver.

[27] The natural logarithm of drawn-all-in spread, which is the coupon spread over LIBOR rate on the drawn amount plus the annual rate.

[28] Table 7 also shows that create-dominant and collaborate-dominant banks behave in a similar manner to compete-dominant and control-bank banks, respectively. This is consistent with the idea that bank lending

behaviour can be identified along two broader dimensions – growth (compete and create) versus safety (control and collaborate).

[29] Data obtained from the FDIC website (https://www.fdic.gov/bank/individual/failed/banklist.html)

[30] Because a more negative value of ΔCoVaR indicates that a bank makes greater contributions to systemic risk, if banks with compete-dominant culture make greater contributions to systemic risk, the coefficient of compete-dominant will be negative.