The Effect of Bank Competition on Accounting Choices, Operational Decisions and Bank Stability: A Text Based Analysis

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Abstract

This paper takes a financial statement analysis approach to examine the relationship between competition and bank stability. We use textual analysis to extract a bank-specific measure of competition from 10-K filings. Exploiting the process of bank deregulation to identify exogenous changes in bank competition, we provide evidence that this measure captures real competitive pressures by showing that it significantly increases following decreases in barriers to out-of-state branch entry, after controlling for classical measures of competition. We next investigate how competition affects bank-specific decision-making channels through which competition can directly influence bank risk and stability. We find that higher competition is associated with lower underwriting standards, less timely accounting recognition of expected loan losses and a shift towards non-interest sources of revenue. Finally, we investigate relations between competition and both stand-alone risk at the individual bank level and system-wide stability. At the individual bank level, we find that competition is associated with both higher future loan charge offs per unit of loan growth and significantly increased downside tail risk. At the system-wide level, we find that higher competition is associated with greater sensitivity of a bank's downside equity risk to system-wide distress, and a greater contribution by individual banks to the downside risk of the entire banking sector.

1. Introduction

The forces of competition are fundamental to all sectors of an economy. However, of particular interest to bank regulators and policy makers is the relationship between bank competition and both excessive risk-taking by individual banks and buildups of banking system vulnerabilities due to correlations in the risk taking behavior of banks. This issue is also of critical importance to financial analysts, credit rating agencies and investors who seek to forecast banks' future prospects. While prior literature explores this relationship, there is not conclusive evidence on whether or not competition leads to greater bank fragility.[1] In this paper, we address three important open questions in the banking literature: Does bank competition increase or decrease bank and banking system risk? What specific channels does bank competition operate through to increase or decrease risk? How should bank competition be measured?

First, we introduce a new text-based, bank-specific measure of bank competition into the literature that offers several advantages relative to measures used in prior literature. Second, we investigate three decision-making channels that have been linked by prior literature to increased bank risk, and through which competition can directly influence bank risk and stability. Specifically, we show that higher competition is associated with lower underwriting standards, less timely accounting recognition of expected loan losses, and greater reliance on non-interest sources of income. Finally, we show that risk at the individual bank level and a bank's contribution to system-wide stability is increasing in competition. Specifically, at the individual bank level, we find that competition is associated with higher future loan charge offs per unit of loan growth, increased risk of a severe balance sheet contraction and greater downside tail risk in a bank's equity returns. At the system level, we show that higher competition is associated with a

[1] See reviews by Beck (2008), Carletti (2008), Degryse and Ongena (2008), and the discussion in Berger et al. (2004).

bank's equity value being more vulnerable to system-wide distress, and with a greater contribution by individual banks to the downside risk of the entire banking sector.

Economic theory provides competing hypotheses on whether bank competition enhances or undermines financial stability. The competition-fragility hypothesis posits that highly competitive environments create downward pressure on bank profits, which in turn creates incentives for banks to take excessive risks (e.g., Keeley [1990]). In contrast, the competition-stability hypothesis posits that banks with greater market power charge higher interest rates, inducing firms to take on greater risk that can undermine the stability of the financial system (Boyd and De Nicolo, 2005).[2] Beck [2008] observes that research efforts to resolve these competing predictions have been hampered by the difficult problems inherent in constructing powerful measures of competition.

Two important classes of bank competition measures are (1) measures of industry structure which presume that market structure determines bank conduct, and (2) measures that infer banks' competitive conduct directly without regard to market structure (e.g., Degryse and Ongena [2008], Beck [2008]), Berger et al. [2004].[3] Conflicting results arising from using these measures has motivated careful scrutiny of the measures. One limitation of industry structure measures (e.g., Herfindahl Hirschman indices) is that they require that industry or market membership be explicitly defined. Because industry level measures rely on the strong assumption that all industry members are subject to the same level of competition, they do not

[2] Martinez- Miera and Repullo [2010] extends Boyd and De Nicolo [2005] by allowing for imperfect correlation in loan defaults, showing that the relationship between competition and risk is U-shaped. Hence, the impact of an increase in competition can go either way, depending on other factors.

[3] A third category is regulatory measures such entry requirements, formal and informal barriers to entry for domestic and foreign banks, activity restrictions and other regulatory requirements, which might prevent new entrants from challenging incumbents. In this paper, we use the process branch banking deregulation in the U.S. to establish the validity of our text-based competition measure.

permit cross-sectional analyses of how individual banks within a defined industry respond to differences in competition.[4]

In contrast to industry structure measures are measures that estimate competition levels by examining the relationship between changes in factor input prices and revenues. One commonly used measure is the Lerner index, a bank-level measure that estimates the gap between marginal costs and revenues for each bank. In constructing Lerner indices, researchers estimate a marginal cost function using historical accounting data in a pooled industry regression. Reliance on historical accounting data suggests that the Lerner index may be sluggish in capturing changes in the competitive environment, and the pooled industry estimation necessarily assumes that all banks in the researcher-defined industry have the same marginal cost function.

In this study, we take a new approach to measuring bank competition by adopting a financial statement analysis perspective. Following Li et al. [2013], we use textual analysis to extract a bank-specific measure of competition from each bank's discussion of its competitive situation in its 10-K filing.[5] The premise of this measure is that it captures managers' perceptions of the competitive pressures currently facing a bank, including recent changes not yet fully reflected in past performance. This measure allows for competitive pressure to vary for individual banks across years and across banks in a given year due, for example, to differences in geographic footprints (Dick [2006]), business models (Altunbas et al. [2011] or product line mixes (Bolt and Humphrey [2012]).[6] Further, this measure requires no equilibrium assumptions

[4] Further, it has been argued that competitiveness cannot be captured by concentration due to ambiguity over whether industry structure determines bank behavior or is itself the result of bank performance (e.g., Claessens and Laeven [2004], Cetorelli (1999). Berger et al. (2004) note that the recent banking literature makes a clear distinction between competition and concentration.

[5] A growing literature in accounting and finance provides evidence that valuable information can be extracted from published financial reports by applying textual analysis techniques to the text of these reports. See for example Ball et al. [2013], Brown and Tucker [2011], and Li [2010, a and b], among others

[6] This measure need not be symmetric across banks. For example, consider a large bank holding company with branches in many local markets across the country and a small regional bank with branches in only two local

and, because it does not require that market boundaries be defined, no restrictive assumptions about bank cost functions are required for its estimation. Finally, this measure can reflect competitive pressures deriving from diverse sources including potential entry and non-bank competitors.

While Li et al. [2013] provides extensive validation of this measure, the banking industry was excluded from their analysis necessitating that we perform additional validation to show that this measure conveys useful, incremental information about bank competition.[7] Accordingly, we complement and extend Li et al. [2013] by providing two bank-centered validation tests of this measure. First, we exploit the process of bank deregulation in the United States to identify exogenous changes in bank competition based on interstate variation in the timing and extent of adoption by state legislatures of the Interstate Banking and Branching Efficiency Act (IBBEA). Using an index on the evolution of banking restrictions across states over time developed by Rice and Strahan [2010],[8] we show that our text-based measure responds in a timely fashion to changes in the competitive environment.[9] Specifically, we show that the measure significantly increases following reductions in barriers to out-of-state branching. This result even holds *after* controlling for both the Lerner and Herfindahl indices. We also find that while the Lerner index is correlated with our text-based measure, it does not respond to changes in the branching

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markets. In this case, the smaller bank may report facing intense competitive pressure in its two local markets, while these two local markets only represent a small part of the large bank's geographic scope and may have little influence on the perception of competition for the entire bank holding company.

[7] Li et al. [2013] validate this text-based competition measure by showing that the measure is related to future operating performance in ways that suggest it is a valid measure of competition. Consistent with a central tenet of competition, they find that more discussion of competition by management in the 10K is associated with a faster rate of diminishing returns on both new and existing investment .In untabulated results, we show that the rate of mean reversion in a bank's ROA/ROE is increasing in our text-based competition measure.

[8] IBBEA granted states the right to erect restrictions to branch expansion, and some states took advantage of these provisions by putting a number of allowable restrictions in place. Over time some states changed the number of restrictions in place, thus altering the threat of branch entry by out-of-state banks. Additional details about IBBEA and prior research examining its effects is provided in Section 2 of this paper.

[9] All analyses include bank fixed effects to control for unobserved (time-invariant) heterogeneity across banks.

restriction index, suggesting that our measure reflects changes in the competitive environment in a more timely fashion than the Lerner index.[10]

Second, we exploit the recurring surveys conducted by the Office of the Comptroller of the Currency and the Federal Reserve that inquire about the extent to which banks have recently eased or tightened credit standards, and their reasons for doing so. Because banks indicate that changes in competition are the most prevalent reason for easing underwriting standards, these surveys provide an additional tool to validate the text-based competition measure.[11] Accordingly, we examine how this competition measure is associated with characteristics of borrowers and loan contracts for which the bank serves as lead arranger in the syndicated loan market. We find that as competition increases, the credit quality of borrowers at loan origination decreases, loan interest spreads become less sensitive to a borrower's credit quality, and the number of covenants in loan originations decreases. These findings are consistent with regulatory surveys and provide additional evidence that our text-based measure captures real competitive pressure.

Having validated our competition measure, we examine two additional decision-making channels through which competition can influence bank stability. First, we examine whether there is an association between competition and loan loss provisioning. Competitive pressure on profits can create incentives for managers to prop up reported earnings by delaying recognition of expected loan losses. Prior research shows that delaying expected loss recognition has negative implications for credit supply (Beatty and Liao [2011]), bank opacity and risk shifting (Bushman and Williams [2012a]), the vulnerability of individual banks to downside risk and the

[10] We do not examine the response of bank concentration to deregulation as Dick [2006] already shows that IBBEA had little impact on concentration at the metropolitan statistical area level, while increasing at the regional level.

[11] For example, the 2012 Survey of Credit Underwriting Practices conducted by the Office of the Comptroller of the Currency (OCC) indicates that competition is the most prevalent reason that lenders ease their underwriting standards (Refer to Figures 3 and 4 of the survey at: http://www.occ.treas.gov/publications/publications-by-type/survey-credit-underwriting-practices-report/pub-survey-cred-under-2012.pdf).

correlation of downside risk across banks (Bushman and Williams [2012b]). Consistent with banks managing earnings upward in response to competitive pressure, we find that the extent to which a bank delays recognition of expected loan losses is increasing in competition.

Second, we examine the association between competition and a bank's decisions to shift its revenue mix towards non-interest sources (e.g., investment banking, proprietary trading, insurance underwriting, etc.). A growing literature provides evidence that expanding into such non-traditional banking activities increases the riskiness of individual banks and decreases the stability of the banking system.[12] We extend this literature by showing that the proportion of revenues a bank derives from non-interest sources is significantly increasing in competition.

Given our findings that banks delay recognition of expected loan losses, shift revenue mix in response to higher competition, and relax lending standards, prior research would predict an increase in a bank's risk profile (Bushman and Williams, 2012b; Brunnermeir et al., 2012). However, it is possible that banks counteract increases in risk through these channels by engaging in offsetting risk mitigation activities. A bank has many levers to pull to mitigate risk but a primary lever is the bank's capital buffers. We examine the association between competition and Tier1 capital, finding that bank capital actually *decreases* with higher competition.[13]

Building on our previous analyses of relations between competition and bank decisions, we turn next to an examination of the ultimate effect of these decisions on direct measures of a bank's individual risk as well as systemic risk in the system. We first investigate whether

[12] For example DeYoung and Roland (2001) show that noninterest income contributes positively to bank earnings volatility. Stiroh (2004, 2006) finds no substantial evidence of diversification benefits from pairing noninterest income with interest income. Demirguc-Kunt and Huizinga (2010) find that banking strategies that rely more prominently on generating noninterest income are riskier. In terms of bank system stability, DeJonghe (2010) show that noninterest income-intensive banks have higher tail betas, and Brunnermeir et al. [2012] document that banks with higher non-interest income contribute more to system-wide risk than do banks focused on traditional banking.

[13] Using cross-country designs Berger et al. [2009] show that bank capital increases with competition, while Beck et al. [2013] find that capital decreases with competition.

increased competition is associated with poor future loan performance. We expect this relationship due to the reduced lending standards associated with higher competition. Consistent with this expectation, we find that the loan growth of banks facing higher competition is associated with higher future loan charge-offs relative to banks facing lower competition. Next, we find that an individual bank's risk of suffering a severe drop in both balance sheet size and equity value is increasing in competition. At the banking system level, we focus on codependence in downside risk of changes in both banks' balance sheet values and equity returns using the *CoVaR* approach (Adrian and Brunnermeir [2011] and the Marginal Expected Shortfall measure (Acharya et al. [2010].[14] We find evidence suggesting that banks facing higher competition contribute more to the tail risk of the financial system, and have increased exposure to downside equity risk during times of system-wide distress. These results combine to suggest that competition has overall negative implications for individual bank risk and banking system stability.

As a final analysis we investigate to what extent competition works through the hypothesized channels in effecting systemic risk. To do this we perform a channel attenuation analysis (Baron and Kenny, 1986) and provide evidence that a significant portion (~20%) of the association between competition and measures of systemic risk work through both the accounting channel (i.e., timely loss recognition) and the operating channel (i.e., revenue mix).

This paper contributes to three streams of literature. First, we contribute to the bank competition literature. We extend this literature by introducing a new bank-specific measure of competition that is shown to reflect real competitive pressures in a timely fashion, and to possess incremental explanatory power over and above traditional measures of competition. We also

[14] Competition can increase system-wide fragility by influencing many banks to herd in their decision-making, simultaneously choosing to increase risk by, for example, delaying expected loss recognition, pursuing similar sources of non-interest revenue and easing credit standards.

contribute by isolating key decision-making channels through which competition can impact bank fragility. Specifically, we show that higher competition is associated with lower underwriting standards, delayed expected loss recognition and a shift towards non-interest sources of income. Additionally, we provide new evidence on the relationship between competition and banking system fragility, showing that competition is associated with greater downside risk at the individual bank level, and increases the co-dependence of tail risk across banks. Our within country analysis of competition and systemic risk complements a recent stream of papers examining this issue in a cross-country setting (e.g., Anginer et al. [2014], Beck [2013], and Schaeck et al. [2009]). Finally, we contribute important new evidence about the implications of bank competition for systemic risk by introducing two measures of systemic risk that have not previously been used in the bank competition literature.

Second, we contribute to the literature that examines the informativeness of textual disclosures in published financial statements. Specifically, we extend the literature investigating whether MD&A's reflect changes in the economic environment (e.g., Brown and Tucker [2011]; Cole and Jones [2005]). Using the powerful setting of branch banking deregulation, we find that our text-based competition measures significantly responds to increases in competition evidenced by a reduction in barriers to out-of-state branching, after controlling for traditional competition measures. This suggests that the text-based measure reflects real competitive pressures facing banks and is not simply a manifestation of strategic disclosure by managers trying to hide their own poor performance. This result also adds to the literature examining how competition influences firms' disclosure decisions (see e.g., Berger [2011]).

Finally, we contribute to the accounting literature by showing that greater competitive pressure is associated with less timely expected loan loss recognition. Our result complements

Dou et al. [2013], who show that delayed loan loss recognition increases following reductions in out-of-state branching restrictions.[15] In contrast to their study, we use deregulation to validate our measure, and then use this measure to capture competitive pressure at *any* point in time, independent of a regulatory event. This raises the possibility that this text-based measure may be useful for designing powerful tests of connections between competitive pressure and opportunistic management in both banking and non-banking settings.

The remainder of the paper proceeds as follows. Section 2 describes the construction of our text-based measure of competition and discusses our validation tests of the measure. Section 3 presents our analyses of the relations between competition and banks' accounting decisions and revenue mix choices, and section 4 presents our analyses of connections between competition and bank stability. Section 5 concludes.

2. *Constructing and Validating a Text-based Measure of Bank Competition*

In section 2.1 we detail the construction of our text-based measure of competition. We then perform two validation exercises. Specifically, section 2.2 examines how this competition measure responds to branch banking deregulation, while section 2.3 examines the relationship between our competition measure and a bank's underwriting standards.

2.1 Measuring Bank Competition

A growing literature provides evidence that valuable information can be extracted from published financial reports by applying textual analysis techniques (e.g., Ball et al. [2013], Brown and Tucker [2011], and Li [2010a, b], among others). Taking a financial statement analysis approach, we follow Li et al. [2013] and extract a bank-specific measure of competition

[15] We also complement Burks et al. [2013] who show that banks increase the issuance of firm-initiated press releases following a reduction in barriers to out-of-state branching.

from the bank's discussion of its competitive situation in its 10K filing.[16] Specifically, we count the number of occurrences of the words "competition, competitor, competitive, compete, competing," including those words with an "s" appended. We remove all cases where the words "not", "less", "few", or "limited" precedes our competition words by three or fewer words. Given the count nature of our metric, we control for the length of the 10-K by scaling by the total number of words in each bank's 10-K, resulting in the following bank-year measure of a bank's competitive environment (*BCE*):

$$BCE = \frac{\#CompWords}{\#TotalWords},$$

where *#CompWords* is the number of occurrences of competition words found in the bank's 10-K and *#TotalWords* is the total number of words in the bank's 10-K. *BCE* is computed on an annual basis for each bank. In our primary analysis we use quarterly data and apply our annual *BCE* measure to the four subsequent quarters. Descriptive statistics for *BCE* and the other measures in our paper are provided in Table 1. *BCE* has a mean (median) value of 0.35 (0.31) and exhibits significant variation with standard deviation of 0.26.

BCE is premised on the argument that it captures managers' current perceptions of competitive pressures facing a bank, including changes in the competitive environment not yet fully reflected in past performance. However, many issues arise when using 10-k disclosures. First, banks may use boilerplate language in the 10-K. To eliminate this concern we incorporate bank and time fixed effects in all of our regression analysis. Including a bank fixed effect is consistent with a financial statement analysis perspective that seeks to exploit within firm variation fundamental to predict future decisions of individual banks.

[16] We thank Feng Li for helping us implement the textual analysis of the banks' 10-Ks.

It is also possible that 10-K discussions do not reflect managers' perceptions of competition, but instead reflect strategic disclosure choices. For example, competition disclosures could be used as a mechanism to deflect blame for poor historical performance (unrelated to competition) on competition.[17] Given this identification concern, we perform two analyses designed to provide direct evidence that the *BCE* measure captures real competitive pressures confronting a bank at a given point in time.

2.2. Does BCE respond to changes in the threat of entry by out-of-state banks?

In this section, we identify exogenous changes in bank competition based on interstate variation in both the timing and extent of adoption by state legislatures of the Interstate Banking and Branching Efficiency Act (IBBEA). Passed in 1994, the most crucial provisions of the IBBEA pertained to interstate branch banking. These provisions were designed to allow banks and bank holding companies to acquire out-of-state banks and convert them into branches of the acquiring bank, acquire a single branch or portions of an out-of-state institution and convert them into branches of the acquiring bank, and open de novo branches across state borders.

However, while IBBEA eliminated federal restrictions on interstate branching, states were permitted to restrict interstate branching. Specifically, states were free to impose up to four restrictions on interstate branching: requiring a minimum age of three years or more on target institutions, setting a statewide deposit concentration limit of 30%, forbidding *de novo* interstate branching, and prohibiting the acquisition of single branches by out-of-state banks. Prior research shows that these restrictions significantly reduced entry by out-of-state banks (Johnson and Rice 2008).

[17] All results in the paper are robust to inclusion of an extensive set of control variables, including banks' past performance (ROA) and bank fixed effects.

We use the annual state-level index of these four restrictions on interstate branching from 1994 to 2005 created by Rice and Strahan (2010). The index, denoted *RegIndex*, is zero for states without entry restrictions (greatest threat of entry) and increases by one for each of the four restrictions up to a maximum of four (the least threat of entry). We gather annual data for *BCE* from Edgar (10-K filings) and quarterly data primarily from Y9-C filings, Compustat, Dealscan and CRSP. Our sample is limited to all bank-quarter observations of commercial banks and bank holding companies (two digit SIC 60-62) that have all the necessary data components. We further eliminate observations if the bank was involved in an acquisition during that particular quarter. The time period of our data spans 1996-2010.

Table 2, panel A reports results from OLS regressions of *BCE* on *RegIndex* and control variables, all measured contemporaneously. Recall that *RegIndex* is the number of restrictions on interstate branching, where fewer restrictions imply greater competition. We include two control variables that reflect the economic performance of a given state, the unemployment rate and the leading index for the state.[18] We also include bank and year fixed effects. In column one, we find that *BCE* responds to changes in the threat of entry as captured by changes in the restriction index. The coefficient on *RegIndex* is -0.007, and is significantly different from zero (p-value < 0.05). This result shows that a reduction in *RegIndex* (an increase in competition) is associated with an increase in a bank's *BCE*. That is, the extent to which banks discuss their competitive environment in 10-K filings significantly increases following a reduction in barriers to out-of-state branching.

[18] The source of these variables is the Philadelphia Federal Reserve Bank's web site. The leading index for each state predicts the six-month growth rate of the state's coincident index, where the coincident index combines four state-level indicators to summarize current economic conditions in a single statistic. The four state-level indicators are nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index.

In column two of table 2, panel A (entitled *BCE and Geographic Footprint*), we repeat the prior analysis after taking into account that banks may have operations across a number of states. Because *BCE* is extracted from the 10-K report of a bank holding company, it reflects a comprehensive view of competition across all of the geographic regions in which the bank operates. We identify the states where a bank has deposits using the Summary of Deposits report from the FDIC, and weight *RegIndex* and other state-level variables by the percentage of the bank's deposits in those states in a given year. As shown in column 2, the results to this analysis are nearly identical to those reported in column 1.

While the previous result shows that *BCE* captures changes in the competitive environment, it does not establish whether *BCE* has incremental value as a measure of competition relative to traditional competition measures. To address this issue, we repeat the prior analysis after replacing *BCE* with a bank's Lerner index. In panel A of table 2, column 3 (entitled *LI*) shows that the Lerner index does not respond to changes in *RegIndex*. This result does not speak to the validity of the Lerner index as a measure of competition, but does provide evidence that Lerner is sluggish in capturing changes in the competitive environment relative to the more timely *BCE* measure.[19] This finding further suggests that *BCE* contains incremental information about a bank's current competitive environment that is not reflected in Lerner.

To further address this issue, we perform a two-stage regression analysis to investigate whether *BCE* reflects information incremental to that captured by Lerner and state-level Herfindahl Hirschman indices (*HH*).[20] In the first-stage, we estimate an OLS regression of *BCE* on the Lerner and *HH* indices. As documented in column 1 of panel B, the coefficient on Lerner is -0.74 (p-value < 0.01), while the coefficient on HH is 0.03, which is not significantly different

[19] In untabulated results, we document that the Lerner index does capture current changes in competition with a lag, where a change in regulation at time t is reflected in the Lerner index in time t+2.
[20] Note that the country-level *HH* and H-statistic is controlled out by the time fixed effect.

from zero. The negative coefficient on Lerner is intuitive as larger values of Lerner imply less competition. This result shows that *BCE* and Lerner reflect some common information about a bank's competitive environment. Next, we take the *BCE* residual from the first stage and estimate an OLS regression of this residual against *RegIndex.* In column 2 of panel B, we see that the coefficient of -0.006 on *RegIndex* is significantly different from zero (p-value < 0.05). That is, *BCE* contains information about a bank's competitive environment that is independent of any information reflected in Lerner and *HH*.

2.3 *BCE and Banks' Credit Standards*

As a second validation analysis, we exploit the recurring surveys conducted by the Office of the Comptroller of the Currency and the Federal Reserve. These surveys inquire about the extent to which banks have recently eased or tightened credit standards, and their reasons for doing so. Banks' responses to these surveys indicate that changes in competition are the most prevalent reason for easing their underwriting standards.[21] Accordingly, we can provide additional validation that *BCE* captures real competitive pressures by examining whether higher values of *BCE* are associated with more relaxed underwriting standards. We examine the following three underwriting standards: (1) the quality of borrowers as measured by their risk of default, (2) loan pricing sensitivity to the borrowers' level of risk, and (3) covenant restrictions.[22] In addition to validating our competition measure, this analysis provides information about an important channel that influences bank stability. In fact, Section 2080.1 of the Federal Reserve's

[21] For example, the summary included in the July 2012 survey indicates that "[a]lmost all domestic banks that reported having eased standards or terms on C&I loans continued to cite more aggressive competition from other banks and nonbank lenders as a reason." The individual responses in support of this statement are tabulated as part of Question 3, Part B of the survey (http://www.federalreserve.gov/boarddocs/snloansurvey/201208/default.htm.) Also, as noted in footnote 5, the survey conducted by the OCC provides similar support for this relationship.

[22] We review every annual Survey of Credit Underwriting Practices conducted by the OCC during our sample period and find that loan pricing (e.g., the spread) is the mechanism most frequently relaxed when more lenders report having eased underwriting standards than tightening them. Covenants are indicated as the second most frequently relaxed mechanism during these periods.

Commercial Bank Examination Manual suggests a causal relationship between higher bank competition, lower underwriting standards, and increased bank risk. Specifically, it states: *"[s]ince lenders are subject to pressures related to productivity and competition, they may be tempted to relax prudent credit underwriting standards to remain competitive in the marketplace, thus increasing the potential for risk."*

We examine characteristics of borrowers and loan contracts for which the bank serves as lead arranger in the syndicated loan market. This information is available in the Dealscan database. We hand match the Dealscan data to the lender and borrower data in Compustat as well as the YC-9 reports (Chava & Roberts [2008] and Murfin [2012]). Because many of our variables are measured at the package level, we run our analyses at that level. When measuring interest spread, we take the average spread over all facilities within a given package.[23]

In addition to a set of appropriate control variables, all empirical specifications in this section and throughout the remainder of our paper include both bank and time fixed effects (borrower fixed effects are also included in the syndicated loan analyses). The inclusion of bank fixed effects provides a within bank design, alleviating concerns that the competition disclosures may be 'boiler plate' in some respects. The inclusion of time fixed effects provides important controls for time specific outcomes that impact all banks. In particular, this controls for time variation in bank sector Herfindahl Hirschman indices.[24]

2.3.1 BCE and Borrower Risk

We begin our analysis by examining whether banks make loans to riskier borrowers in response to increased competition. We compute each borrower's *Z-Score* using Altman's

[23] In untabulated results we also use the maximum spread in the package instead of the mean and results are robust.

[24] In contrast, the Lerner Index is computed for each bank each year, and so is not controlled out with time fixed effects. In untabulated analyses, we re-perform all empirical specifications in this paper while including bank/year Lerner indices as a control variable and find that the results reported in this paper are robust to the inclusion of this variable.

original weighting factors (Altman [1977]), and the borrower's estimated default frequency (*EDF*) as described by Bharath & Shumway [2008]. We also use an indicator variable, *ExtremeZ*, that is set equal to 1 if the borrower's *Z-Score* indicates that the firm is in distress at the time of loan origination.[25] We estimate the following pooled regressions with bank, borrower, and year fixed effects, clustering the standard errors by both time and bank to correct for possible time-series and cross-sectional correlation.

$$\begin{aligned} BorrowerRisk_t = {} & b_0 + b_1 BCE_t + b_2 Tier\,1_t + b_3 LenderSize_t + b_4 BorrowerSize_t + \\ & b_5 Revolver_t + b_6 Amount_t + b_7 Maturity_t + b_8 Spread_t + b_9 \#Covenants_t + \\ & BankEffects + BorrowerEffects + TimeEffects + e_t, \end{aligned} \tag{1}$$

where *BorrowerRisk* is defined as *Z-Score*, *EDF* or *ExtremeZ*. *Tier 1* is included to control for differences in capital adequacy and is defined as the lender's tier 1 capital prior to the date of the loan. *Lender* (*Borrower*) *Size* is the natural logarithm of total assets of the lender (borrower) prior to the date of the loan. *Revolver* is an indicator variable if the loan includes a revolver. *Amount* is the natural log of the package amount. *Maturity* is the number of months to maturity. *Spread* is measured as the basis points over LIBOR charged on the loan, and is computed by averaging over all loan facilities within a syndicated loan package. *#Covenants* is the number of covenants associated with the package. Finally, we use OLS (a probit model) to estimate Equation 1 when using *Z-Score* and *EDF* (*ExtremeZ*) as the dependent variable.

Table 3, panel A reports the results from the estimation of (1). Columns 1 and 2 in Table 3, panel A indicate that the riskiness of borrowers is increasing in the level of competition faced by the bank. Further, Column 3 indicates that the probability that a borrower is in financial

[25] Z-scores lower than 1.81 are considered to be in a "distress" zone whereas Z-Scores greater than 2.99 are deemed to be "safe" and Z-scores in between 1.81 and 2.99 are said to be in a "grey" zone.

distress at the time of loan origination is also increasing in *BCE*.[26] Thus, Column 3 provides evidence that the result from Columns 1 and 2 is not entirely driven by the bank granting credit to borrowers that are closer to crossing over the distress threshold. Rather, it provides evidence that a bank operating in more competitive environment increases it's lending to borrowers that are already below the threshold. Our results are both statistically and economically meaningful as the marginal effect of a one standard deviation change in *BCE*, holding the other variables at their mean values, is associated with nearly a 5% change in the probability that a borrower is already in distress at the time of loan origination.

2.3.2 BCE and Pricing Borrower Risk

Having shown that banks issue credit to riskier borrowers when faced with increased competition, we now examine the relationship between competition and a bank's pricing of risk. In the face of competitive pressures, theory suggests that banks may reduce the sensitivity of interest spreads to borrower risk in order to maintain their lending volume (Broecker [1990]). To examine this conjecture, we estimate the following OLS pooled regressions clustering the standard errors by both time and bank.

$$\begin{aligned} Spread_t = {} & b_0 + b_1 BCE_t * BorrowerRisk_t + b_2 BCE_t + b_3 Tier1_t + b_4 LenderSize_t + \\ & b_5 BorrowerRisk_t + b_6 BorrowerSize_t + b_7 Revolover_t + b_8 Amount_t + \\ & b_9 Maturity_t + b_{10} \# Covenants_t + BankEffects + BorrowerEffects + \\ & TimeEffects + e_t, \end{aligned} \tag{2}$$

where *Spread* is measured as the basis points over LIBOR charged on the loan, averaged over all loans in a loan package. We again use three measures of the borrower's risk (*BorrowerRisk*); *Z-Score, EDF, and ExtremeZ.* All other variables are as defined earlier.

[26] Because our probit model includes substantial fixed effects in a panel set, the coefficients reported are potentially biased or inconsistent (e.g., Greene [2004]). Accordingly, we also run this model using OLS and find that the signs and statistical significance of our variable of interest is robust to the use of a linear probability model.

The results from estimating equation (2) are included in Table 3, panel B. Consistent with the well-established relationship linking higher borrower risk to increased spreads, we find that the main effects (*Z-Score, EDF, ExtremeZ)* are all estimated to be positive. Meanwhile, our variable of interest relates to the interaction of these borrower variables with the lender's level of competition. We find that each of these interactions is directionally consistent with our predictions and that two of the three measures (*Z-Score* and *ExtremeZ*) are statistically significant. These findings combine with those of panel A to suggest that a lender's competitive environment not only result in lending to riskier borrowers, but also that banks appear willing to receive less compensation per unit of risk when operating in increasingly competitive environments.

2.3.3 BCE and Loan Restrictions

As a final characteristic of contracting, we examine the relationship between *BCE* and the number of covenants embedded in the loan deals that it arranges. Berlin & Mester [1992] suggest that the lender's ability to monitor the loan is increasing in the number of restrictions that it attaches to the loan. However, an increased number of restrictions attached to the loan may reduce the attractiveness of the arrangement from the borrower's perspective (Dell' Ariccia [2000]). Therefore, banks facing a highly competitive environment may relax the restrictions placed on loans in an effort to increase loan volume for the bank. We test this conjecture by estimating the following OLS pooled regression:

$$\begin{aligned} \#Covenants_t = {} & b_0 + b_1 BCE_t + b_2 Tier1_t + b_3 LenderSize_t + b_4 BorrowerRisk_t + \\ & b_5 BorrowerSize_t + b_6 Revolver_t + b_7 Amount_t + b_8 Maturity_t + \\ & b_9 Spread_t + BankEffects + BorrowerEffects + TimeEffects + e_t, \end{aligned} \tag{3}$$

where *#Covenants* is measured as the total number of financial covenants in the contract at the time of origination. All other variables in (3) are as defined previously.

Panel C of Table 3 reveals that the number of covenants attached to loans is decreasing in the lender's competitive environment. This finding is consistent with Skinner [2011] who conjectures that one potential reason that so few covenants are included in debt agreements is due to the "nature of competition in debt markets". To the extent that *#Covenants* captures how restrictive the loan terms are for the borrower, this result provides evidence that banks are willing to relax the restrictiveness of loans when facing increased competition. Results in panel C combine with the evidence provided in Panels A and B of Table 3 to show that banks relax their underwriting standards when they face high levels of competition. While prior analytical literature has modeled this relationship (e.g., Dell'Ariccia [2000], Gorton & He [2008]), and surveys have alluded to it as well, we believe that this paper provides the first large sample empirical evidence that the lender's level of competition has a significant effect on the characteristics of lending contracts.

3. *BCE* and Bank Decision-Making Channels

Section 2 suggests that *BCE* captures valuable information about a bank's competitive environment. In this section, we explore two specific decision-making channels through which competition can work to influence bank stability. Specifically, we examine the associations between *BCE* and a bank's loan loss provisioning decisions and its pursuit of non-interest income.

3.1 BCE and Accounting Decisions

Prior research shows that there are cross-sectional differences in the recognition of expected losses in the loan loss provision, with some banks delaying expected losses to future periods (Beatty and Liao [2011], Bushman and Williams [2012a, b]). Such a delay provides a

bank with the current benefit of higher profitability at the expense of lower expected future profitability. If competition puts downward pressure on a bank's profits, a bank manager may seek to prop up the bank's reported earnings by delaying the recognition of expected loan losses. Accordingly, we conjecture that higher competition will lead bank managers to reduce the timeliness of recognizing their banks' expected losses. Prior research shows that delaying expected loss recognition has negative implications for credit supply (Beatty and Liao [2011]), bank opacity and risk shifting (Bushman and Williams [2012a]), the vulnerability of individual banks to downside risk and the correlation of downside risk across banks (Bushman and Williams [2012b]).

To test this conjecture, we estimate the following OLS model, clustering standard errors by both bank and time:

$$\begin{aligned} LLP_t = {} & \beta_0 + \beta_1 BCE_{t-1} * \Delta NPL_{t+1} + \beta_2 BCE_{t-1} * \Delta NPL_t + \beta_3 BCE_{t-1} + \beta_4 \Delta NPL_{t+1} + \\ & \beta_5 \Delta NPL_t + \beta_6 \Delta NPL_{t-1} + \beta_7 \Delta NPL_{t-2} + \beta_8 Ebllp_t + \beta_9 LoanGrowth_t + \\ & \beta_{10} Size_{t-1} + \beta_{11} Tier1_{t-1} + \beta_{12} Consumer_{t-1} + \beta_{13} Commercial_{t-1} + \beta_{14} RealEstate_{t-1} + \\ & BankEffects + TimeEffects + \varepsilon_t , \end{aligned} \tag{4}$$

where *LLP* is defined as loan loss provisions scaled by lagged total loans. *ΔNPL* is the change in non-performing loans over the quarter scaled by lagged total loans; *Ebllp* is earnings before loan loss provisions and taxes scaled by lagged total loans; *Loan Growth* is the percentage change in total loans over the quarter; *Commercial*, *Consumer* and *RealEstate* is the percentage of commercial, consumer and real estate loans (respectively) relative to the bank's total loan portfolio; and *Deposits*, defined as total deposits scaled by lagged loans, is included to control for differences in bank funding. All other variables have been defined previously.

To capture timeliness of expected loan loss recognition, we follow prior research and focus on both the β_4 and β_5 coefficients, where larger values of β_4 and β_5 are indicative of more

timely loss recognition (i.e., current loan loss provisions are more sensitive to current and future changes in non-performing loans). We then test the effect of competition on the timeliness of loss recognition by examining the β_1 and β_2 coefficients. We conjecture that such pressures will result in $\beta_1 < 0$ and $\beta_2 < 0$ as banks choose to delay the losses until future periods.

Results from the estimation of (4) are reported in Table 4 panel A. Consistent with our conjectures, we find that banks' accrual choices are a function of competition. Specifically, we find that $\beta_1 < 0$ and $\beta_2 < 0$, consistent with decreased timeliness in the recognition of expected losses. These findings suggest that bank managers use their accounting discretion to buoy up profits and mask the increased risk of their asset portfolios in highly competitive environments. This behavior can be consequential for a bank as prior research shows that delaying expected loss recognition has negative implications for credit supply (Beatty and Liao [2011]), bank risk shifting (Bushman and Williams [2012a]), and both individual bank and systemic risk (Bushman and Williams [2012b]). This suggests that competition can operate through bank manager's decision accounting decisions to generate significant externalities that extend beyond the individual bank's reported profitability.

While competition may increase the pressure on management to manipulate financial reporting, external monitoring should mitigate a bank manager's ability to engage in this type of behavior. Prior research indicates that auditors act as an important external monitoring mechanism to mitigate opportunistic earnings management (e.g., Watts [1977]). However, audit quality is not uniform, where Big 5 auditors are believed to monitor and discipline behavior more aggressively than non-Big 5 auditors (e.g., DeAngelo [1981], Becker et al. [1998]). As competitive pressure builds to manage earnings, effective auditors should provide resistance to a bank manager's efforts to delay expected loan losses. Accordingly, we modify the prior equation

to include both an indicator variable representing whether the bank was audited by a Big 5 auditor as well as interactions of the Big 5 variable with each of the variables of interest from Panel A.

In table 4, Panel B the positive coefficients of 0.05 (p-value < 0.05) and 0.0458 (p-value < 0.10) on the interaction of *Big5* with $BCE*\Delta NPL_t$ and $BCE*\Delta NPL_{t+1}$, respectively, suggest that the presence of a Big 5 auditor mitigates, but does not fully offset the effects of competition on accounting choices.

3.2 BCE and Non-interest Income

In this section, we examine whether banks respond to competitive pressure in the loan market by aggressively seeking out non-interest sources of revenue. Sources of non-interest revenue include investment banking, venture capital and trading activities. Prior research examining banks' pursuit of these activities generally concludes that diversification into these activities increases bank risk. Specifically, Stiroh [2004, 2006] and Fraser et al. [2002] find that non-interest income is associated with more volatile bank returns. DeYoung and Roland [2001] find fee-based activities are associated with increased revenue and earnings variability. Brunnermeier et al. [2012] find that banks with higher non-interest income have a higher contribution to systemic risk than traditional banking. Examining international banks, Demurgic-Kunt and Huizinga [2010] find that bank risk decreases up to the 25th percentile of non-interest income and then increases, and De Jonghe [2010] finds non-interest income to monotonically increase systemic tail risk. While these prior studies document the increased bank risk associated with a bank's pursuit of non-interest income, it is not clear why banks choose to pursue these revenue sources. Accordingly, we address this unanswered question by examining the extent to which competition drives banks to seek out these alternative sources of income.

We consider two measures of non-interest revenue: *RevMix*, defined as total non-interest revenue divided by interest revenue, and *FeeMix*, the total non-interest income minus deposit service charges and trading revenue divided by interest revenue We regress both of these measures on *BCE* and other appropriate control variables using the following OLS specification, clustering standard errors by both time and bank:

$$\begin{aligned} RevMixVariable_{t+1} = {} & b_0 + b_1 BCE_t + b_2 NonIntExp_t + b_3 Commercial_t + b_4 Consumer_t + \\ & b_5 RealEstate_t + b_6 Deposits_t + b_7 Mismatch_t + b_8 Tier1_t + b_9 Size_t + \\ & b_{10} ROA_t + TimeEffects + BankEffects + e_{t+1}, \end{aligned} \tag{5}$$

where the dependent variable is either total revenue mix (*RevMix*) or fee revenue mix (*FeeMix*). We include *NonIntExp*, defined as total non-interest expense divided by interest revenue, to control for the total overhead carried by the bank. *Deposits*, defined as total deposits scaled by lagged loans, is included to control for differences in bank funding. Following Adrian and Brunnermier [2011], we include the bank's *Mismatch* ((Current liabilities – Cash)/Total liabilities) to control for the bank's reliance on short-term funding sources. The bank's return on book value of assets (*ROA*) is included to control for differences in profitability. We also include both time and bank fixed effects. All other variables have been defined previously.

Note that an observed coefficient of $b_1 > 0$ is consistent with competition leading banks to change their mix of revenue sources by seeking out non-interest revenue activities. As reported in Table 5, the estimated coefficient on *BCE* for *RevMix (FeeMix)* is 0.0153, p-value <0.01 (0.013, p-value < 0.01), suggesting that banks operating in more competitive environments change their revenue mix in an attempt to supplement declining net interest margins. Given the findings from prior research linking a bank's pursuit of non-interest revenue with increased risk, this finding highlights another important channel through which competition influences bank stability. Taken together with our prior analyses that examine a bank's underwriting standards

(Table 3) and loan loss provisioning (Table 4), our analyses suggest that competition leads bank managers to make decisions that increase bank risk.

3.3 Risk Mitigation – *Competition and Bank Capital*

Sections 3.1 and 3.2 suggest that banks delay the recognition of their expected loan losses and shift their revenue mix in response to higher competition. Prior literature predicts that these behaviors increase a bank's level of risk (Bushman and Williams, 2012b; Brunnermeir et al., 2012). However, it is possible that banks counteract this increased risk by simultaneously engaging in other behaviors that mitigate this increased risk. Accordingly, we examine whether banks mitigate this increased level of risk by increasing capital buffers to support their increased risk-taking. To do so, we run the following OLS regression:

$$\begin{aligned} Tier1_{t+1} = \beta_0 + \beta_1 BCE_t + \beta_2 Trading_t + \beta_3 Commercial_t + \beta_4 Consumer_t + \\ \beta_5 RealEstate_t + \beta_6 Deposits_t + \beta_7 Mismatch_t + \beta_8 MTB_t + \beta_9 Size_t + \\ \beta_{10} ROA_t + \beta_{11} \beta_{mrkt} + TimeEffects + BankEffects + \varepsilon_{t+1}, \end{aligned} \quad (6)$$

where *Tier1* is the bank's tier 1 capital ratio, and all other variables are as previously defined.

Table 6 reports the results from estimating equation (6). Contrary to banks using capital buffers to offset the increased risk associated with higher competition, we find that *BCE* is negatively associated with *Tier1*. Specifically, we find a negative and significant coefficient on *Tier1* (-0.0032, p-value < 0.01). Thus, our results suggest that bank capital actually decreases with higher competition.[27] Of course bank capital is only one risk mitigation device, and this analysis does not allow us to rule out whether banks use other mechanisms to reduce their level of risk. In the next section, we examine whether banks offset the increased risk from altering their accounting and operational decisions in response to competition by examining the relationship between *BCE* and several measures designed to capture a bank's total level of risk

[27] Using cross-country designs Berger et al. [2009] show that bank capital increases with competition, while Beck et al. [2013] find that capital decreases with competition.

4. Bank Competition and Risk

In the prior sections, we document that competition affects both accounting and operational decision-making channels that have the potential to impact not only the risk of the individual bank, but also systemic risk. In this section, we investigate the possibility that competition, operating through the channels we considered earlier and other channels, increases the standalone risk of individual banks and systemic risk by increasing codependence in the tails of banks' equity returns.

4.1 Competition and Standalone Risk of Individual Banks

We take two approaches to examining the standalone risk of a bank. First, we consider consequences of increased competition on the future performance of current lending activities. Second, we examine the association between competition and each bank's downside risk as reflected in the distribution over a bank's equity value and the market value of its assets.

4.1.1 Competition, Loan Growth and Future Charge-offs

In section 2.3, we provide evidence consistent with competition influencing banks to relax their underwriting standards. This finding raises questions about whether this behavior negatively impacts the future performance of banks' loan portfolios, which has a direct impact on the individual bank's stability (Keely [1990]). Accordingly, we look at the effect of competition on the relation between a bank's *current* period loan growth and its *future* loan charge-offs. Given the decreased borrower quality associated with lower underwriting standards, we predict that an increase in current period loan growth will have a higher marginal impact on future loan charge-offs as competition increases. To investigate this prediction, we estimate the following model, clustering the standard errors by both time and bank.

$$LCO_{12m/24m} = \alpha_0 + \beta_1 LoanGrowth_t + \beta_2 BCE_t + \beta_3 LoanGrowth_t * BCE_t + \beta_4 \Delta NPL_t + \beta_5 \Delta NPL_{t-1} + \beta_6 \Delta NPL_{t-2} + \beta_7 Size_t + \beta_8 Tier1_t + \beta_9 Consumer_t + \beta_{10} Commercial_t + \beta_{11} RealEstate_t + \beta_{12} ROA_t + \varepsilon_t \quad (7)$$

where *LCO* is total loan charge-offs divided by total loans at time t over either the next 12 months (LCO_{12m}) or 24 months (LCO_{24m}). Loan growth is defined as the percentage change in total loans over the quarter. All other variables are as defined previously.

Table 7 reports the results of estimating (7). Consistent with our prediction, we find that $\beta_3 > 0$ for each specification. Specifically, Table 7 reports that the portion of a bank's current loans that are charged off both over the next 12 month (coef = 0.096, p-value<0.01) and 24 month (coef = 0.0190, p-value<0.01) horizon are increasing in the bank's competitive environment. This finding is particularly troublesome when considering our previous finding that competition reduces the timeliness of banks' loan loss provisions and capital buffers.

4.1.3 Competition and Value-at-Risk (VaR)

In this section we examine the relationship between competition and characteristics of the probability distributions over two key balance sheet variables: changes in the market value of assets and equity returns. These two distributions are economically related as unhedged changes in the market value of a bank's assets will have consequences for equity values. Any differences in the two distributions must derive from the underlying structure of a bank's assets relative to its liabilities. Also, as we discuss below, because the market value of total assets is unobservable, we use a bank's equity returns to transform the book values of assets into market values following the methodology in Adrian and Brunnermier [2011].

We capture a bank's standalone tail risk using estimated value-at-risk (*VaR*). *VaR* measures the potential loss in value of a risky asset or portfolio over a defined period for a given confidence interval. Thus, if the *VaR* of a bank's equity returns is -15% at a one-week, 95%

confidence level, there is a only a 5% chance that banks equity value will drop more than 15% over any given week. Let X^i represent the percentage change in the market value of total assets or equity for bank *i*, and let *q* represent a given probability threshold. VaR_q^i is then defined implicitly as

$$probability(X^i \leq VaR_q^i) = q \, .$$

Following prior research (Adrian and Brunnermier [2011], Bushman and Williams [2012b]) we use quantile regression to estimate time varying *VaR*s. With quantile regression, the predicted value for a given quantile (*q*%) can be interpreted as the expected outcome at the given quantile, making it straightforward to estimate time-varying *VaR* at any quantile.

To compute each bank's weekly percentage change in market-valued total assets (*MVA*) we follow prior research and define it as:.

$$X_t = \frac{MVA_t - MVA_{t-1}}{MVA_{t-1}} = \frac{\left(MTB_t * BVA_t\right) - \left(MTB_{t-1} * BVA_{t-1}\right)}{MTB_{t-1} * BVA_{t-1}}$$

$$= \frac{MVE_t}{MVE_{t-1}} * \left[\frac{BVA_t / BVE_t}{BVA_{t-1} / BVE_{t-1}} \right] - 1 \qquad . \qquad (8a)$$

MTB is the weekly market to book ratio, *BVA* (*BVE*) is the weekly book value of assets (equity), and MVE is market value of equity. Because book value of equity and book value of assets are only reported on a quarterly basis, we linearly interpolate the book value over the quarter on a weekly basis. To compute the weekly percentage change in the banks market value of equity, we use CRSP and compute a weekly stock return for the bank. Note that equity returns can be recovered from (8a) by setting the ratio inside the square bracket equal to one.

To compute time-varying *VaR* at the *q*-percentile, we estimate the following quantile regression over the bank's full weekly time series, requiring a minimum of 260 observations:

$$X_t^i = a^i + b^i M_{t-1} + e_t^i \ . \tag{8b}$$

M in (8b) is a vector of macro state variables.[28] Our conditional weekly time-varying *VaR* at the *q*-percentile is computed as follows, where the coefficients are the estimates from equation (8b):

$$VaR_{q\%,t}^i = \hat{a}^i + \hat{b}^i M_{t-1} \ . \tag{8c}$$

We compute a quarterly *VaR* by summing up the weekly $VaR_{q\%}$.

We use three measures to reflect a bank's risk profile. To capture tail risk, we use the 1% quantile *VaR* for assets ($VaR_{1\%}^A$) and equity ($VaR_{1\%}^E$), where more negative values indicate that the bank has a more severe downside loss threshold for a given probability 1% probability. Our second measure is the distance between the *VaR* at the 1% quantile and the 50% quantile, which we term ΔVaR_{Left}. ΔVaR_{Left}^A (ΔVaR_{Left}^E) captures the expected percentage change in asset (equity) values when a bank moves from the median to the 1% quantile. Larger values of ΔVaR_{Left} indicate that the bank's distribution has a longer left tail. Our third measure ΔVaR_{Right}^A (ΔVaR_{Right}^E) is the distance from $VaR_{50\%}^A$ ($VaR_{50\%}^E$) *to* $VaR_{99\%}^A$ ($VaR_{99\%}^E$), where larger values of ΔVaR_{Right} indicate that the bank's distribution has a longer right tail.

[28] The *M* vector consists of :1) *VIX*, which captures the implied volatility of the S&P 500 reported by the CBOE; 2) *Liquidity Spread*, defined as the difference between the 3-month general collateral repo rate and the 3-month bill rate *Liquidity Spread* is a proxy for short-term liquidity risk in market. We obtain the repo rates from Bloomberg and the bill rates from the Federal Bank of New York; 3) The change in the 3-month T-Bill rate (*Δ3T-Bill*), as it predicts the tails of the distribution better in the financial sector than the level; 4) Δ*Yield Curve Slope*, measured as the yield spread between the 10-year Treasury rate and the 3-month rate; 5) *ΔCredit Spread*, defined as change in the spread between BAA-rated bonds and the Treasury rate with the same 10-year maturity; 6) The weekly value weighted equity market return (Ret_{Mrkt}); and 7) the weekly real estate (SIC code 65-66) sector return in excess of the market return (Ret_{Estate}). The 3-month T-Bill, 10-year Treasury, and spread between BAA-rated bonds and Treasuries are obtained from the Federal Reserve. The market returns are from CRSP.

We estimate the effect of competition on the various measures of *VaR* using the following OLS regression model:

$$\begin{aligned} VaR_t^{A/E} = {} & b_0 + b_1 BCE_{t-1} + b_2 Trading_{t-1} + b_3 Commercial_{t-1} + b_4 Consumer_{t-1} + \\ & b_5 Realestate_{t-1} + b_6 Mismatch_{t-1} + b_7 Deposits_{t-1} + b_8 ROA_{t-1} + \\ & b_9 Tier1_{t-1} + b_{10} Size_{t-1} + b_{11} s_{E,t-1} + b_{12} b_{t-1}^{Mrkt} + b_{13} Illiquid_{t-1} + b_{14} MTB_{t-1} + e_t \end{aligned} \quad (9)$$

where σ_E is standard deviation of the bank's equity returns over the prior quarter. β^{Mrkt} is the bank's equity beta from a basic CAPM model estimated by bank over the prior quarter. *Illiquid* is defined as the average daily absolute return divided by the dollar trading volume for the day. All other variables are as defined previously.

Table 8 panels A and B present the results from the estimation of equation (9) for both asset and equity *VaR* measures. The results in both panels A and B show that *BCE* is negatively correlated with both $VaR_{1\%}^{A}$ (coefficient = -0.0737, p-value<0.01) and $VaR_{1\%}^{E}$ (coefficient = -0.0604, p-value<0.01). These results suggest that banks facing high competition also face more severe downside risk compared to banks facing weaker competitive pressures. Panels A and B in Table 8 suggest that competition primarily affects the left tail of the distribution over a bank's asset and equity values.

4.2. Competition and Systemic Risk

Finally, we investigate the effects of competition on the risk of the banking system. Up to this point we have viewed the effects of competition from a bank level perspective. Banks play a critical role in the economy as financial intermediaries. In the aftermath of the recent financial crises much attention has been paid to systemic risk in the banking system, including the effects of competition on systemic risk. We have previously documented that competition delays the recognition of expected losses, and increases the propensity for banks to pursue noninterest

sources of revenue and to relax credit standards. We have also documented that competition increases the stand-alone risk of banks. But to what extent do these risks contribute to the systemic risk of the financial system? Brunnermeier et al., (2012) show that increased reliance of noninterest revenue increases a banks contribution to systemic risk. Bushman and Williams (2012b) find evidence that the delay of expected loss by a bank increases the banks contribution to systemic risk and make the bank more susceptible to economy-wide shocks. We therefore test to see if the effects of competition ultimately affect systemic risk.

4.2.1 ΔCoVaR

As discussed earlier, we examine the influence of competition on systemic risk by considering the relation between *BCE* and codependence in the tails of banks' asset changes and equity returns. We build directly on the earlier *VaR* framework and use the *CoVaR* construct from Adrian and Brunnermeier (2011). *CoVaR* reflects the tail risk of the banking sector in aggregate, *conditional* on the performance of an individual bank *i*. The objective is to measure the extent to which the tail risk of the banking sector is more severe when bank *i* is in distress relative to when bank *i* is operating at normal levels.

Formally, *CoVaR* is the *VaR* of the banking system *conditional* on the state of an individual bank, and Δ*CoVaR* captures the marginal contribution of a specific bank to the tail risk of the banking sector. To compute $\Delta CoVaR_q$ we estimate the following quantile regressions equations again using weekly data:

$$X_t^i = a^i + b^i M_{t-1} + e_t^i \tag{10a}$$

$$X_t^{system} = g_1 + g_2 M_{t-1} + g_3 X_t^i + e_t^{system} \quad , \tag{10b}$$

where X^i is bank i's weekly equity return (percent asset change rate), X^{system} is the value-weighted asset change rate from the index of all banks in the economy (excluding bank i), and M is the vector of macro state variable defined above. Equation (10a) is just the *VaR* formulation we estimated earlier (i.e., equation (8b)). Equation (10b) extends (10a) to a portfolio of banks and *conditions* on the performance bank i. (10a) is estimated at both q% = 1% and 50%, and (10b) at q% = 1%. Using the predicted values from (9a) and (9b) we specify

$$VaR^i_{q\%,t} = \hat{\alpha}^i + \hat{\beta}^i M_{t-1} \tag{10c}$$

$$CoVaR_{1\%,t} = \hat{g}_1 + \hat{g}_2 M_{t-1} + \hat{g}_3 VaR^i_{1\% or 50\%,t} \ , \tag{10d}$$

$CoVaR_{1\%,t}$, equation (10d), is the system's time t *VaR* at q% = 1%, *conditional* on the *VaR* of the individual bank i being at either the 1% or 50% quantile. To capture the sensitivity of the system's conditional $VaR_{1\%}$ to bank i's events, we compute

$$\begin{aligned} \Delta CoVaR_t &= CoVaR_t^{i=VaR_{1\%}} - CoVaR_t^{i=VaR_{50\%}} \\ &= \hat{g}_1 + \hat{g}_2 M_{t-1} + \hat{g}_3 (VaR^i_{1\%,t} - VaR^i_{50\%,t}) \end{aligned} \ . \tag{10e}$$

We sum weekly *ΔCoVaR* to obtain a quarterly measure, where *more negative* values of $\Delta CoVaR_q$ indicates that a move by bank i from a median state of asset (or equity) growth rates to a 'distressed' state produces a larger marginal contribution to overall systemic risk.

Using our estimates of *ΔCoVaR* we estimate the following equation.

$$\begin{aligned} \Delta CoVaR_t^{A/E} = {} & \beta_0 + \beta_1 BCE_{t-1} + \beta_2 Trading_{t-1} + \beta_3 Commercial_{t-1} + \beta_4 Consumer_{t-1} + \\ & \beta_5 Realestate_{t-1} + \beta_6 Mismatch_{t-1} + \beta_7 Deposits_{t-1} + \beta_8 ROA_{t-1} + \\ & \beta_9 Tier1_{t-1} + \beta_{10} Size_{t-1} + \beta_{11} \sigma_{E,t-1} + \beta_{12} \beta_{t-1}^{Mrkt} + \beta_{13} Illiquid_{t-1} + \\ & \beta_{14} MTB_{t-1} + \varepsilon_t \end{aligned} \tag{11}$$

where all variables were defined previously. To the extent that the effects of competition ultimately result in increases in systemic risk we expect to $\beta_1<0$.

We estimate equation (11) and report the results in the first two columns in Table 9. The table shows that for the dependent variable $\Delta CoVaR^A$ the coefficient for *BCE* is -0.0156 (p-value <0.01). For the dependent variable $\Delta CoVaR^E$ the coefficient on *BCE* is -0.0124 (p-value <0.01). The results provide evidence that *BCE* is associated with an increase in the banks contribution to systemic risk based on either equity values or asset values.

4.2.2 Marginal Expected Shortfall (MES)

For our final measure of systemic risk we follow Acharya et al. (2010) and compute the marginal expected shortfall (*MES*) of the bank. *MES* captures the correlation between a bank's equity returns and market equity returns, on the days where the market return is in the bottom 5% for the year. That is, it measures the extent to which an individual bank's returns are low when the overall (banking) market returns are low. For each quarter end we compute the observed distribution of returns for the market as a whole over the subsequent 12 months. We then isolate the days that fall in the bottom 5% of market returns for the year, and compute the average return for each individual bank over those days. The more negative *MES*, the lower an individual bank's returns are when the market return is low (higher marginal expected shortfall). We then estimate the following equation:

$$\begin{aligned} MES_t = {} & b_0 + b_1 BCE_{t-1} + b_2 Trading_{t-1} + b_3 Commercial_{t-1} + b_4 Consumer_{t-1} + \\ & b_5 Realestate_{t-1} + b_6 Mismatch_{t-1} + b_7 Deposits_{t-1} + b_8 ROA_{t-1} + \\ & b_9 Tier1_{t-1} + b_{10} Size_{t-1} + b_{11} s_{E,t-1} + b_{12} b_{t-1}^{Mrkt} + b_{13} Illiquid_{t-1} + \\ & b_{14} MTB_{t-1} + e_t \end{aligned} \tag{12}$$

If competition increases the systemic risk of the bank we would predict $\beta_1<0$. We estimate equation (12) and report the results in the last column in Table 9. The reported coefficient on

BCE is -0.0025 (p-value < 0.05), which indicates that competition increases the marginal expected shortfall of the bank. To put economic significance on the results, a one standard deviation increase in *BCE* results in 12% reduction in the average return over the days in the market's bottom 5%.

4.3 Channel Attenuation Analysis

The previous analysis indicates that more competition leads to more systemic risk, while section 3 provides evidence that more competition also leads banks to make accounting and operating decisions that prior literature has found to increase systemic risk. If competition is working through these specific channels to influence systemic risk, then the inclusion of these channels in our model should reduce the affect that *BCE* has on systemic risk. Accordingly, we use an attenuation analysis approach (Baron and Kenny, 1986) to examine this conjecture.

To perform this analysis, we include variables in our model that proxy for: (1) the timeliness of each bank's loan loss provision, and (2) each bank's revenue mix. While Section 2.3 indicates that competition reduces underwriting standards, another channel that influences systemic risk, data limitations preclude us from capturing the quality of a bank's underwriting standards. Accordingly, we do not include this channel in our analysis. To capture the timeliness of LLP in a single proxy, we follow Beatty and Liao (2011) and use loan loss allowance divided by NPL (*TimelyLLP*). We also use *RevMix* to capture each bank's pursuit of non-interest revenue sources.

We begin our analysis by estimating equations (11) and (12) for the full sample of firms that have all of the variables required for the mitigation analysis. Similar to those results reported in Table 9, Panel A of Table 10 reports that *BCE* is negatively associated with both of the *CoVaR* variables and *MES*. We then re-estimate equations (11) and (12) and include *TimelyLLP* and

RevMix. Panel B of Table 10 report the results of estimating these modified equations. Consistent with our prediction, we find that the inclusion of *TimelyLLP* and *RevMix* in equations (11) and (12) reduces the magnitude of the *BCE* coefficient. Specifically, we find that the magnitude of the *BCE* coefficient is reduced by approximately 20% for both *CoVaR* variables and by approximately 40% for the *MES* regression. Further, our results provide additional support that banks' loan loss provisioning and pursuit of non-interest income influence systemic risk in the manner indicated by prior research. Taken together, Table 10 provides support to our conjecture that competition influences systemic risk through both *TimelyLLP* (accounting channel) and *RevMix* (operations channel).

4.4 Robustness Tests

In Section 2 we document that *BCE* moves with the interstate bank restrictions. A benefit of our measure over the use of the deregulation index to study competition is that *BCE* can be used for financial statement analysis purposes any time, and is not restricted by the time periods of deregulation. However one concern is that in our pooled regressions we are only picking up the effect of the interstate deregulation. To eliminate this concern we re-estimate our risk analyses after restricting the analysis to the post deregulation period. In unreported results, we find that the results are robust to restricting the sample to the post-deregulation time period. In further untabulated analysis, we demonstrate that our results on the relation between competition and bank risk are driven by competition and not some correlated omitted variable by substituting the bank deregulation index for *BCE* and replicating our result that increased competition is associated with increased risk.

As another robustness test, we investigate whether our results using *BCE* are robust to the inclusion of the Lerner Index (*LI*). To investigate *BCE*'s ability to explain behavior above and

beyond the Lerner Index, we begin by computing the Lerner Index (*LI*) for each bank-year (see Appendix A for details), where higher values are an indication of monopoly like behavior.[29]. We then re-run each of the primary analyses including both *BCE* and *LI* and report the results in Table 11 panels A, B and C.

Table 11 panel A shows the results for the primary channels analyses. In all three cases, our results with *BCE* are robust to the inclusion of the Lerner index. However the results for *LI* are both weaker and less consistent than those identified with the *BCE* measure. Panels B and C report the results from the various risk analyses. Similar to panel A, we find that *BCE* is robust to the inclusion of the Lerner index. However in the case of two of the three systemic risk measures, the coefficients on *LI* indicate that more competition results in less systemic risk. Overall the results from Table 11 provide strong evidence that *BCE* provides information above and beyond that which is captured by other bank-time specific measures of competition.

5. Summary

Three important open questions in the banking literature are: How should bank competition be measured? What specific channels does bank competition operate through to increase or decrease risk? Does bank competition increase or decrease bank and banking system risk?

We introduce a new text-based measure of bank competition and take extensive efforts to validate the measure. In a powerful analysis, we use the branch banking deregulation process to provide evidence that this measure captures information about shifts in competition in a more timely fashion than classical competition measures such as the Lerner index. The enhanced timeliness of our measure makes it particularly conducive to examine future bank responses to current shifts in competition.

[29] In unreported results we also compute bank-quarter *LI* and results are robust.

Next, we examine distinct channels through which competition impacts risk represents a novel contribution. The current literature generally looks at the direct association between competition and risk without explicitly delineating *how* it impacts risk. Our result that competition is associated with shifts to non-interest income is new to the literature, as is our result on the association between competition and credit standards in the syndicated loan market. Further, our finding that competition is associated with delayed loss recognition also extends the literature.

Both of our analyses that examine the relation between competition and individual bank risk, as measured by future loan charge offs and VaR, are novel. However, our analysis of the connection between competition and the correlation of risk-taking across banks (i.e., systemic risk) is likely our biggest contribution to the bank competition-bank stability literature. There is very little in the banking literature on this issue, and what there is uses cross-country settings (e.g., Anginer et al. [2014], Beck [2013], and Schaeck et al. [2009]). We believe that our within-country analysis of competition and systemic risk makes a substantive contribution to this literature.

We also contribute to the textual analysis literature by providing convincing evidence that banks adjust their 10-K disclosures in a timely manner to reflect the changes in their competitive environment. Specifically, we use the powerful setting of branch banking deregulation to show that our text-based competition measure increases following a reduction in barriers to out-of-state branching, after controlling for traditional competition measures. This finding extends the literature investigating whether MD&A's reflect changes in the economic environment (e.g., Brown and Tucker [2011]; Cole and Jones [2005]). It also adds to the literature examining how competition influences firms' disclosure decisions.

Finally, we contribute to the accounting literature by showing that greater competitive pressure is associated with less timely expected loan loss recognition. Our result complements and extends Dou et al. [2013], who show that delayed loan loss recognition increases following reductions in out-of-state branching restrictions.[30] In contrast to their study, we use deregulation to validate our measure, and then use this measure to capture competitive pressure at *any* point in time, independent of a regulatory event. This raises the possibility that this text-based measure may be useful for designing powerful tests of connections between competitive pressure and opportunistic management in both banking and non-banking settings.

[30] We also complement Burks et al. [2013] who show that banks increase the issuance of firm-initiated press releases following a reduction in barriers to out-of-state branching.

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Appendix A

This appendix briefly describes the Lerner Index and how we estimate these measures in the current paper.

Lerner Index (see e.g., Beck et al. [2013] for further discussion)*:*

The Lerner index attempts to capture the extent to which banks can increase the marginal price beyond the marginal cost. The Lerner Index (*LI*) as follows:

$$Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad , \tag{b}$$

where P_{it} is defined as operating income (interest revenue plus non-interest revenue) to total assets.

Using a translog cost function, we estimate the marginal cost of the bank (*MC*) as follows:

$$\ln C_{it} = b_0 + b_1 \ln Q_{it} + \frac{b_2}{2} \ln Q_{it}^2 + \sum_{k=1}^{3} g_{kt} \ln W_{w,it} + \sum_{k=1}^{3} f_k \ln Q_{it} \ln W_{k,it} + \sum_{k=1}^{3} \sum_{j=1}^{3} \ln W_{k,it} \ln W_{j,it} + e_{it} \ , \tag{c}$$

where C_{it} are the banks total costs (interest expense plus non-interest operating expenses) scaled by total assets. *Q* is the banks total output, which is defined as total assets. W_1 is the input price of labor defined as wages divided by total assets; W_2 is the input price of funds and is defined as interest expense to total deposits; W_3 is the input price of fixed capital and is defined as non-interest expenses divided by total assets.

We estimate (c) using all banks with available data in the cross-section each year to attain predicted coefficients for each year. After estimating (c) we compute the marginal cost for each bank-year as:

$$MC_{it} = \frac{C_{it}}{Q_{it}} \left[\hat{\beta}_1 + \hat{\beta}_2 \ln Q_{it} + \sum_{k=1}^{3} \hat{\phi}_k \ln W_{k,it} \right] . \tag{d}$$

We then insert the resulting bank-year specific measure of *MC* from (d) into (b). This results in a bank-year specific *Lerner Index* measure.

Table 1 – Descriptive Statistics

BCE is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *VaR* is defined as the bank's 1 percentile value-at-risk over the quarter. *ΔCoVaR* is our measure of systemic risk which is computed as the market's value-at risk conditional on the bank's value-at-risk. *LLP* is loan loss provision scaled by lagged total loans. *ΔNPL* is the change in nonperforming loans over the quarter scaled by lagged total loans. *EBLLP* is earnings before tax and loan loss provision scaled by lagged total loans. *LCO* is gross charge-offs scaled by lagged loans. *Loan Growth* is the percentage change in total loans over the quarter. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Trading* is computed as total trading assets divided by total assets. *RevMix* is the ratio of non-interest income to total interest income. *Deposits* is total deposits scaled by lagged total loans. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. *Borrower Z-Score* is the Altman z-score (Altman [1977]) of the borrower. *Borrower EDF* is the expected default frequency (Bharath and Shumway [2008]). *Borrower Size* is the natural logarithm of the bank's (firm's) lagged total assets. *Spread* is the basis points over Libor on the loan. *#Covenants* is the number of financial and net worth covenants associated with the package. *Revolver* is an indicator variable equal to 1 if the facility is a revolver and 0 otherwise. *Amount* is the natural log of the facility amount. *Maturity* is the number of months to maturity.

Variables	Mean	Median	StdDev
BCE	0.3524	0.3071	0.2597
VaR^A	-1.4701	-1.2699	0.8477
$\Delta CoVaR^A$	-0.2218	-0.1990	0.1595
VaR^E	-1.4737	-1.2652	0.8696
$\Delta CoVaR^E$	-0.1969	-0.1752	0.1451
MES	-0.0122	-0.0092	0.0237
LLP	0.0013	0.0007	0.0019
ΔNPL	0.0006	0.0001	0.0042
EBLLP	0.0071	0.0068	0.0038
LCO	0.0019	0.0007	0.0031
Loan Growth	0.0341	0.0207	0.1125
Commercial	0.1209	0.1087	0.1157
Consumer	0.0243	0.0000	0.0576
RealEstate	0.4677	0.5949	0.3520
Maturity Mismatch	0.8442	0.8703	0.1043
Trading	0.0011	0.0000	0.0069
RevenueMix	0.1451	0.1267	0.0947
Deposits	1.2166	1.1608	0.3085
Tier 1	0.1113	0.1061	0.0371
Size	7.4284	7.0732	1.5633
Borrower Z-Score	2.8391	2.4628	2.0701
Borrower EDF	5.9444	0.0000	17.9323
Borrower Size	7.2649	7.2618	1.6741
Spread	152.4018	125.0000	102.5396
#Covenants	2.5238	2.0000	1.1128
Revolver	0.8476	1.0000	0.3594
Amount	5.5502	5.6284	1.3282
Maturity	47.5580	59.0000	21.2108
LI	0.9419	0.9727	0.0665

Table 2 – Measures of Competition (*BCE, LI, and HH*) on Interstate Regulation Index

The table below presents the results from an OLS regression of *BCE* on *RegIndex*. Where *BCE* is defined as the number of instances the word 'competition' appears in the bank's 10-K divided by the total number of words in the 10-K (Li et al., 2013). *RegIndex* is the Rice and Strahan (2010) branching restrictiveness index, where higher values indicate more restrictions. The regression includes both bank and time fixed effects. Standard errors are clustered by bank and year.

Panel A.

	Dependent Variable		
Variable	***BCE***	***BCE & Geographic Footprint***	***LI***
RegIndex	-0.0068**	-0.0069**	0.0002
	[0.003]	[0.003]	[0.001]
Unemployment	0.0031	0.0031	-0.0005*
	[0.003]	[0.003]	[0.000]
Leading Index	0.0025	0.0025	0.0004
	[0.002]	[0.002]	[0.001]
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
N	14,633	14,633	14,633

Panel B.

	Dependent Variable	
Variable	1st Stage: *BCE*	2nd Stage: $BCE^{Resdiual}$
RegIndex		-0.0062**
		[0.002]
Unemployment	-0.0315***	
	[0.004]	
Leading Index	0.0148***	
	[0.004]	
LI	-0.7352***	
	[0.130]	
HH	0.0258	
	[0.078]	
Year FE	No	Yes
Firm FE	No	Yes
N	14,633	14,633

*, **, *** Indicates significance at the 0.10, 0.05, and 0.01 level respectively.

Table 3 – Competition and Contracting

The below results report pooled OLS regressions. The dependent variable *Z-Score* is the Altman z-score (Altman [1977]) of the borrower. *EDF* is the borrower's expected default frequency (Bharath and Shumway [2008]). *ExtremeZ* is an indicator variable equal to 1 if the borrower's z-score is below 1.81 and 0 otherwise. *Lender BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Lender Tier 1* is the bank's tier 1 capital ratio at the end of the quarter. *Lender (Borrower) Size* is the natural logarithm of the bank's (firm's) lagged total assets. *Revolver* is an indicator variable equal to 1 if the package includes a revolver and 0 otherwise. *Amount* is the natural log of the package amount. *Maturity* is the number of months to maturity. *Spread* is the basis points over Libor on the loan. *#Covenants* is the number of financial and net worth covenants associated with the package. Time, Borrower and Lender fixed effects are included and standard errors are clustered by time and lender.

Panel A – Portfolio Risk

		Dependent Variables		
Variable	**Prediction**	Z-Score	EDF	Extreme Z
Lender BCE$_{t-1}$	− (Z-Score) + (EDF/ExtremeZ)	-0.4334** [0.187]	5.7253** [2.859]	1.17863** [0.564]
Lender Tier 1 (%)		0.0380 [0.034]	-1.4081*** [0.535]	-0.1590* [0.083]
Lender Size		-0.0451 [0.119]	1.4272 [1.327]	0.4841 [0.301]
Borrower Size		-0.6891*** [0.088]	-0.7354 [1.090]	1.2158*** [0.113]
Revolver		-0.0950 [0.060]	3.4371*** [1.098]	0.1828 [0.171]
Amount		-0.0011 [0.047]	0.2433 [0.523]	0.0271 [0.108]
Maturity		0.0034*** [0.001]	-0.1123*** [0.021]	-0.0071 [0.005]
Spread		-0.0059*** [0.000]	0.0730*** [0.007]	0.0141*** [0.001]
#Covenants		-0.0561** [0.027]	-1.5090*** [0.400]	-0.0908* [0.055]
Estimation		OLS	OLS	Probit
Fixed Effect		Bank, Borrower, Time	Bank, Borrower, Time	Bank, Borrower, Time
Observations		6,546	6,546	1,854
R-squared		0.840	0.641	

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 3 – Competition and Contracting

The below results report pooled OLS regressions. The dependent variable *Spread* is the basis points over Libor on the loan. *Lender BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Lender Tier 1* is the bank's tier 1 capital ratio at the end of the quarter. *Lender (Borrower) Size* is the natural logarithm of the bank's (firm's) lagged total assets. *Borrower Z-Score* is the Altman z-score (Altman [1977]) of the borrower. *Borrower EDF* the expected default frequency (Bharath and Shumway [2008]). *ExtremeZ* is an indicator variable equal to 1 if the borrower's z-score is below 1.81 and 0 otherwise. *Revolver* is an indicator variable equal to 1 if the package includes a revolver and 0 otherwise. *Amount* is the natural log of the package amount. *Maturity* is the number of months to maturity. *#Covenants* is the number of financial and net worth covenants associated with the package. Time, Borrower and Lender fixed effects are included and standard errors are clustered by time and lender.

Panel B – Under Pricing

Variable	**Prediction**	**Dependent Variable: Spread**			
Lender BCE$_{t-1}$ Z-Score*	+	15.0750***		14.6132***	
		[4.321]		[3.876]	
Lender BCE$_{t-1}$ EDF*	–		-0.4430	-0.0870	
			[0.685]	[0.651]	
*Lender BCE$_{t-1}$*ExtremeZ*	–				-50.7016***
					[18.613]
Lender BCE$_{t-1}$		-15.9468	28.0358**	-20.8043	49.5375***
		[18.818]	[13.736]	[18.864]	[13.696]
Lender Tier 1 (%)		2.3144	3.2667	3.5663	2.6899
		[2.393]	[2.410]	[2.253]	[2.431]
Lender Size		-1.8497	-2.3409	-3.1981	-0.9965
		[6.214]	[6.421]	[5.941]	[6.340]
Borrower Z-Score	–	-19.2750***		-16.3988***	
		[1.317]		[1.244]	
Borrower EDF	+		1.3223***	1.0387***	
			[0.160]	[0.154]	
Borrower ExtremeZ	+				58.4934***
					[4.369]
Borrower Size		-25.0786***	-12.9323***	-21.4505***	-21.3105***
		[3.902]	[3.944]	[3.958]	[3.850]
Revolver		-4.0803	-6.7814	-7.1977*	-3.0726
		[4.283]	[4.535]	[4.226]	[4.580]
Amount		-1.3097	-1.5674	-1.4820	-0.8031
		[2.494]	[2.356]	[2.291]	[2.579]
Maturity		0.1736*	0.2574***	0.2724***	0.1353
		[0.097]	[0.097]	[0.093]	[0.104]
#Covenants		11.0501***	14.0856***	11.9850***	12.7146***
		[1.607]	[1.585]	[1.553]	[1.617]
Fixed Effect		Bank, Borrower, Time	Bank, Borrower, Time	Bank, Borrower, Time	Bank, Borrower, Time
Observations		6,546	6,546	6,546	6,546
R-squared		0.825	0.812	0.825	0.805

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 3 – Competition and Contracting

The below results report pooled OLS regressions. The dependent variable *#Covenants* is the number of financial and net worth covenants associated with the package. *Lender BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Lender Tier 1* is the bank's tier 1 capital ratio at the end of the quarter. *Lender (Borrower) Size* is the natural logarithm of the bank's (firm's) lagged total assets. *Borrower Z-Score* is the Altman z-score (Altman [1977]) of the borrower. *Borrower EDF* the expected default frequency (Bharath and Shumway [2008]). *Revolver* is an indicator variable equal to 1 if the package includes a revolver and 0 otherwise. *Amount* is the natural log of the package amount. *Maturity* is the number of months to maturity. *Spread* is the basis points over Libor on the loan. Time, Borrower and Lender fixed effects are included and standard errors are clustered by time and lender.

Panel C – Relaxed Activity Restrictions

Variable	**Prediction**	**Dependent Variable: #Covenants**		
Lender BCE_{t-1}	–	-0.2747**	-0.2420**	-0.2526**
		[0.114]	[0.117]	[0.113]
Lender Tier 1 (%)		-0.0445**	-0.0490**	-0.0485**
		[0.021]	[0.022]	[0.022]
Lender Size		-0.0079	-0.0025	-0.0033
		[0.045]	[0.044]	[0.044]
Borrower Z-Score		-0.0139		-0.0209
		[0.020]		[0.019]
Borrower EDF			-0.0030**	-0.0033**
			[0.001]	[0.001]
Borrower Size		0.0511	0.0564	0.0419
		[0.044]	[0.045]	[0.042]
Revolver		0.0208	0.0328	0.0313
		[0.031]	[0.030]	[0.030]
Amount		-0.0129	-0.0119	-0.0120
		[0.018]	[0.018]	[0.018]
Maturity		0.0019*	0.0015*	0.0016*
		[0.001]	[0.001]	[0.001]
Spread		0.0016***	0.0020***	0.0017***
		[0.000]	[0.000]	[0.000]
Fixed Effect		Bank, Borrower, Time	Bank, Borrower, Time	Bank, Borrower, Time
Observations		6,546	6,546	6,546
R-squared		0.771	0.772	0.772

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 4 – Competition and Accrual Choices

The below results report pooled OLS regressions. The dependent variable *LLP* is defined as the loan loss provision scaled by lagged total loans. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *ΔNPL* is the change in nonperforming loans over the quarter scaled by lagged total loans. *EBLLP* is earnings before tax and loan loss provision scaled by lagged total loans. *Loan Growth* is the percentage change in total loans over the quarter. *Size* is the natural logarithm of lagged total assets. *Tier 1* is the bank's tier 1 capital ratio at the end of the quarter. *Consumer* is the percentage of consumer loans to total loans. *Commercial* is the percentage of the loan portfolio in commercial loans. *RealEstate* is the percentage of real estate loans to total loans. *Big5* is an indicator variable set equal to 1 if the bank is audited by a big 5 auditor and 0 otherwise. Both time and bank fixed effects are included and the standard errors are clustered by bank and time.

Panel A: Expected Loss Recognition

Variable	**Predictions**	**Dependent Variable: LLP_t**
$BCE_{t-1}*\Delta NPL_{t+1}$	–	-0.0543***
		[0.017]
$BCE_{t-1}*\Delta NPL_t$	–	-0.4143***
		[0.072]
BCE_{t-1}		0.0003***
		[0.000]
ΔNPL_{t+1}		0.0452***
		[0.009]
ΔNPL_t		0.0978***
		[0.011]
ΔNPL_{t-1}		0.0579***
		[0.008]
ΔNPL_{t-2}		0.0533***
		[0.008]
EBLLP		-0.0070
		[0.011]
Loan Growth		0.0000
		[0.000]
Size		0.0003***
		[0.000]
Tier 1		0.0017
		[0.002]
Consumer		0.0010*
		[0.001]
Commercial		0.0006
		[0.000]
RealEstate		0.0001
		[0.000]
Fixed Effect		Time, Bank
Observations		17,693
R-squared		0.485

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 4 – Competition and Accrual Choices (cont…)

Panel B: Auditor Monitoring

Variable	Predictions	Dependent Variable: LLP_t
$Big5*BCE_{t-1}*\Delta NPL_{t+1}$	+	0.0458*
		[0.028]
$Big5*BCE_{t-1}*\Delta NPL_t$	+	0.0500**
		[0.029]
Big5		-0.0000
		[0.000]
$BCE_{t-1}*\Delta NPL_{t+1}$	–	-0.0720***
		[0.025]
$BCE_{t-1}*\Delta NPL_t$	–	-0.4424***
		[0.095]
BCE_{t-1}		0.0003**
		[0.000]
ΔNPL_{t+1}		0.0439***
		[0.010]
ΔNPL_t		0.1029***
		[0.010]
ΔNPL_{t-1}		0.0682***
		[0.007]
ΔNPL_{t-2}		0.0650***
		[0.008]
EBLLP		-0.0259**
		[0.012]
Loan Growth		-0.0006*
		[0.000]
Size		0.0004***
		[0.000]
Tier 1		0.0043**
		[0.002]
Consumer		0.0047**
		[0.002]
Commercial		0.0011
		[0.001]
RealEstate		0.0001
		[0.000]
Fixed Effect		Time, Bank
Observations		12,799
R-squared		0.525

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 5 – BCE and Operating Decisions: Revenue Mix and Fee Mix

The below results report pooled OLS regressions where the dependent variables are *RevMix* defined as non-interest revenue divided by interest revenue. *FeeMix* is defined as the total non-interest income minus deposit service charges and trading revenue divided by interest revenue. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *NonInt Exp* is non-interest expense divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Deposits* is the total deposits scaled by lagged total loans. *Mismatch* is the maturity mismatch. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. *ROA* is defined as net income divided by total assets. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

		Dependent Variable	
Variable	**Prediction**	**RevMix**	**FeeMix**
BCE_{t-1}	+	0.0153***	0.0130***
		[0.004]	[0.004]
NonInt Exp		0.4429***	0.2998***
		[0.028]	[0.029]
Commercial		0.0229	0.0360
		[0.016]	[0.026]
Consumer		0.0074	0.0536**
		[0.024]	[0.025]
RealEstate		0.0434***	0.0416***
		[0.008]	[0.014]
Deposits		-0.0084*	-0.0242***
		[0.005]	[0.007]
Mismatch		-0.0457***	-0.0242
		[0.013]	[0.017]
Tier1		-0.0421	-0.0951
		[0.051]	[0.068]
Size		0.0069*	0.0139**
		[0.004]	[0.006]
ROA		15.5009***	12.6299***
		[1.284]	[1.448]
Fixed Effects		Time, Bank	Time, Bank
Observations		18,444	10,054
R^2		0.827	0.764

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 6 – Competition and Regulatory Capital

The below results report pooled OLS regressions where the dependent is *Tier1* defined as the bank's tier 1 capital ratio. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Trading* is the percent of trading revenue divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Deposits* is the total deposits scaled by lagged total loans. *ROA* is the bank's return on assets. *Size* is the natural logarithm of total assets. β_{mrkt} is defined and the market beta of the bank over the prior period. *MTB* is the bank's market to book ratio. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

Variable	**Prediction**	**Dependent Variable: *Tier1***
BCE_{t-1}	–	-0.0032**
		[0.001]
Trading		0.0664**
		[0.032]
Commercial		-0.0126*
		[0.007]
Consumer		0.0439***
		[0.008]
RealEstate		-0.0002
		[0.002]
Mismatch		0.0077**
		[0.003]
Deposits		0.0072***
		[0.002]
ROA		0.7964***
		[0.243]
Size		-0.0113***
		[0.002]
β_{mrkt}		0.0027***
		[0.001]
MTB		-0.0003*
		[0.000]
Fixed Effect		Time, Bank
Observations		15,199
R-squared		0.701

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 7 – Competition and Individual Bank Risk – Future Charge-offs

The below results report pooled OLS regressions. The dependent variable LCO_{12m} (LCO_{24m}) is defined as gross charge-offs scaled by lagged total loans over the next 12 (24) months. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *ΔNPL* is the change in nonperforming loans over the quarter scaled by lagged total loans. *Loan Growth* is the percentage change in total loans over the quarter. *Size* is the natural logarithm of lagged total assets. *Tier 1* is the bank's tier 1 capital ratio at the end of the quarter. *Consumer* is the percentage of consumer loans to total loans. *Commercial* is the percentage of commercial loans to total loans. *Real Estate* is the percentage of real estate loans to total loans. Both time and bank fixed effects are included and the standard errors are clustered by bank and time.

		Dependent Variables	
Variable	**Prediction**	**LCO_{12m}**	**LCO_{24m}**
*BCE_{t-1}*Loan Growth*	+	0.0096***	0.0190***
		[0.004]	[0.008]
BCE_{t-1}		0.0018**	0.0029**
		[0.001]	[0.001]
ΔNPL_t		0.5179***	0.7877***
		[0.062]	[0.136]
ΔNPL_{t-1}		0.4534***	0.5902***
		[0.056]	[0.110]
ΔNPL_{t-2}		0.4292***	0.4511***
		[0.062]	[0.091]
Loan Growth		-0.0130***	-0.0179***
		[0.002]	[0.003]
Size		0.0042***	0.0113***
		[0.001]	[0.002]
Tier 1		-0.0011	-0.0535***
		[0.009]	[0.012]
Consumer		-0.0003	-0.0145
		[0.004]	[0.011]
Commercial		0.0175***	0.0240***
		[0.002]	[0.005]
RealEstate		0.0022	-0.0088***
		[0.002]	[0.003]
ROA		-0.1246**	-0.0252
		[0.051]	[0.233]
Fixed Effect		Time, Bank	Time, Bank
Observations		12,833	11,037
R-squared		0.642	0.664

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 8 – Competition and Individual Bank Risk – *VaR* and *VaR*^{E}

The below results report pooled OLS regressions where the dependent variables are VaR^A (VaR^E) and is defined as the bank's 1 percentile value-at-risk of market value of assets (equity) over the quarter. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Trading* is the percent of trading revenue divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Deposits* is the total deposits scaled by lagged total loans. *ROA* is the bank's return on assets. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. σ_E is the standard deviation of equity returns. β_{mrkt} is defined and the market beta of the bank over the prior period. *Illiquid* is the average daily illiquid of the stock over the quarter. *MTB* is the bank's market to book ratio. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

Panel A. VaR

	Dependent Variable			
Variable	$VaR^A_{1\%}$	DVaR^A_{Left}	$VaR^A_{50\%}$	DVaR^A_{Right}
BCE_{t-1}	-0.0737***	0.0750***	0.0013	0.0496
	[0.021]	[0.020]	[0.002]	[0.054]
Trading	0.5162	-0.6433	-0.1270	6.4303
	[1.991]	[1.995]	[0.130]	[5.259]
Commercial	-0.1900*	0.1707	-0.0193	0.4267**
	[0.106]	[0.106]	[0.012]	[0.190]
Consumer	0.7333**	-0.6868**	0.0464	-0.8898
	[0.321]	[0.317]	[0.032]	[0.556]
RealEstate	-0.1385***	0.1524***	0.0139***	0.0997
	[0.038]	[0.037]	[0.003]	[0.070]
Mismatch	-0.0261	0.0456	0.0194*	-0.2226
	[0.071]	[0.070]	[0.010]	[0.155]
Deposits	0.0344	-0.0402	-0.0058*	0.0460
	[0.028]	[0.028]	[0.003]	[0.049]
ROA	10.0582***	-10.3364***	-0.2781	-13.1805*
	[3.566]	[3.618]	[0.194]	[6.915]
Tier1	-0.0140	0.0263	0.0123	0.3742
	[0.236]	[0.237]	[0.017]	[0.366]
Size	-0.0291	0.0132	-0.0159***	-0.0067
	[0.036]	[0.036]	[0.003]	[0.084]
σ_E	-1.1551***	1.1457***	-0.0094	1.6991**
	[0.429]	[0.422]	[0.008]	[0.662]
β_{mrkt}	-0.0205	0.0189	-0.0016	0.0211
	[0.029]	[0.028]	[0.002]	[0.046]
Illiquid	-9.9154	40.3437	30.4284**	-51.3978
	[290.799]	[285.356]	[13.707]	[459.126]
MTB	0.0096	-0.0062	0.0034***	-0.0521***
	[0.010]	[0.009]	[0.001]	[0.017]
Fixed Effects	Time, Bank	Time, Bank	Time, Bank	Time, Bank
Observations	13,730	13,730	13,730	13,730
R^2	0.667	0.666	0.318	0.791

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 8 – Competition and Individual Bank Risk –*VaR* and *VaR*^{E} *(Continued)*

The below results report pooled OLS regressions where the dependent variables are *VaR (VaR*^{E}*)* and is defined as the bank's 1 percentile value-at-risk of market value of assets (equity) over the quarter. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Trading* is the percent of trading revenue divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Deposits* is the total deposits scaled by lagged total loans. *ROA* is the bank's return on assets. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. σ_E is the standard deviation of equity returns. β_{mrkt} is defined and the market beta of the bank over the prior period. *Illiquid* is the average daily illiquid of the stock over the quarter. *MTB* is the bank's market to book ratio. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

Panel B. VaR^E

	Dependent Variable			
Variable	$VaR^E_{1\%}$	DVaR^E_{left}	$VaR^E_{50\%}$	DVaR^E_{Right}
BCE_{t-1}	-0.0604***	0.0580***	-0.0024	0.0590
	[0.021]	[0.021]	[0.002]	[0.052]
Trading	0.5262	-0.6244	-0.0981	6.8116
	[2.124]	[2.136]	[0.112]	[5.204]
Commercial	-0.0846	0.0666	-0.0180*	0.4471**
	[0.102]	[0.100]	[0.010]	[0.193]
Consumer	0.7515**	-0.6955**	0.0560*	-0.8594
	[0.319]	[0.315]	[0.032]	[0.543]
RealEstate	-0.1693***	0.1747***	0.0054	0.0837
	[0.039]	[0.037]	[0.004]	[0.069]
Mismatch	-0.0069	0.0248	0.0178**	-0.2176
	[0.072]	[0.070]	[0.008]	[0.150]
Deposits	0.0326	-0.0341	-0.0015	0.0325
	[0.027]	[0.027]	[0.002]	[0.051]
ROA	10.1769***	-9.8016***	0.3752*	-11.7684*
	[3.395]	[3.237]	[0.209]	[6.511]
Tier1	0.0377	-0.0595	-0.0219	0.4304
	[0.240]	[0.242]	[0.013]	[0.359]
Size	-0.0360	0.0235	-0.0125***	0.0213
	[0.038]	[0.038]	[0.003]	[0.081]
σ_E	-1.1881***	1.1668***	-0.0214**	1.6382**
	[0.431]	[0.422]	[0.009]	[0.638]
β_{mrkt}	-0.0209	0.0188	-0.0021	0.0206
	[0.029]	[0.028]	[0.002]	[0.044]
Illiquid	72.3665	-47.7744	24.5921**	83.1694
	[321.465]	[315.304]	[9.482]	[473.623]
MTB	0.0101	-0.0070	0.0031**	-0.0478***
	[0.011]	[0.010]	[0.001]	[0.017]
Fixed Effects	Time, Bank	Time, Bank	Time, Bank	Time, Bank
Observations	13,730	13,730	13,730	13,730
R^2	0.667	0.665	0.334	0.796

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 9 – Competition and Systemic Risk – *ΔCoVaR*, *ΔCoVaR*^{E}, and Marginal Expected Shortfall (*MES*)

The below results report pooled OLS regressions where the dependent variables are: $\Delta CoVaR^A$ ($\Delta CoVaR^E$) is the bank's contribution to the system's 1 percent VaR^A(VaR^E). *MES* and is defined as the bank's average daily return computed over the trading days where the market return was in the bottom 5% over the quarter. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Trading* is the percent of trading revenue divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Deposits* is the total deposits scaled by lagged total loans. *ROA* is the bank's return on assets. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. σ_E is the standard deviation of equity returns. β_{mrkt} is defined and the market beta of the bank over the prior period. *Illiquid* is the average daily illiquid of the stock over the quarter. *MTB* is the bank's market to book ratio. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

	Dependent Variable		
Variable	***ΔCoVaR*^{A}**	***ΔCoVaR*^{E}**	***MES***
BCE_{t-1}	-0.0156***	-0.0124***	-0.0025**
	[0.004]	[0.003]	[0.001]
Trading	0.4568	0.3578	-0.0475
	[0.276]	[0.224]	[0.064]
Commercial	0.0051	-0.0006	-0.0086
	[0.014]	[0.012]	[0.007]
Consumer	0.1118**	0.0799	0.0012
	[0.052]	[0.054]	[0.012]
RealEstate	-0.0289***	-0.0215***	-0.0022
	[0.005]	[0.005]	[0.002]
Mismatch	0.0173	0.0208*	-0.0015
	[0.013]	[0.011]	[0.003]
Deposits	0.0039	0.0039	0.0030***
	[0.004]	[0.003]	[0.001]
ROA	0.2471	0.2508	0.3102***
	[0.279]	[0.266]	[0.101]
Tier1	-0.0810*	-0.0728**	-0.0346**
	[0.042]	[0.032]	[0.014]
Size	-0.0060	-0.0046	-0.0039**
	[0.004]	[0.004]	[0.002]
σ_E	-0.1021***	-0.0948***	-0.0137
	[0.037]	[0.036]	[0.008]
β_{mrkt}	0.0002	0.0007	-0.0080***
	[0.003]	[0.003]	[0.001]
Illiquid	22.8645	60.2791	10.0473
	[37.562]	[43.901]	[11.830]
MTB	0.0015	0.0013	-0.0006
	[0.001]	[0.001]	[0.000]
Fixed Effects	Time, Bank	Time, Bank	Time, Bank
N	13,730	13,730	14,282
R^2	0.848	0.857	0.359

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 10 – Systemic Risk and Channels Mitigation

The below results report pooled OLS regressions where the dependent variables are: $\Delta CoVaR^A$ ($\Delta CoVaR^E$) is the bank's contribution to the system's 1 percent VaR^A(VaR^E). *MES* and is defined as the bank's average daily return computed over the trading days where the market return was in the bottom 5% over the quarter. *BCE* is the number of occurrences of competition-related words per 1,000 total words in the 10-k (Li et al. [2013]). *Timely LLP* is defined as the banks loan loss allowance dividend by NPL. *RevMix* defined as non-interest revenue divided by interest revenue. Control Variables include: *Trading* is the percent of trading revenue divided by interest revenue. *Commercial* is the percentage of the loan portfolio in commercial loans. *Consumer* is the percentage of consumer loans to total loans. *RealEstate* is the percentage of real estate loans to total loans. *Mismatch* is the maturity mismatch. *Deposits* is the total deposits scaled by lagged total loans. *ROA* is the bank's return on assets. *Tier1* is the bank's tier 1 capital ratio. *Size* is the natural logarithm of total assets. σ_E is the standard deviation of equity returns. β_{mrkt} is defined and the market beta of the bank over the prior period. *Illiquid* is the average daily illiquid of the stock over the quarter. *MTB* is the bank's market to book ratio. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

	Dependent Variables		
Variable	$\Delta CoVaR^A$	$\Delta CoVaR^E$	***MES***
Panel A. Not Controlling for Channels			
BCE_{t-1}	-0.0173***	-0.0138***	-0.0027**
	[0.004]	[0.004]	[0.001]
Controls	Included	Included	Included
Fixed Effects	Time, Bank	Time, Bank	Time, Bank
Observations	12,383	12,383	12,383
R^2	0.848	0.857	0.367
Panel B. Controlling for Channels			
BCE_{t-1}	-0.0139***	-0.0111***	-0.0017**
	[0.004]	[0.004]	[0.001]
Accounting Channel:			
Timely LLP	0.0013***	0.0011***	0.0002***
	[0.000]	[0.000]	[0.000]
Operations Channel:			
RevMix	-0.0313**	-0.0313**	-0.0011
	[0.001]	[0.015]	[0.001]
Controls	Included	Included	Included
Fixed Effects	Time, Bank	Time, Bank	Time, Bank
Observations	12,383	12,383	12,383
R^2	0.866	0.857	0.381

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.

Table 11 – BCE Controlling for the Lerner Index (*LI*)

The below results present pooled OLS regressions of the paper's primary analyses controlling for the bank's Lerner Index (*LI*). All of the same controls from the original analyses are included but not reported. Time and bank fixed effects are included in the regression and standard errors are clustered by time and bank.

Panel A. Channels – Accounting & Revenue Mix

	Dependent Variable		
Variable	***RevMix***	***FeeMix***	***LLP***
BCE_{t-1}	0.0078**	0.0043*	0.0002***
	[0.003]	[0.003]	[0.000]
LI_{t-1}	0.1028*	0.0464	-0.0012
	[0.055]	[0.045]	[0.001]
$BCE_{t-1}*\Delta NPL_{t+1}$			-0.0506***
			[0.019]
$BCE_{t-1}*\Delta NPL_{t}$			-0.0963***
			[0.019]
$LI_{t-1}*\Delta NPL_{t+1}$			-0.0414
			[0.217]
$LI_{t-1}*\Delta NPL_{t}$			0.0987
			[0.434]
Controls	Included	Included	Included
Fixed Effects	Time, Bank	Time, Bank	Time, Bank
Observations	17,632	9,789	15,970
R^2	0.805	0.765	0.484

Panel B. Individual Risk (Charge-offs)

	Dependent Variable	
Variable	LCO_{12m}	LCO_{24m}
BCE_{t-1}*Loan Growth	0.0106**	0.0179**
	[0.005]	[0.009]
LI_{t-1}*Loan Growth	-0.0040	-0.0020
	[0.003]	[0.005]
Controls	Included	Included
Fixed Effects	Time, Bank	Time, Bank
Observations	11,460	9,807
R^2	0.641	0.658

Panel C. Individual Risk (VaR^A & VaR^E) and Systemic Risk ($\Delta CoVaR^A$, $\Delta CoVaR^E$, & MES)

	Dependent Variables				
Variable	$VaR^A_{1\%}$	$VaR^E_{1\%}$	$DCoVaR^A$	$DCoVaR^E$	***MES***
BCE_{t-1}	-0.0701***	-0.0594***	-0.0159***	-0.0124***	-0.0021**
	[0.021]	[0.022]	[0.004]	[0.003]	[0.001]
LI_{t-1}	0.0446	-0.0044	0.0338**	0.0156	0.1856**
	[0.145]	[0.149]	[0.014]	[0.013]	[0.087]
Controls	Included	Included	Included	Included	Included
Fixed Effects	Time, Bank	Time, Bank	Time, Bank	Time, Bank	Time, Bank
Observations	12,255	12,255	12,255	12,255	13,106
R^2	0.659	0.660	0.848	0.858	0.360

***, **, * indicates significance at the 0.01, 0.05, and 010 level respectively.