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University of Southern California
will present

"Does Fair Value Accounting Exacerbate the
Pro-cyclicality of Bank Lending?"

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Does Fair Value Accounting Exacerbate the Pro-cyclicality of Bank Lending?

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Abstract

This paper examines whether fair value accounting increases the pro-cyclicality of banks' lending behavior. Exploiting cross-sectional variation in individual banks' exposure to fair value accounting, I find that fair value accounting does *not* exacerbate the pro-cyclicality of bank lending over the past two business cycles during 1995-2010. This result holds despite the fact that every one dollar of unrealized gains (losses) is associated with at least 25 cents of new lending (cutbacks in lending). The probable cause of this non-exacerbation finding is that interest rates rise (fall) during some of the expansionary (recessionary) periods, resulting in movements of bank assets' fair value that are not pro-cyclical.

Does Fair Value Accounting Exacerbate the Pro-cyclicality of Bank Lending?

"The second problem involves ways of making the system less *pro-cyclical* so that the financial system is less susceptible to exuberant booms and disastrous busts…. Capital rules, *accounting policies*, and other regulatory standards should not make this job even more difficult by encouraging excessively *pro-cyclical* behavior by financial institutions, that is, behavior that causes financial institutions to tighten credit in downturns and ease credit in booms more than is justified by changes in the credit worthiness of borrowers."

- Ben Bernanke, March 20, 2009[1]

1. Introduction

Fair value accounting has come under severe attack for its alleged role in precipitating the financial crisis of 2007-2008 (U.S. Congress, 2008; American Bankers Association, 2008). Central to the concerns about fair value accounting is whether it exacerbates the pro-cyclical lending behavior of financial institutions, i.e., the tendency of banks to expand credit during economic booms and curtail credit during busts.[2,3] Excessive pro-cyclicality in the financial system amplifies economic cycles, increases financial instability, and hence is of great concern to bank regulators and policymakers (Financial Stability Forum, 2009; Financial Stability Board, 2009; Bank of Italy, 2009). Bank regulators are especially concerned that fair value accounting may have exacerbated the pro-cyclicality of the banking system (European Central Bank, 2004; Banque de France, 2008). Supporting these concerns, two simulation-based studies show that fair value accounting induces unintended pro-cyclicality in banks' balance sheets and can, thereby,

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[1] From Ben Bernanke's speech at the Independent Community Bankers of America's National Convention and Techworld, Phoenix, Arizona. Emphasis added.

[2] The standard textbook definition of pro-cyclicality is the tendency of an economic variable to move in the same direction as aggregate economic activity over the business cycle (up in expansions, down in contractions) (see, e.g., Abel and Bernanke, 2005).

[3] At the height of the financial crisis, sixty-five members of Congress write a letter to the SEC, stating that "the 'mark-to-market' rule, while well intended, has the unintended consequences of exacerbating economic downturns by hamstringing the ability of banks to make loans to consumers and businesses" (see U.S. Congress, 2008).

exacerbate the pro-cyclicality of their lending (European Central Bank, 2004; International Monetary Fund, 2009). Despite its importance, however, there is little empirical evidence on this issue. My paper attempts to fill this gap.

Specifically, the objective of my paper is to study whether fair value accounting exacerbates the intrinsic pro-cyclicality of banks' lending behavior over the business cycle, i.e., whether fair value accounting induces banks to expand credit during economic expansions and curtail credit supply during recessions. Bank lending is intrinsically pro-cyclical (Fisher, 1933; Kiyotaki and Moore, 1997; Asea and Blomberg, 1998; Lown and Morgan, 2006), and fair value accounting is alleged to increase lending pro-cyclicality because fair values of bank assets are conjectured to increase (decrease) during economic upturns (downturns), resulting in "surplus capital" ("capital shortfall") that facilitates (restrains) lending during those periods.

I use a broad sample of 2,956 unique bank holding companies comprising 69,578 bank-quarter observations during 1995-2010 to conduct the main empirical analysis. To measure fair value accounting, I exploit the cross-sectional variation in the extent of individual banks' fair value accounting exposure, measured as the fraction of bank assets carried at fair value on the balance sheet (Nissim and Penman, 2007; SEC, 2008; Khan, 2010).[4] To capture bank lending behavior, I use the quarterly growth in outstanding loans as in Berger and Udell (2004), Beatty and Liao (2011), and Cornett et al. (2011), among others. I next partition the full sample period into recessions (2001Q2-2001Q4 and 2008Q1-2009Q2) and expansions (the remaining quarters

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[4] The measure used by Nissim and Penman (2007) and Khan (2010), however, includes both assets and liabilities that are recognized on the balance sheet at fair value or disclosed in the footnote at fair value. Since fair values recognized on the balance sheet affect bank examiners' assessments of a bank's capital adequacy (Office of the Comptroller of the Currency, 1994) and hence are more likely to affect a bank's lending behavior compared to fair values disclosed in the footnote, the fair value accounting exposure measure used here only includes assets that are recognized at fair value on the balance sheet.

during 1995-2010) in order to get time-series variation in macroeconomic conditions.[5] My primary analysis examines differential lending behavior across banks with high versus low fair value accounting exposure during expansionary and recessionary periods. If fair value accounting has pro-cyclical effects, I should find that banks with high fair value accounting exposure increase lending more rapidly during expansions and curtail lending more substantially during recessions than banks with low fair value accounting exposure.

I begin my empirical analysis by investigating my primary research question – whether banks' fair value exposure impacts the pro-cyclicality of their lending. Contrary to conventional wisdom, I find that banks with greater fair value accounting exposure do not increase lending more rapidly in expansions, nor do they curtail lending more substantially in recessions relative to banks with less fair value accounting exposure. These results are robust to controlling for time fixed effects and factors shown in the literature to affect bank lending. Thus, fair value accounting does not appear to have exacerbated the pro-cyclicality of bank lending over the past two business cycles.

The above result begs the question: what caused this counterintuitive no-exacerbation finding? For fair value accounting to exacerbate the pro-cyclicality of bank lending, two necessary conditions must be met. First, increases (decreases) in fair values, i.e., unrealized gains (losses), through their impact on the strength of banks' balance sheets, must induce banks to increase (reduce) lending.[6,7] Second, fair values of bank assets must move in a pro-cyclical

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[5] The partition into expansions and recessions is based on National Bureau of Economic Research (NBER) business cycle dates.

[6] With the five exceptions noted in footnote 7, most unrealized gains (losses) from securities are included in "Accumulated Other Comprehensive Income" as part of "Shareholders' Equity" on the balance sheet, and are excluded from earnings and regulatory capital. According to the rules set by Office of the Comptroller of the Currency (1994), "examiners will consider both unrealized gains and losses in their evaluation of the adequacy of a bank's regulatory capital. When unrealized losses could threaten a bank's financial condition, other regulatory actions that are based on regulatory capital may be initiated".

manner on average, increasing during economic expansions and decreasing during recessions. In other words, banks must experience unrealized gains in economic upturns and unrealized losses in downturns. Violations of either of these necessary conditions would imply that fair value accounting is unlikely to increase the pro-cyclicality of bank lending. Thus, to understand why fair value accounting does not increase lending pro-cyclicality, I examine which of these two necessary conditions are violated.

I first investigate whether the first necessary condition is violated, i.e., whether unrealized gains and losses recognized on the balance sheet do *not* affect banks' subsequent lending behavior. Because the objective of this analysis is simply to examine whether a link exists between unrealized gains/losses and subsequent lending behavior without considering whether such a relationship is pro-cyclical, I perform these tests on a pooled cross-sectional and time-series basis over the full sample period. Given that bank regulators consider unrealized gains (losses) recognized on the balance sheet in assessing banks' capital adequacy (Office of the Comptroller of the Currency, 1994), I hypothesize that unrealized gains (losses) affect subsequent bank lending. Consistent with this hypothesis, I find that unrealized gains (losses) recognized on the balance sheet during the past one to four quarter(s) increase (decrease) banks'

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[7] The five exceptions in which unrealized gains (losses) are included in earnings and regulatory capital are: (1) Unrealized gains (losses) from trading assets are included in earnings and regulatory capital; trading assets, however, represents a very small fraction of a typical bank holding company' assets. (2) Unrealized *losses* from *equity* securities are included in Tier 1 regulatory capital; equity securities, however, constitute a very small fraction of a typical bank holding company's investment securities. (3) Up to 45% of pretax unrealized gains from available-for-sale *equity* securities can be included in Tier 2 regulatory capital. See http://www.gpo.gov/fdsys/pkg/FR-1998-09-01/html/98-23379.htm. (4) Unrealized losses from available-for-sale and held-to-maturity securities that are deemed "other than temporary" (referred to as "other-than-temporary impairment" or "OTTI"). The part of OTTI representing credit losses must be included in earnings and regulatory capital, and the rest of OTTI are included in Other Comprehensive Income and excluded from regulatory capital. OTTI mostly occurred during the recent financial crisis and recession. However, these OTTI could have also been recognized even under historical cost accounting with impairment and writedowns. (5) For fiscal years ending after November 15, 2007, unrealized gains (losses) of assets elected to use fair value accounting under FAS 159 are included in earnings and regulatory capital (the exception being that changes in fair values of liabilities caused by deterioration of the banks' own creditworthiness go into earnings, but not into tier 1 capital.) I find that the extent to which my sample bank holding companies use this "fair value option" is limited.

lending activities in the current quarter during 1995-2010 – a period in which fair value accounting rules are in effect. In particular, every one dollar of unrealized gains (losses) recognized over the past one to four quarter(s) is associated with at least 25 cents of increase (decrease) in lending during the current quarter. In contrast, holding gains (losses) that occurred over the past one to four quarter(s) have very small or no impact on the current quarter's lending during 1988-1991 – a period in which fair value accounting rules are not in effect.[8,9] These comparative analyses suggest that it is not changes in fair values *per se*, but rather the use of fair value accounting to recognize those changes on the balance sheet that affects subsequent lending. These findings are robust to the inclusion of time fixed effects and factors shown by prior literature to affect lending, suggesting that the results are less likely to be driven by correlated omitted variables. Thus, the first necessary condition for fair value accounting to exacerbate lending pro-cyclicality does not appear to be violated.

I next examine whether the second necessary condition (for fair value accounting to exacerbate lending pro-cyclicality) is violated, i.e., whether the fair values of bank assets are not pro-cyclical. Contrary to conventional wisdom, I find that the fair values of bank assets are *not* pro-cyclical at either the industry level or the firm level. At the industry level, I find that the banking industry incurs unrealized losses during almost half of the expansionary quarters, and these losses offset 68% of the unrealized gains that the industry experiences during the remaining

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[8] During the fair-value-accounting periods, unrealized gains (losses) in my empirical analyses refer to unrealized gains (losses) from available-for-sale securities that are included in "Accumulated Other Comprehensive Income (AOCI)" as part of "Shareholders' Equity" on the Balance Sheet. The reason I exclude unrealized gains (losses) from trading assets is that the data are not available; such exclusion, however, has very small impact on my analysis because trading assets represent a very small fraction of total assets of my sample bank holding companies. During pre-fair-value-accounting periods, unrealized gains (losses) refer to holding gains (losses) from investment securities; these unrealized gains (losses) are not recognized on the balance sheet during the pre-fair-value-accounting periods.

[9] My empirical analyses focus on fair values of asset side instead of liability side of the balance sheet. The reason is that only a small fraction of liabilities are fair valued (Prior to 2008, only trading liabilities and derivative liabilities are fair valued, and trading and derivative liabilities constitute a very small portion of banks' total liabilities; although banks can elect to fair value their liabilities for fiscal years ending after November 15, 2007, I find that the extent to which my sample bank holding companies use this "fair value option" on their liabilities is limited.)

expansionary quarters. Equally surprisingly, the industry reaps unrealized gains during one-third of the recessionary quarters, and these gains almost completely offset the entire unrealized losses that the industry incurs during the remaining recessionary quarters. At the firm level, I find that banks with greater fair value accounting exposure actually incur slightly greater unrealized *losses* during expansion periods relative to banks with less fair value accounting exposure; however, I do not observe a similar relationship with respect to unrealized gains or losses in recessions. Taken together, this evidence suggests that the fair values of banks assets are not pro-cyclical at either the industry or the firm level. Thus, the second necessary condition appears to be violated, which helps explain why fair value accounting does not exacerbate the pro-cyclicality of bank lending.[10]

Given the above finding, in my final analysis I investigate why the fair values of bank assets are not pro-cyclical. I find that the answer probably resides in the pattern of interest rate movements, as banks primarily hold fixed-income instruments whose fair values are inversely related to interest rates. Studying how the three components of interest rates – namely, risk-free rate, term spread, and default spread – move over the business cycle, I find that the risk-free rate rises (the risk-free rate and the default spread fall) during some of the expansionary (recessionary) periods, which result in unrealized losses (gains) during those periods and therefore, make the fair values of bank assets not pro-cyclical.

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[10] My prior analyses suggests that the relationship between unrealized gains/losses and bank lending is a lagged relationship, i.e., unrealized gains/losses recognized during the past one to four quarters affects bank lending in the current quarter. Accordingly, I perform a sensitivity test to examine whether the lagged fair values of bank assets are pro-cyclical. I find that the lagged fair values of bank assets are *not* pro-cyclical, either.

Overall, the evidence in this paper suggests that fair value accounting does not exacerbate the pro-cyclicality of bank lending behavior.[11] This result holds despite the fact that changes in fair values (i.e., unrealized gains/losses) have a significant impact on subsequent lending behavior. The evidence further suggests that this non-exacerbation finding is probably due to the fact that fair values of bank assets do not move in a pro-cyclical manner – interest rates rise (fall) during some of the expansionary (recessionary) periods, resulting in movements of the fair values of bank assets that are not pro-cyclical.

My paper makes the following contributions. First, my study adds to the fair value accounting and banking literature by providing empirical evidence on the relationship between fair value accounting and banks' lending behavior. Despite deep concerns among financial regulators and policymakers that fair value accounting may have a pro-cyclical impact on bank lending and, therefore, increase financial instability, little empirical evidence has been presented to support such concerns. To my knowledge, this is the first archival study to examine whether fair value accounting exacerbates the pro-cyclicality of bank lending. In so doing, this paper helps inform the policy debate on fair value accounting and its impact on the financial system.

Second, my paper provides empirical evidence that sheds light on whether fair value accounting contributed to the recent financial crisis. As I find that the banking sector incurs unrealized losses almost as much as it experiences unrealized gains during expansions, fair value accounting is less likely to have contributed to banks' excessive leverage and risk-taking during

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[11] Importantly, the finding that fair value accounting does not exacerbate the pro-cyclicality of lending would probably still hold even if we had used *full* fair value accounting during the past two business cycles, since fair values of banks' entire balance sheets would still likely not be pro-cyclical under *full* fair value accounting as bank assets are largely fixed-income instruments whose fair values are very sensitive to interest rate changes.

the recent booms, which contradicts critics' claims.[12] Likewise, I find that the unrealized gains reaped by the banking industry during some of the recessionary quarters almost completely offset the unrealized losses incurred during the remaining recessionary quarters. This result suggests that fair value accounting is less likely to have contributed to the substantial contraction in credit supply during the financial crisis, again contradicting critics' allegations. Rather, my results are consistent with recent papers that suggest that fair value accounting did not contribute to the recent financial crisis (e.g., SEC, 2008; Ryan, 2008; Ball, 2008; Laux and Leuz, 2010; Barth and Landsman, 2010; Shaffer, 2010; Badertrcher, Burks, and Easton, forthcoming).

Finally, this paper should be of interest to accounting standard setters and policymakers in deciding whether to require firms to carry other financial instruments, such as bank loans, at fair value on their balance sheets. On one hand, the finding that fair value accounting has not exacerbated the pro-cyclicality in bank lending over the past two business cycles should ease concerns about the potential pro-cyclical effects of fair value accounting on banks. On the other hand, the finding that unrealized gains (losses) do have a significant impact on bank lending suggests that a wider application of fair value accounting to other bank assets such as bank loans must be taken cautiously.[13]

2. **Related Literature and Motivation**

My primary interest is whether fair value accounting exacerbates the pro-cyclicality of bank lending behavior over the business cycle. While financial regulators and policymakers are

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[12] Adrian and Shin (2010, 2011) show that *investment* banks actively expand (contract) their balance sheets during economic upturns (downturns), resulting in high (low) leverage during upturns (downturns).

[13] FASB (2010) proposed to require fair value of bank loans, but backed off due to strong opposition from banks and American Bankers Association (see Moore, 2011).

deeply concerned that fair value accounting may introduce unintended pro-cyclicality in bank balance sheets and, thereby, exacerbate the pro-cyclicality in bank lending over the business cycle (European Central Bank, 2004; Banque de France, 2008), to my knowledge, no direct archival research addresses this question. However, several related strands of literature provide background and motivation for my study.

One related stream of research is the theoretical work on the impact of mark-to-market accounting in bad times.[14] Allen and Carletti (2008) model the contagion effect of mark-to-market accounting during financial crises. They find that the interaction between liquidity pricing and mark-to-market accounting can depress asset prices below fundamental values, causing contagion from the insurance sector to the banking sector. Plantin, Sapra, and Shin (2008) model the feedback effect of mark-to-market accounting in bad times. They show that as liquidity dries up, mark-to-market leads to pro-cyclical trades that inject excessive, endogenous volatility into prices, which induces suboptimal real decisions, especially for illiquid, long-lived, and senior claims.[15] However, neither of these analytical works addresses whether and how fair value accounting affects banks' lending behavior.

A second related literature is the burgeoning empirical work and discussion papers on whether fair value accounting contributed to the recent financial crisis.[16] Overall, the evidence is mixed. On one hand, multiple studies come to similar conclusions that fair value accounting

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[14] Mark-to-market accounting can be viewed as the pure form of fair value accounting, as it uses market prices to determine fair value.

[15] Building on premises quite different from those of Plantin, Sapra, and Shin (2008), the model in O'Hara (1993) predicts that in the presence of information asymmetry, mark-to-market accounting induces banks to prefer issuing short-term loans over long-term loans.

[16] Another stream of literature focuses on relevance of fair values for equity investors (and creditors); for example, Hann, Heflin, and Subramanyam (2007) examine value relevance and credit relevance of fair value pension accounting. For an overview of early literature on value relevance of fair values, see Wahlen et al. (2000). Other strands of the recent literature centers on reliability of fair value estimates (e.g., Kolev 2009), risk information of fair values (e.g., Riedl and Serafeim, 2011; Blankespoor, Linsmeier, Petroni, and Shakespeare, 2011), and information content of unrealized cash flow hedge gains/losses (Campbell, 2011).

played little or no role in the financial crisis (SEC, 2008; Ryan, 2008; Ball, 2008; Laux and Leuz, 2010; Barth and Landsman, 2010; Shaffer, 2010; Badertrcher, Burks, and Easton, forthcoming).[17] On the other hand, Khan (2010) finds that fair value accounting increases contagion effects among banks, especially during periods of market illiquidity; additionally, Bhat, Frankel, and Martin (2011) find evidence of a feedback effect between trading and prices of mortgage-backed securities during the recent financial crisis. Given the mixed evidence and the importance of this issue, Laux and Leuz (2009) call for more research to resolve the debate on fair value accounting. As loan growth is an important driver of the riskiness of banks (Foos, Norden, and Weber, 2010), and the seeds of the financial crisis could have been sown during the boom years preceding the financial crisis, my paper helps shed light on the fair value accounting debate by examining whether fair value accounting induced banks to increase lending more rapidly (and thus take more risk) during the boom years preceding the crisis.

Additionally, closely related to this paper are two simulation studies by International Monetary Fund (2009) and European Central Bank (2004), which investigate whether full fair value accounting (under which all assets are carried at fair value on the balance sheet) has a pro-cyclical effect on banks' equity capital over hypothetical business cycles. Both of these simulation studies conclude that fair value accounting can indeed have a pro-cyclical impact on lending. However, it is unclear whether these simulation results are generalizable to the real world given the limitations associated with modeling hypothetical business cycles. To overcome the limitations of these simulation exercises, my paper uses real-world empirical data to investigate whether fair value accounting actually induces banks to increase lending more rapidly during economic expansions and forces banks to curtail lending more substantially during

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[17] For analyses of broad issues that have contributed to the financial crisis, see Acharya and Richardson (2009), Diamond and Rajan (2009), and Rajan (2010).

recessions. To my knowledge, this is the first study to provide large-sample archival evidence on whether fair value accounting exacerbates the pro-cyclicality of bank lending over the business cycle.

Finally, an interesting study by Beatty and Liao (2011) examines whether the current loan loss provisioning rules magnify the pro-cyclicality of bank lending. They find that banks that delay less in recognizing expected loan losses experience smaller reduction in lending during the most recent recession. My paper is related to Beatty and Liao (2011) in that both papers study whether accounting rules increase the pro-cyclicality of bank lending; my focus is very different from theirs, however, as they focus on delays in loan loss provisioning.

To summarize, although there are related studies, none addresses whether fair value accounting exacerbates the pro-cyclicality of bank lending. Given the importance of this issue, my paper contributes to both the literature and the policy debates on fair value accounting.

3. Hypothesis Development

As discussed above, for fair value accounting to have a pro-cyclical effect on bank lending, two necessary conditions must be met: (1) changes in the fair values of bank assets affect lending; (2) the fair values of bank assets are pro-cyclical. Whether fair value accounting increases lending pro-cyclicality crucially hinges on whether both of these necessary conditions are met. Below I discuss each of these necessary conditions, as well as the implications for whether fair value accounting increases the pro-cyclicality of bank lending.

3.1. Hypothesis on Necessary condition 1: Whether Unrealized Gains (Losses) Affect Lending

Unrealized gains (losses) can affect banks' lending behavior by impacting their regulatory costs.[18] Regulatory costs are costs arising from regulatory intervention as banks' capital ratios fall toward or below the statutory minimum; the extreme form of such intervention is seizure of the bank by the Federal Deposit Insurance Corporation (FDIC).

With a few exceptions noted in footnote 7, most unrealized gains (losses) are excluded from both earnings and regulatory capital (Office of the Comptroller of the Currency, 1994).[19] As a result, these unrealized gains may not turn into "surplus capital" that banks can deploy to make more loans, and unrealized losses may not lead to "capital shortfalls" that force banks to curtail lending. For this reason, it is often implicitly assumed that these unrealized gains and losses have little impact on bank behavior, an assumption that has never been empirically tested. That said, although fluctuations in the fair values of securities are mostly excluded from regulatory capital, "examiners will consider both unrealized gains and losses in their evaluation of the adequacy of a bank's regulatory capital. When unrealized losses could threaten a bank's financial condition, other regulatory actions that are based on regulatory capital may be initiated"(Office of the Comptroller of the Currency, 1994).

Since unrealized gains (losses) affect bank examiners' overall assessment of a bank's capital adequacy and, in turn, affect the likelihood that banks face regulatory intervention, they likely impact bank managers' lending decisions. In particular, as unrealized gains recognized on

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[18] I focus on regulatory costs instead of contracting costs for the following reason: unrealized gains and losses recognized on the balance sheet mostly come from available-for-sale securities; these unrealized gains and losses from available-for-sale securities are excluded from earnings and, thus, are less likely to affect contractual constraints tied to earnings, such as managerial compensation contracts and debt contracts. Thus, unrealized gains and losses are less likely to affect banks' contracting costs. Note that (1) unrealized gains and losses of assets elected to use the fair value option afforded by FAS 159 since November 15, 2007 are included in earnings; however, I find that the extent to which banks use the fair value option during 2008-2010 is limited, and (2) under FAS 159, banks can elect to use the fair value option on securities that were originally classified as available-for-sale securities under FAS 115. Consequently, they must reclassify these available-for-sale securities as trading assets.

the balance sheet are viewed favorably by bank examiners, these gains put the bank in a better capital position than its regulatory capital ratios suggest, reduce the probability of regulatory intervention and, thereby, allow bank managers to take on more risk by issuing more loans. Conversely, since unrealized losses are viewed negatively by bank examiners, these losses put the bank in a worse capital position than its regulatory capital ratios suggest, increase the probability of regulatory intervention and, thereby, force bank managers to reduce risk exposures by curtailing lending.[20] This motivates the following hypothesis:

Hypothesis 1: Unrealized gains are associated with an increase in subsequent lending, whereas unrealized losses are associated with a cutback in subsequent lending.

To my knowledge, no empirical papers have investigated whether and how unrealized gains (losses) excluded from earnings and regulatory capital affect bank managers' behavior.

3.2 Hypothesis on Necessary condition 2: Whether the Fair Values of Bank Asses are Pro-cyclical

It is often assumed that fair values of bank assets move in a pro-cyclical manner: in good times, most asset classes appreciate in value, resulting in fair value gains; in bad times, most asset classes decline in value, resulting in fair value losses. This relationship may not hold for banks, however. A unique aspect of banks is that banks' assets consist largely of fixed-income instruments such as debt securities and loans whose fair values are very sensitive to interest rate changes. In fact, interest-rate risk is by far the greatest risk faced by debt securities investors

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[20] Extending more credit is considered risk-taking for two reasons. First, from a regulatory standpoint, making loans is riskier than the alternative of investing in highly-rated securities such as highly-rated agency-sponsored mortgage-backed securities, as banks need to hold much more capital against loans than against investments in highly-rated agency-sponsored mortgage-backed securities. Second, loan growth has been shown to be an important driver of bank risk (Foos, Norden, and Weber, 2010).

(Fabozzi, 2005). Importantly, the fair value of debt securities moves in the opposite direction of changes in interest rates. To illustrate, the fair value of debt securities (as well as other fixed-income instruments such as bank loans and medium-term notes) can be calculated as follows:[21]

$$Fair\ Value = \sum_{t=1}^{n} \frac{Expected\ Cash\ Flow_t}{(1 + rf_t + Term\ Spread_t + Default\ Spread_t)^t}$$

where $rf_t + Term\ Spread_t + Default\ Spread_t$ is the time-varying interest rate required by investors to hold the debt securities,[22] and n is the contractual maturity of the debt securities. This equation illustrates that, as interest rates increase (decrease), the fair value of the debt securities decreases (increases).[23]

Since interest-rate risk is by far the greatest risk faced by debt securities investors (Fabozzi, 2005), the question of whether fair values of debt securities are pro-cyclical crucially depends on the behavior of these three components of interest rates over the business cycle. In recessions, both term spread and default spread tend to increase (Fama and French, 1989; Chen, 2010), but the risk-fee rate rf often decreases as monetary policy is shifted to boost the weak economy. Thus, the sum of the three (i.e., interest rates) may actually decrease, causing an increase in the fair values of debt securities.[24] In addition, default spread may decrease during the late phases of recessions, as seen in the recent recession, which ultimately works to push interest rates down and fair values up. Conversely, during some expansionary periods, although both term spread and default spread tend to decrease (Fama and French, 1989; Chen, 2010), rf may

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[21] The expected cash flow takes into account factors such as probability of default and early prepayment of principal, factors that are very important in valuing mortgage-backed securities (Schwartz and Torous, 1989; Stanton, 1995).
[22] The interest rate required by investors is also referred to as required yield. The relationship between required yield and fair value of debt securities is convex (Fabozzi, 2005).
[23] In theory, only unexpected changes in interest rates will affect banks' net worth.
[24] The impact of a decreasing interest rate on the fair value of mortgage-backed securities is not as straightforward. Decreasing interest rates lead to an increase in prepayment risk because mortgage borrowers may be induced to pay off the loan earlier in order to refinance, which would have a negative impact on fair value of the mortgage-backed securities.

increase as monetary policy changes (for example, during 2004Q1-2007Q1); therefore, the sum of the three may actually increase, causing fair values of debt securities to fall. In sum, interest rates may increase (decrease) during some expansionary (recessionary) periods, resulting in a decrease (increase) in fair values of debt securities in those periods. Therefore, fair values of debt securities may not move pro-cyclically with the aggregate economic activity. The same analysis applies to fair values of loans as loans are also fixed-income instruments.[25] Therefore, theoretically, there is no guarantee that fair values of bank assets move pro-cyclically with the aggregate economic activity.

Ample anecdotal evidence exists that changes in interest rates have a large impact on the fair values of debt securities held by banks. As the Federal Reserve continuously raised interest rates during 2005, the commercial banking sector incurred unrealized losses of -$13.4 billion, and many banks explicitly attributed these losses to the increase in interest rates. For instance, Wachovia, which posted more than -$1.4 billion of unrealized losses on its debt securities that year, stated in its 10-K that "the gross unrealized losses at December 31, 2005 and 2004, were primarily caused by interest rate changes." Likewise, International Bancshares Corporation, which experienced -$69 million of unrealized losses on its mortgage-backed securities in 2005, stated in its annual report that "the unrealized losses on investments in mortgage-backed securities [were] caused by changes in market interest rates. … The decrease in fair value [was] due to market interest rates and *not other factors*."

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[25] Ideally, banks can use derivatives to hedge interest rate risks so that changes in interest rate will not affect their financial conditions. However, more than 80% of insured commercial banks in the U.S. do not use derivatives to hedge interest rate risk or credit risks, according to the bank regulator the Office of the Comptroller of the Currency (1994-2011). This is consistent with findings in Minton, Stulz, and Williamson (2009) that banks make very limited use of credit derivatives to hedge credit risk associated with loans.

Given the above discussion, whether the fair values of bank assets are pro-cyclical is an empirical question.

3.3 Hypothesis Development: Whether Fair Value Accounting Exacerbates the Pro-cyclicality of Lending

Bank lending is intrinsically pro-cyclical (Fisher, 1933; Kiyotaki and Moore, 1997; Asea and Blomberg, 1998; Lown and Morgan, 2006; also see Figure 2). The central research question of interest in this study is whether fair value accounting exacerbates this pro-cyclicality. As discussed above, for fair value accounting to increase the pro-cyclicality of lending, two necessary conditions must be met. I have hypothesized that changes in fair values are likely to affect subsequent lending *ex ante* (Hypothesis 1); however, it is not clear *ex ante* whether the fair values of bank assets are pro-cyclical. Thus, whether fair value accounting exacerbates the pro-cyclicality of actual lending is an empirical question that only data can answer. I move to this empirical analysis next.

4. Does Fair Value Accounting Exacerbate the Pro-cyclicality of Lending?

4.1 Research Design: Whether Fair Value Accounting Exacerbates the Pro-cyclicality of Lending

In this section I examine the central question of this paper: whether fair value accounting exacerbates the pro-cyclicality of bank lending. To answer this research question, I exploit the cross-sectional variation in individual banks' exposure to fair value accounting, and examine whether banks with greater fair value accounting exposure exhibit more pro-cyclical lending

behavior relative to banks with less fair value accounting exposure over the business cycle.[26] My measure of individual banks' exposure to fair value accounting is the fraction of total assets carried at fair value on the balance sheet (i.e., fair-valued assets divided by total assets). Variants of this measure have been used to measure banks' exposure to fair value accounting (e.g., Nissim and Penman, 2007; SEC, 2008; Khan, 2010). The measure used by Nissim and Penman (2007) and Khan (2010), however, includes assets and liabilities recognized on the balance sheet or disclosed in the footnote at fair value. Since fair values recognized on the balance sheet affect bank examiners' assessment of banks' capital adequacy (Office of the Comptroller of the Currency, 1994) and hence likely affect banks' risk taking, while fair values disclosed in the footnote are less likely to have a similar effect, my fair value accounting exposure measure only includes assets recognized at fair value on the balance sheet and excludes those disclosed at fair value in the footnote (which mainly comprise held-to-maturity securities and loans).

I define expansionary and recessionary periods based on National Bureau of Economic Research (NBER) business cycle dates, a widely used business cycle indicator. There are two recessions during my sample period (1995-2010), March 2001-November 2001 and December 2007-June 2009, which gives me two recessionary periods, 2001Q2-2001Q4 and 2008Q1-2009Q2.[27] Quarters other than these recession quarters are classified as expansion quarters. My

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[26] Ideally one would use a difference-in-difference design that exploits both time-series and cross-sectional variation in individual banks' exposure to fair value accounting. However, difference-in-difference design is not suitable for this study because important confounding events happened during my long sample period of 1995-2010. In particular, Basal II risk-based capital requirements started to be fully implemented in 1993Q3, which happened around the same time as the introduction of fair value recognition rule SFAS115 in late 1993. Many policymakers and researchers suspect that the Basal II risk-based capital requirements may have had pro-cyclicality impact on bank lending. It is therefore difficult to attribute the over-time increase in bank lending pro-cyclicality, if there is any, to the introduction of fair value accounting. Accordingly, I focus on examining whether the *cross-sectional* difference in banks' fair value accounting exposure is associated with *cross-sectional* variation in the pro-cyclicality of their lending behavior.

[27] I define a quarter as a recessionary quarter when at least two months during the quarter are in a recession.

measure of lending behavior is quarterly growth in total outstanding loans.[28] Variants of this measure are frequently used in the literature to capture banks' lending behavior (e.g., Beatty and Liao, 2011; Berger and Udell, 2004; Cornett et al., 2011). The main regression models are panel regressions that controls for quarter fixed effects. Quarter fixed effects control for time-specific factors that affect lending but are invariant across banks, making it unnecessary to control for time-varying macroeconomic factors that affect bank lending, such as unemployment rates and risk-free interest rate. All standard errors are clustered at the firm level. Except for the dummy variable, all other variables are winsorized at the top and bottom 99% within each quarter. The model is given as follows:

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\begin{aligned}
\Delta Loan_{i,t} = \alpha_0 &+ \alpha_1 FVA_{i,t-1} + \alpha_2 FVA_{i,t-1} * \mathrm{Re}\,cession_t + \alpha_2 \,\mathrm{Re}\,cession_t + \\
&\sum \alpha_k Control\,Variable_{i,t-1}^k + Quarter\,Fixed\,Effects_t + \varepsilon_{i,t}
\end{aligned}
\tag{1}
$$

where i stands for bank, and t for quarter. $\Delta Loan_{i,t}$ is quarterly loan growth measured as $(Loan_{i,t} - Loan_{i,t-1})/Assets_{i,t-1}$, where $Loan_{i,t}$ is total loans and leases outstanding at the end of quarter t, $Loan_{it-1}$ is total loans and leases outstanding at the beginning of quarter t, and $Assets_{i,t-1}$ is total assets at historical costs. $FVA_{i,t-1}$ is bank i's exposure to fair value accounting at the beginning of quarter t, measured as *Fair-valued assets/Assets$_{i,t-1}$*. Fair-valued assets are assets carried at fair value on the balance sheet, measured as the sum of fair value of trading assets and fair value of available-for-sale securities during 1995-2007, and the sum of fair value of trading assets, fair value of available-for-sale securities, and fair value of other assets elected to use fair

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[28] Outstanding loans are the equilibrium outcome of supply of loans and demand for loans. However, the focus of my paper is on examining whether changes in fair values of bank assets affect banks' ability to *supply* credit. Thus, I need to control for the *demand* effect. My solution is to control for the time fixed effects and, thus, hold constant across banks the creditworthiness of borrowers and their demand for loans, which allows me to focus on how the cross-sectional variation in fair value accounting exposure affects banks' ability to supply credit.

value accounting under FAS 159 during 2008-2010.[29] *Recession$_t$* is a business cycle indicator based on NBER business cycle dates; it takes the value of 1 for recession quarters 2001Q2-2001Q4 and 2008Q1-2009Q2, and 0 for expansion quarters (remaining quarters over the 1995-2010 period). Significantly positive α_1 and significantly negative $\alpha_1 + \alpha_2$ would suggest that fair value accounting exacerbates lending pro-cyclicality, whereas insignificant α_1 and $\alpha_1 + \alpha_2$ would suggest that fair value accounting does not increase lending pro-cyclicality.

The panel regression above controls for the following factors shown by the literature to affect bank lending behavior:

- Strategies and liquidity of banks: Banks that hold 30% of assets in securities likely have different strategies than banks that hold only 5% of assets in securities. First, the former are more heavily involved in securities businesses while the latter focus more on originating loans, which could result in different lending behavior. Second, the former have more liquid balance sheets than the latter, and the liquidity of a bank's balance sheet has been shown to affect credit supply by affecting the bank's liquidity risk management (Kashyap and Stein, 2000; Van den Heuvel, 2011; Cornett et al., 2011). To control for differences in strategies and liquidity positions across banks with different asset structures, I include as control variable the fraction of total assets in investment securities – *Historical Costs of Securities/Assets$_{i,t-1}$*, which is measured as the historical costs of securities divided by total assets at historical costs.

- Quality of existing loan portfolios: Poor quality of existing loan portfolios predicts high future credit losses, which erodes banks' capital positions and directly diminishes banks'

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[29] Under SFAS 159, banks can elect to measure essentially any financial assets and liabilities at fair value in their financial statements for fiscal years beginning after November 15, 2007. This is the so-called "fair value option". The option is available at the inception of a financial instrument on an instrument-by-instrument basis and is irrevocable. Unrealized gains (losses) for the assets and liabilities elected to use the fair value option are included in earnings.

lending capacity (Kwan, 2010). Accordingly, I control for the ratio of non-performing loans to total loans. Non-performing loans are loans 90 days or more past due plus loans no longer accruing interest.

- Profitability: Profitability affects banks' capital and in turn their abilities to support and fund new lending (Berger and Udell, 2004). Banks typically engage in two kinds of activities: investing in securities and originating loans. Prior to 2008, unrealized gains (losses) arise exclusively from securities business.[30] To mitigate concerns that the observed impact of fair value accounting exposure on lending may be driven by realized gains on securities, I separately control for profitability of banks' securities businesses, *Securities ROE$_{i,t-1}$*, measured as realized gains (losses) on available-for-sale and held-to-maturity securities during the prior quarter scaled by average total equity capital. I also control for the profitability of loan businesses, *Non-securities ROE$_{i,t-1}$*, measured as total return on equity (ROE) minus *Securities ROE$_{i,t-1}$*.

- Reliance on core deposits as a stable source of financing: Banks that rely more on core deposits as opposed to short-term financing may exhibit different lending behavior than banks that rely less on core deposits (Ivashina and Scharfstein, 2010; Cornett et al., 2011).[31] Accordingly, I control for banks' reliance on core deposits using *Core Deposits/Assets$_{i,t-1}$*, which is measured as core deposits scaled by total assets at historical cost. I also control for *Recesssion$_t$ * Core Deposits/Assets$_{i,t-1}$*, which is the interaction between the core deposit ratio and the recession dummy. The interaction term captures the differential impact of core deposits on lending in recessions relative to expansions, as prior research shows that banks that rely more on core deposits as a stable source of

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[30] For fiscal years starting after November 15, 2007, unrealized gains (losses) also come from other assets such as loans elected to use fair value accounting under SFAS 159.
[31] Core deposits are deposits under $100,000 plus all transactions deposits.

funding cut lending less during the recent financial crisis relative to other banks (Ivashina and Scharfstein, 2011; Cornett et al., 2011).

- Leverage: Due to regulation, leverage directly affects banks' abilities to originate new loans (Berger and Udell, 2004). Leverage also signals the amount of risk that the bank has undertaken and, thereby, directly affects how much additional risk the bank can take in making new loans. Accordingly, I control for $Leverage_{i,t-1}$, which is measured as total assets divided by total equity capital.[32]

- Firm size: as firm size affects lending behavior (see, for e.g., Berger et al. 2005), I control for firm size using the natural log of total assets.

I also conduct subsample analysis based on size and leverage partitions. Large banks differ from small banks in many ways. For example, lending practices of large banks differ from those of small banks (Berger et al., 2005); large banks are more likely to receive federal assistance during crises than small banks (the so-called "too big to fail" doctrine). [33] Consequently, large banks likely exhibit different lending behavior than small banks. To capture such differences, I partition the sample into small banks (total assets of $1 billion or less) and big banks (total assets of more than $1 billion). Also, high-leverage banks that are closer to violating the minimum capital thresholds are likely to be affected by changes in the fair values of their assets to a greater extent than banks that maintain a sizable buffer in their capital structure. High-leverage banks are thus more likely to be affected by fair value accounting exposure in a pro-cyclical manner relative to low-leverage banks. Accordingly, I also partition the sample into low-

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[32] I do not use regulatory capital ratios and risk-based leverage ratios such as Tier 1 risk-based capital ratio or Tier 1 leverage ratio because data for these measures are not available until 2001.

[33] For analyses of the benefits and costs of the large-scale government bailout of the ten largest U.S. banks during the recent financial crisis, see Veronesi and Zingales (2010).

leverage banks (leverage in the bottom tercile) and high-leverage banks (leverage in the top tercile).

4.2 Sample and Data

The sample consists of all U.S. bank holding companies with total assets of more than $150 million over the 1995-2005 period, and those with total assets of more than $500 million over the 2006-2010 period.[34] Financial data are collected from quarterly FR Y-9C reports, supplemented by Compustat data when necessary.[35] Risk-free interest rate data are from CRSP. Term spread, default spread, and real GDP growth data are from the St. Louis Fed. Data are collected quarterly for the sample period 1995-2010. The sample begins in 1995 for two reasons. First, 1994 is the first year in which fair value accounting affects banks' balance sheets, since SFAS 115 mandates that trading assets and available-for-sale securities be reported at fair value on the balance sheet (with unrealized gains and losses recorded in accumulated other comprehensive income) for fiscal years beginning after December 15, 1993; prior to SFAS 115, fair values of assets are not reported on the balance sheet. Second, the analysis requires that fair value data lead bank loan data by one year, thus the sample begins in 1995. To mitigate potential effects of major mergers and acquisitions, I follow the literature to exclude bank-quarters with total asset growth during the quarter exceeding 10% (see, e.g., Cornett et al., 2011). The final main sample consists of 69,578 bank-quarter observations comprising 2,956 unique banks over the 1995-2010 period.

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[34] According to the Bank Holding Company Act, bank holding companies with total assets exceeding certain asset-size threshold are required to file quarterly FR Y-9C to the Federal Reserve. The filing threshold is $150 million of total assets prior to 2006, and $500 million of total assets from 2006 onward.

[35] The quarterly FR Y-9C report contains a consolidated balance sheet, a consolidated income statement, and detailed supporting schedules, including a schedule of off balance-sheet items. The data are available from Federal Reserve Bank of Chicago website from 1986Q3 onward.

4.3 Descriptive Statistics of Loan Growth and Fair Value Accounting Exposure

Table 1 provides summary statistics of the sample banks' characteristics. Mean quarterly loan growth indicates that new lending in an average quarter is equal to 1.3% of total assets for an average bank. The mean (median) fair value accounting exposure as captured by *FVA* indicates that 19% (17%) of an average (median) bank's total assets are measured at fair value on the balance sheet. With respect to the persistence of banks' fair value accounting exposure, the AR(1), AR(2), AR(3), and AR(4) are 0.97, 0.94, 0.91, and 0.89, respectively, suggesting that individual banks' fair value accounting exposure is very persistent over time.

Table 2 presents Pearson correlations. The correlation between loan growth and fair value accounting exposure is significantly negative. Such negative correlation likely mirrors the significantly negative correlation between loan growth and banks' asset structures (*Historical Costs of Securities/Assets)*. This further suggests that my fair value accounting exposure measure is closely linked to banks' asset structures and, therefore, it is very important to control for banks' asset structures when examining the relationship between loan growth and fair value accounting exposure.

4.4 Results on Whether Fair Value Accounting Exacerbates Pro-cyclicality of Lending

Table 3 reports results on the relationship between fair value accounting exposure and actual lending – specifically, whether banks with greater fair value accounting exposure exhibit more pro-cyclical lending behavior relative to banks with less fair value accounting exposure.

Panel A of Table 3 presents results for the full sample and the size subsamples. For the full sample, the coefficient on $FVA_{i,t-1}$ is 0.002 and insignificant, indicating that fair value accounting exposure has a positive but statistically insignificant impact on lending during

expansions; the sum of the coefficients *on* $FVA_{i,t-1}$ and $FVA_{i,t-1}*Recession_t$ is -0.001 and insignificant, suggesting that fair value accounting exposure has a negative but statistically insignificant impact on lending during recessions. For small banks, fair value accounting exposure has a significantly positive impact on lending during expansions (the coefficient on FVA_{it-1} is 0.003 and statistically significant) but no statistically significant impact on lending during recession (the sum of the coefficients on $FVA_{i,t-1}$ and $FVA_{i,t-1}*Recession_t$ is 0.004 and insignificant). For large banks, fair value accounting exposure has no significant impact on lending during either expansions (the coefficient on $FVA_{i,t}$ is -0.0003 and insignificant) or recessions (the sum of the coefficients on $FVA_{i,t-1}$ and $FVA_{i,t-1}*Recession_t$ is -0.011 and insignificant). The coefficient on the $Recession_t$ dummy is -0.02 and statistically significant, indicating that bank lending is indeed pro-cyclical: banks curtail lending equivalent to 2% of total assets during a recession quarter relative to an expansion quarter.

With respect to the control variables in the full sample, Panel A of Table 3 shows that banks with a greater emphasis on securities businesses grow loans more slowly in expansions, with a coefficient of -0.03 on *Historical Costs of Securities/Assets$_{i,t-1}$*; however, these banks curtail lending by less during recessions, as suggested by the significant coefficient of 0.01 on *Recession$_t$ *Historical Costs of Securities/Assets$_{i,t-1}$*. These results indicate that *Historical Costs of Securities/Assets$_{i,t-1}$* is indeed a reasonable proxy for the liquidity of banks' balance sheets and that more liquid banks continue to lend in recessions relative to less liquid banks (Ivashina and Scharfstein, 2011; Cornett et al., 2011). Banks that rely more on stable financing from core deposits appear to grow their loans more slowly in expansions, as evidenced by the coefficient of -0.01 on *Core Deposit/Assets$_{i,t-1}$*; however, during recessions, these banks curtail lending by less relative to other banks, with a significantly positive coefficient of 0.010 on *Recession$_t$*Core*

Deposit/Assets$_{i,t-1}$.[36] This finding is consistent with the results in Cornett et al. (2011). Not surprisingly, banks with poor loan quality grow their loans more slowly, as evidenced by the significant coefficient of -0.33 on *Nonperformaning Loan/Loan$_{i,t-1}$*. Profitability of non-securities businesses (i.e., loan origination) has a statistically significant and economically large impact on lending, as indicated by the coefficient of 0.05 on *Non_securities ROE$_{i,t-1}$*. In contrast, the profitability of securities businesses (i.e., realized gains and losses on securities scaled by average total equity) has little impact on lending.

Panel B of Table 3 presents results for the low-leverage (leverage in the bottom tercile) and the high-leverage (leverage in the top tercile) subsamples. For both the low- and the high-leverage banks, the coefficient on *FVA$_{i,t-1}$* is positive but insignificant, indicating that fair value accounting exposure does not have significant impact on lending in expansions. Furthermore, the sum of the coefficients on *FVA$_{it-1}$* and *FVA$_{i,t-1}$*Recession$_t$* is insignificant, suggesting that fair value accounting exposure does not have a significant impact on lending in recessions either. In untabulated analyses, I find that the impact of unrealized gains and unrealized losses on lending is symmetric. Put differently, unrealized losses reduce subsequent lending to the same extent that unrealized gains increase subsequent lending.

Overall, Table 3 provides evidence that fair value accounting exposure does *not* amplify the pro-cyclicality of bank lending over the past two business cycles during 1995-2010. In other words, banks with greater fair value accounting exposure do not grow loans more rapidly during economic upturns or curtail lending more substantially during downturns relative to banks with less fair value accounting exposure.

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[36] However, the coefficient on *Recession$_t$*Core Deposit/Assets$_{it-1}$* is insignificant for both the small-bank and the large-bank subsamples.

This counterintuitive finding begs the question: why doesn't fair value accounting increase the pro-cyclicality of bank lending? As previously discussed, two necessary conditions must be met for fair value accounting to increase lending pro-cyclicality: (1) increases (decreases) in fair values, i.e., unrealized gains (losses), through their impact on the strength of banks' balance sheets, induce banks to increase (reduce) lending; (2) fair values of banks' assets move, on average, in a pro-cyclical manner (see Figure 1). Violations of either necessary condition make it unlikely that fair value accounting will exacerbate lending pro-cyclicality. In Sections 5 and 6 below, I investigate whether, in fact, either of these two necessary conditions is violated.

5. Do Unrealized Gains (Losses) Affect Lending?

5.1 Research Design: Whether Unrealized Gains (Losses) Affect Lending

To test whether unrealized gains (losses) recognized on the balance sheet affect bank lending, I examine whether unrealized gains (losses) recognized during the past one to four quarter(s) affect lending in the current quarter. Note that a positive relationship between unrealized gains (losses) and subsequent lending could arise simply because an increase (decrease) in fair values improves (worsens) a bank's financial position and thereby induces more (less) lending, even if fair value accounting is not used to recognize the unrealized gains (losses) on the balance sheets. To rule out this possibility, I also examine the relationship between unrealized gains and losses and subsequent lending in a period before fair value accounting rules came into effect ("pre-fair-value-accounting period"). If the relationship between unrealized gains (losses) and subsequent lending is not significant in the pre-fair-value-accounting period but becomes significant after fair value accounting rules came into effect ("fair-value-accounting period"), then I can conclude that the significant relationship between

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unrealized gains (losses) recognized on the balance sheet and bank lending in the fair-value-accounting period results from the use of fair value accounting.

The panel regression model used in this analysis is given as follows:

$$\Delta Loan_{i,t} = \alpha_0 + \alpha_1 Unrealized\,Gains\,(Losses)\,/\,Assets_{i,t-1} + \alpha_2 Unrealized\,Gains\,(Losses)\,/\,Assets_{i,t-1} * Post_t$$
$$+ \alpha_3 Post_t + \sum \alpha_k Control\,Variable_{i,t-1}^k + Quarter\,Fixed\,Effects_t + \varepsilon_{i,t} \qquad (2)$$

where i stands for bank, and t for quarter. $\Delta Loan_{i,t}$ is quarterly loan growth measured as $(Loan_{i,t} - Loan_{i,t-1})\,/\,Assets_{i,t-1}$. $Unrealized\,Gains\,(Losses)\,/\,Assets_{i,t}$ is unrealized gains (losses) during the past one to four quarter(s) divided by total assets at historical cost, with the definition slightly different for the pre-fair-value-accounting period of 1988-1991 and fair-value-accounting period of 1995-2010. [37] For the fair-value-accounting period, *Unrealized Gains (Losses)* are unrealized gains (losses) recognized on the balance sheets during the past one to four quarter(s) based on fair value accounting rules. For the pre-fair-value-accounting period, *Unrealized Gains (Losses)* are holding gains (losses) for investment securities that occurred during the past one to four quarter(s). *Post* is a dummy variable equal to 0 for the pre-fair-value-accounting period and 1 for the fair-value-accounting period. All control variables are the same as those in Model (1), except that interaction terms with *Recession_t* are not included.

5.2 Descriptive Statistics of Unrealized Gains (Losses)

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[37] I exclude 1992-1993 because this period does not qualify as a pure pre-fair-value-accounting period or a pure fair-value-accounting period. SFAS No. 107, which is effective for fiscal years ending after December 15, 1992, mandates *disclosure* of fair value of financial instruments; thus, banks with fiscal years ending after December 15, 1992 already disclose the fair values of their assets in 1992, so 1992-1993 does not qualify as a pure pre-fair- value-accounting period. Additionally, 1992-1993 does not qualify as a pure fair- value-accounting period as fair values do not affect balance sheet until fiscal years beginning after December 15, 1993. I also exclude 1994 as fair value data are available since 1994 and the analysis requires that fair value data lead bank loan data by one year.

As shown in Table 1, for the fair-value-accounting period, mean unrealized gains (losses) recognized during the past four quarters represent 0.009% of total assets. The 90th percentile (10th percentile) of unrealized gains (losses) recognized during the past four quarters represent 0.335% (-0.315%) of total assets, suggesting that the small mean value of unrealized gains (losses) is partly driven by unrealized gains and losses from banks at the extremes offsetting each other. The mean value of unrealized gains (losses) is also small partly because total assets are used as the deflator. To see this, I also report summary statistics for unrealized gains (losses) in Table 1 using total equity as the deflator; in this case, the mean unrealized gains (losses) recognized during the past four quarters total 0.2% of total equity (after gains and losses offset each other), with the 90th percentile (10th percentile) totaling 4.0% (-3.6%) of total equity. Unrealized gains (losses) recognized during the past one or two quarters and cumulative unrealized gains (losses) have similar summary statistics. Further, the summary statistics for unrealized gains (losses) for the pre-fair-value-accounting period are similar to those for the fair-value-accounting period.

5.3 Results on Whether Unrealized Gains (Losses) Affect Subsequent Bank Lending

Table 4 presents results on whether unrealized gains (losses) impact subsequent lending. To ensure that the observed impact is driven by accounting rather than by economic fundamentals, I compare the pre-fair-value-accounting period (1988-1991) and the fair-value-accounting period (1995-2010). Different columns in Table 4 represent unrealized gains (losses) that occurred at different time horizons as the main independent variable. The results in columns 1 and 2 show that during the pre-fair-value-accounting period, unrealized gains (losses) that occurred during the past four or two quarters, respectively, have a minimal impact on current-quarter lending. In contrast, during the fair-value-accounting period, for every one dollar of

unrealized gains (losses) recognized on the balance sheet during the past four or two quarters, banks increase (reduce) lending by 25 or 32 cents, respectively, in the current quarter. Column 3 shows that every one dollar of unrealized gains (losses) that occurred during the past one quarter is associated with about 8 cents of increase (decrease) in lending in the current quarter during the pre-fair-value-accounting period, whereas the lending impact during the fair-value-accounting period is three times as large at 25 cents. Additionally, column 4 shows that during the pre-fair-value-accounting period, every one dollar of cumulative unrealized gains (losses) is associated with approximately 6 cents of increased (decreased) lending in the current quarter, while the lending impact is insignificant during the fair-value-accounting period. The very small impact of cumulative unrealized gains (losses) on lending makes intuitive sense: some of the cumulative unrealized gains (losses) could have occurred long time ago and, thereby, is less likely to affect banks' lending decisions during the current quarter.

The economic impact of unrealized gains (losses) on lending during the fair-value-accounting period is significant. On average, an increase in unrealized gains (recognized during the past four quarters) from the bottom to the top quartile (decile) of the distribution results in an increase in quarterly lending equivalent to 0.06% (0.16%) of total assets; these effects are economically large considering the average quarterly loan growth for the entire sample is equivalent to 1.3% of total assets. Moreover, approximately 200 sample banks fall into the bottom or top decile of the unrealized gains (losses) distribution; thus, the impact of unrealized gains (losses) on lending exists for a sizable number of banks.

Overall, consistent with Hypothesis 1, I find that unrealized gains (losses) recognized on the balance sheet under fair value accounting during the past one to four quarter(s) induce banks to increase (reduce) lending in the current quarter, whereas the effect is either absent or much

weaker during the pre-fair-value-accounting period. Thus, the first necessary condition for fair value accounting to exacerbate the pro-cyclicality of bank lending does not appear to be violated. This result also suggests that under fair value accounting, changes in fair values do affect banks' lending behavior; therefore, concerns that fair value accounting may exacerbate the pro-cyclicality of bank lending are legitimate.

Thus far, I have shown that the first necessary condition for fair value accounting to exacerbate the pro-cyclicality of bank lending is not violated. Thus, the finding that fair value accounting does not increase the pro-cyclicality of bank lending is not caused by the violation of the first necessary condition. Then is it caused by the second necessary condition (i.e., the fair values of bank assets are pro-cyclical) being violated? Section 6 investigates whether fair values of bank assets are, indeed, pro-cyclical.

6. Are Fair Values Pro-cyclical?

6.1 Research Design: Testing Whether Fair Values are Pro-cyclical

To test whether fair values tend to increase in expansions and decrease in recessions, I examine whether changes in fair values (i.e., unrealized gains (losses)) are pro-cyclical, both at the industry and at the firm level. At the industry level, I test whether the aggregate unrealized gains (losses) for the banking industry are pro-cyclical using the following models:

Industry Sum of Unrealized Gains $(Losses)_t = \alpha_0 + \alpha_1 \text{Re} cession_t + \varepsilon_t$ \hfill $(3A)$

Industry Sum of Unrealized Gains $(Losses)_t = \beta_0 + \beta_1 GDPgrowth_t + \varepsilon_t$ \hfill $(3B)$

Positively significant α_1 and β_1 would indicate that fair values of bank assets are pro-cyclical. Conversely, insignificant α_1 and β_1 would suggest that fair values of bank assets are not pro-cyclical.

It is important to note that since I find in Section 5 that unrealized gains (losses) recognized during the past one to four quarter(s) affect bank lending during the current quarter, I also need to investigate whether the lagged fair values of bank assets are pro-cyclical. Thus as a sensitivity test, I examine whether the lagged aggregate unrealized gains (losses) for the banking industry are pro-cyclical using the following models:

$$Industry\ Sum\ of\ Unrealized\ Gains\ (Losses)_{t-i} = \alpha_0 + \alpha_1\ Re\,cession_t + \varepsilon_t \qquad (3C)$$

$$Industry\ Sum\ of\ Unrealized\ Gains\ (Losses)_{t-i} = \beta_0 + \beta_1 GDPgrowth_t + \varepsilon_t \qquad (3D)$$

where i =1, 2, or 4 in examining whether the industry aggregate unrealized gains (losses) recognized during the past one, two, and four quarters, respectively, are pro-cyclical.

At the firm level, I test whether banks with greater fair value accounting exposure tend to recognize more unrealized gains in expansions and incur more unrealized losses in recessions relative to banks with less fair value accounting exposure.[38] To do so, I use the following model:

$$Unrealized\ Gains\,(Losses)\,/\,Assets_{i,t} = \alpha_0 + \alpha_1 FVA_{i,t-1} + \alpha_2 FVA_{i,t-1} * Re\,cession_t + \alpha_3\ Re\,cession_t$$
$$+ \sum \alpha_k Control\ Variable_{i,t-1}^k + Fixed\ quarter\ effect_t + \varepsilon_{i,t} \qquad (4)$$

where i stands for bank and t for quarter. The dependent variable $Unrealized\ Gains\,(Losses)\,/\,Assets_{i,t}$ is unrealized gains (losses) recognized on the balance sheet during quarter t divided by total assets at historical cost. $FVA_{i,t-1}$ is bank i's exposure to fair value

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[38] Changes in fair value equals unrealized plus realized gains (losses) (Barth 1994). However, because realized gains (losses) do not differ under fair value accounting versus historical cost accounting, unrealized gains (losses) is what sets fair value accounting apart from historical cost accounting. I therefore focus on unrealized gains (losses) instead of the sum of unrealized and realized gains (losses). Nonetheless, the results are very similar when I define changes in fair value as unrealized plus realized gains (losses) following Barth (1994) and Venkatachalam (1996), among others.

accounting at the beginning of quarter *t*, measured as *Fair-valued assets/Assets$_{i,t-1}$. Recession$_t$* is the business cycle indicator based on NBER business cycle dates; it takes the value of 1 for recession quarters 2001Q2-2001Q4 and 2008Q1-2009Q2, and 0 for expansion quarters (remaining periods during 1995-2010). The control variables are *Securities ROE$_{i,t-1}$, Leverage$_{i,t-1}$,* and *Size$_{i,t-1}$,* as defined in Section 3.

6.2 Results on Whether Fair Values are Pro-cyclical: Industry-level Analysis

I first examine whether aggregate unrealized gains (losses) for the banking industry as a whole are pro-cyclical. Figure 3 shows the time series of industry aggregate unrealized gains (losses) recognized during the year.[39] Interestingly, the banking industry incurs unrealized losses in six out of the thirteen expansionary years: -$0.3B, -$1.1B, -$15.5B, -$5.2B, -$1.5B, and -$13.4B in 1996, 1998, 1999, 2003, 2004, and 2005, respectively. In fact, during 24 out of the 54 expansionary quarters, the banking industry incurs unrealized losses totaling -$122B that offsets 68% of the $178B of total unrealized gains that the industry recognizes during the remaining expansionary quarters. Equally surprisingly, during three out of the nine recessionary quarters, the industry reaps unrealized gains of $19B that almost completely offsets the entire -$21B of unrealized losses that the industry incurs during the remaining recessionary quarters. Thus, Figure 3 suggests that the banking industry as a whole does not tend to experience unrealized gains in expansions or incur unrealized losses in recessions; rather, unrealized gains (losses) appear to be equally likely to occur regardless of good times or bad.

Table 5 presents results from a more formal test that regresses industry aggregate unrealized gains (losses) on the recession dummy (in Panel A) and real GDP growth (in Panel B).

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[39] For ease of exposition, here I use annual data instead of quarterly data.

In Panel A, the coefficient on *Recession_t*, which captures the incremental impact of recessions relative to expansions on industry aggregate unrealized gains (losses), is insignificant. Panel B uses a more fine-tuned measure of aggregate economic activity, namely quarterly real GDP growth, as the independent variable, and finds results similar to those in Panel A. Overall, Table 5 indicates that the banking industry as a whole does *not* tend to enjoy fair value gains in economic upturns or suffer fair value losses in downturns.

Additionally, since changes in fair values of bank assets recognized during the past one to four quarter(s) affect current-quarter lending, I also use model (3C) and (3D) to examine whether the lagged fair values of bank assets are pro-cyclical. The untabulated results for this sensitivity test suggest that the lagged fair values of bank assets are not pro-cyclical, either.

It is important to point out that, as the unrealized losses incurred by the banking sector during about almost half of the expansion quarters offset approximately 68% of the unrealized gains recognized during the remaining expansion quarters, fair value accounting is less likely to have contributed to excessive leverage and risk taking during the recent boom, which contradicts critics' allegations. Likewise, as the unrealized gains experienced by the banking industry during about one third of the recession quarters almost completely offset the unrealized losses that incurred during the remaining recession quarters, fair value accounting is less likely to have contributed to excessive write-downs during the recent bust, which again contradicts critics' allegation. [40]

6.3 Results on Whether Fair Values are Pro-cyclical: Firm-level Analysis

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[40] It is important to note that although banks write down billions of dollars of their debt securities as "other-than-temporary impairment" (OTTI) during the recent financial crisis, those OTTI could have also arisen even under historical cost accounting with impairment and writedowns.

Table 6 presents the results of a firm-level analysis on whether changes in fair values are pro-cyclical. The coefficient on $FVA_{i,t-1}$ is -0.0001, suggesting that banks with higher fair value accounting exposure actually recognize more unrealized losses (as opposed to gains) during expansions. The coefficient of -0.0001 on $FVA_{i,t-1}$, however, is too small to have any meaningful impact on lending.[41] The sum of coefficients on $FVA_{i,t-1}$ and $FVA_{i,t-1}*Recession_t$ is -0.0003 and statistically insignificant, indicating that banks with greater fair value accounting exposure do *not* tend to recognize more unrealized losses in recessions.

Overall, the analysis in Table 6 reveals that banks with greater fair value accounting exposure do *not* appear to recognize more unrealized gains during expansions, *nor* do they appear to incur more unrealized losses during recessions. Thus, unrealized gains (losses) do not appear to be pro-cyclical at the firm level, which is consistent with the results from the industry level analysis. These results suggest that the fair values of bank assets are not pro-cyclical at the industry or firm level; hence, the second necessary condition for fair value accounting to exacerbate the pro-cyclicality of bank lending is violated. In the following subsection, I investigate a possible explanation for this phenomenon.

6.4 Why are Fair Values of Bank Assets not Pro-cyclical? The Relationship between Changes in Fair Values and Changes in Interest Rates

Why are fair values of bank assets not pro-cyclical? I posit that the answer resides in changes in interest rates since interest-rate risk is by far the biggest risk that debt security investors face (Fabozzi, 2005). As the valuation model for debt securities in Section 4.1 illustrate, all three components of interest rates (namely, risk-free rate, term spread, and default spread) are

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[41] Consider a bank with 30% of total assets carried at fair value (i.e., $FVA_{i,t-1}$=0.30, which is greater than the 75th percentile of the fair value accounting distribution as shown in Table 1). This bank will recognize -0.0001 x 0.30 = -0.00003 of unrealized losses during quarter *t*, which will translate into a change in lending equal to -0.00003 x 0.26 = -0.000008, or a 0.0008% reduction in lending during quarter *t* – too small to be economically significant.

important determinants of debt securities' fair values.[42] Accordingly, I examine whether changes in the fair values of bank assets for the whole industry (i.e., the industry aggregate unrealized gains (losses)) are associated with changes in interest rates as well as changes in the three components of interest rates using the following regression models:

$$Industry\ Sum\ of\ Unrealized\ Gains\ (Losses)_t = \alpha_0 + \alpha_1 \Delta Interest\ Rates_t + \varepsilon_t \tag{5A}$$

$$\begin{aligned}Industry\ Sum\ of\ Unrealized\ Gains\ (Losses)_t = \beta_0 + \beta_1 \Delta Risk-free\ Rate_t + \beta_2 \Delta Term\ Spread_t \\ + \beta_3 \Delta Default\ Spread_t + \varepsilon_t \end{aligned} \tag{5B}$$

Figure 4 shows the time series of quarterly risk-free rate in relation to industry aggregate unrealized gains and losses recognized during the quarter; this figure illustrates that the risk-free rate tends to rise during the second half of both expansions and fall sharply during both recessions. Figure 5 presents the times series of term spread and default spread; this figure shows that the term spread and default spread tend to rise during both recessions, consistent with Fama and French (1989) and Chen (2010), with the exception that the default spread falls sharply during the second half of the most recent recession, resulting in $14B of unrealized gains; the term spread tends to fluctuate during most of the expansion periods (although it continuously decreases during the extended expansion period from 2004 to early 2007), while the default spread is relatively stable throughout both expansions. Changes in these three components of interest rates have a significant impact on fair values of bank assets. During 1999Q1-Q3, as the Federal Reserve continuously increases rates and both the risk-free rate and term spread rose, the

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[42] Here risk-free rate is 3-month T-bill rate; term spread is 10-year Treasury bond yield minus 3-month T-bill rate; default spread is Moody's Seasoned Baa Corporate Bond Yield minus Aaa Corporate Bond Yield. I choose to use 10-year Treasury bond yield for two reasons: 1) 10 year likely reflects expected life of mortgage-backed securities due to potential prepayment (Boudoukh et al. 1997); and 2) I find that mortgage-backed securities constitute about 35% (50%) of an average bank's securities holdings prior to (since) 2008. These three rates are approximation of the rates required by debt security investors, since data on the required rates of specific debt securities are not available.

industry experiences unrealized losses of -$13B. Again when the risk-free rate and term spread increase in 2004Q2, the industry incurs unrealized losses of -$18B during that quarter.

Figure 6 presents the time series of interest rates in relation to industry aggregate unrealized gains and losses during 1995-2010. The figure clearly illustrates that the industry aggregate unrealized gains and losses move in the opposite direction of interest rate changes. That is, unrealized gains (losses) tend to coincide with decreases (increases) in interest rates. Importantly, during both recessions interest rates increase in the first half of the recessions and then decrease in the second half, resulting in unrealized losses in the first half of the recessions and unrealized gains in the second half. Similarly, interest rates fluctuate during both expansions, resulting in unrealized gains as well as unrealized losses during these periods.

As a more formal test of the inverse relationship between changes in interest rates and changes in the fair values of bank assets, I conduct a regression analysis. Table 7 provides the results. Panel A shows that, as interest rates increase (decrease), the banking industry experiences unrealized losses (gains). Panel B further illustrates that, as each of the three components of interest rates increases (decreases), the banking industry experiences unrealized losses (gains).

Collectively, this evidence suggests that the reason fair values of bank assets are not pro-cyclical is because interest rates fluctuate during both expansions and recessions. In particular, interest rates rise (fall) during some of the expansionary (recessionary) periods, resulting in movements of the fair values of bank assets that are not pro-cyclical.

6.5 Generalizability of the Results

The overall conclusion of this paper is that fair value accounting does not amplify pro-cyclicality of bank lending over the past two business cycles spanning 1995-2010, despite the fact that unrealized gains (losses) affect subsequent lending. Given the large sample size of close to 70,000 bank-quarter observations, these results are not likely to be driven by low power of the tests.

Note that during the sample period 1995-2010 the accounting system does not require full fair valuing of the balance sheet;[43] in particular, the largest portion of banks' assets – namely, loans – are not required to be measured at fair value on the balance sheet, although banks could have elected to use fair value on loans beginning in 2008. This raises the question of whether the main findings of this study would be generalizable to full fair value accounting of the balance sheet. The answer is likely yes. Like debt securities, loans are fixed-income instruments and, thus, their fair values are likely to depend on interest rates in a similar way. Specifically, as interest rates rise (fall) during expansions (recessions), fair values of bank loans are likely to decrease (increase). Put differently, similar to fair values of debt securities, fair values of bank loans are unlikely to be pro-cyclical over the past two business cycles. Thus, fair values of banks' total assets are less likely to be pro-cyclical under *full* fair value accounting since debt securities and loans represent the bulk of banks' assets. This argument implies that my main finding that fair value accounting does not exacerbate the pro-cyclicality of bank lending over the past two business cycles is likely to hold even under *full* fair value accounting.

7. Conclusion

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[43] Under full fair value accounting, all assets are measured at fair value on the balance sheet.

Using a large sample of 2,956 unique bank holding companies comprising 69,578 bank-quarter observations over the 1995-2010 period, this paper finds that fair value accounting does not exacerbate the pro-cyclicality of bank lending over the past two business cycles. Banks with greater fair value accounting exposure do not increase lending more rapidly during expansions, nor do they reduce lending more substantially during recessions relative to banks with less fair value accounting exposure. This non-exacerbation finding holds despite the evidence that unrealized gains (losses) affect subsequent lending, even though these holding gains (losses) are not explicitly reflected in earnings or regulatory capital. The finding that unrealized gains (losses) affect bank lending challenges the conventional view that unrealized gains (losses) that are excluded from earnings and regulatory capital do not affect bank behavior.

The two seemingly contradictory and counterintuitive findings (i.e., fair value accounting does not increase the pro-cyclicality of bank lending; unrealized gains and losses affect bank lending) can be reconciled by the observation that fair values of bank assets are not pro-cyclical. Specifically, I find that during almost half (one-third) of the expansionary (recessionary) periods studied, fair values of bank assets actually decrease (increase), as a result of an increase (decrease) in interest rates following, for example, shifts in monetary policy.

In summary, this paper shows that over the past two business cycles, fair value accounting does not increase the pro-cyclicality of bank lending. This result could ease concerns about fair value accounting injecting excessive pro-cyclicality into the credit supplied by banks.

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Table 1. Summary Statistics

VARIABLES	N	Mean	Minimum	p10	p25	Median	p75	p90	Maximum	Stddev
ΔLoan	69,578	0.013	-0.073	-0.014	-0.001	0.012	0.026	0.041	0.085	0.023
FVA	69,578	0.19	0.00	0.06	0.11	0.18	0.26	0.35	0.89	0.12
UGL_P4 (×100)	69,578	0.009	-1.579	-0.315	-0.113	0.003	0.134	0.335	1.696	0.312
UGL_P2 (×100)	69,578	0.009	-0.983	-0.228	-0.087	0.003	0.098	0.245	1.164	0.219
UGL_P1 (×100)	69,578	0.005	-1.021	-0.166	-0.062	0.000	0.076	0.187	0.748	0.168
UGL_CUM (×100)	69,578	0.047	-2.139	-0.256	-0.081	0.018	0.166	0.385	2.052	0.313
Pre_UGL_P4 (×100)	16,043	0.041	-7.625	-0.702	-0.226	0.062	0.340	0.680	13.479	0.878
Pre_UGL_P2 (×100)	16,043	0.079	-5.172	-0.415	-0.160	0.048	0.296	0.578	14.863	0.685
Pre_UGL_P1 (×100)	16,043	0.061	-3.823	-0.303	-0.114	0.034	0.217	0.483	2.886	0.441
Pre_UGL_CUM (×100)	16,043	-0.029	-8.220	-0.605	-0.228	0.008	0.245	0.554	2.128	0.622
UGL_EP4 (×100)	69,578	0.177	-32.362	-3.612	-1.277	0.037	1.528	3.955	40.593	3.959
UGL_EP2 (×100)	69,578	0.141	-21.344	-2.619	-0.988	0.029	1.123	2.878	27.508	2.793
UGL_EP1 (×100)	69,578	0.084	-18.496	-1.923	-0.702	0.005	0.859	2.212	19.112	2.134
UGL_ECUM (×100)	69,578	0.466	-38.342	-3.075	-0.931	0.206	1.888	4.379	27.842	3.828
BVSR	69,578	0.239	0.004	0.096	0.153	0.224	0.310	0.404	0.655	0.120
PLOANR	69,578	0.011	0.000	0.001	0.003	0.007	0.013	0.024	0.183	0.015
ROEO	69,578	0.027	-1.012	0.010	0.021	0.030	0.039	0.049	0.155	0.039
ROES	69,578	0.001	-0.223	0.000	0.000	0.000	0.000	0.003	0.061	0.006
CDR	69,578	0.68	0.15	0.54	0.62	0.69	0.76	0.80	0.87	0.11
Leverage	69,578	12.01	4.63	8.12	9.66	11.41	13.59	16.35	84.45	4.03
Size	69,578	13.30	11.48	12.17	12.42	12.98	13.76	14.88	18.98	1.23

Table 1 provides summary statistics for all firm-level variables based on all bank-quarter observations. *UGL_P4, UGL_P2, UGL_P1,* and *UGL_CUML* are variants of *Unrealized Gains (Losses)/Assets$_{t-1}$* based on unrealized gains (losses) recognized during the past four quarters, the past two quarters, the past one quarter, and cumulative as of the beginning of the quarter, respectively, during the fair-value-accounting period of 1995-2010. *Pre-UGL_P4, Pre-UGL_P2, Pre-UGL_P1,* and *Pre-UGL_CUML* are the counterpart of *UGL_P4, UGL_P2, UGL_P1, and UGL_CUML,* respectively, during the pre-fair-value-accounting period of 1988-1991. *UGL_EP4, UGL_EP2, UGL_EP1*, and *UGL_ECUM* are defined in a similar fashion as *UGL_P4, UGL_P2, UGL_P1*, and *UGL_CUM*, except that their deflators are lagged total equity capital. *BVSR* refers to *Historical Costs of Securities/Assets,* *PLOANR* refers to *Nonperforming Loans/Loans, ROEO* refers to *Non-securities ROE, ROES* refers to *Securities ROE,* and *CDR* refers to *Core Deposits/Assets.* All variables are calculated as defined in the Appendix.

Table 2. Pearson Correlations

VARIABLES	FVA	UGL_P4	UGL_P2	UGL_P1	UGL_CUM	BVSR	PLOANR	ROEO	ROES	CDR	Leverage	Size	Recession
$\Delta Loan$	-0.074	-0.085	-0.092	-0.053	-0.064	-0.071	-0.315	0.225	-0.021	0.022	0.001	-0.067	-0.047
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.835)	(0.001)	(0.001)
FVA		-0.008	-0.016	-0.008	0.104	0.709	-0.016	0.007	0.064	-0.055	-0.085	-0.005	-0.031
		(0.033)	(0.001)	(0.038)	(0.001)	(0.001)	(0.001)	(0.049)	(0.001)	(0.001)	(0.001)	(0.225)	(0.001)
UGL_P4			0.688	0.535	0.533	-0.019	0.065	-0.034	0.040	0.016	-0.059	0.018	0.275
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
UGL_P2				0.639	0.354	-0.009	0.057	-0.036	-0.013	0.010	-0.037	0.016	0.201
				(0.001)	(0.001)	(0.016)	(0.001)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.001)
UGL_P1					0.264	0.002	0.035	-0.008	-0.066	0.003	-0.031	0.011	0.105
					(0.001)	(0.593)	(0.001)	(0.038)	(0.001)	(0.377)	(0.001)	(0.005)	(0.001)
UGL_CUM						0.044	0.004	0.006	0.164	0.045	-0.203	-0.032	0.052
						(0.001)	(0.254)	(0.114)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BVSR							-0.098	0.059	0.032	0.067	-0.170	-0.078	-0.084
							(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
PLOANR								-0.525	0.055	-0.091	0.236	0.104	0.055
								(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROEO									-0.083	0.062	-0.318	-0.044	-0.061
									(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROES										-0.019	0.038	0.008	-0.027
										(0.001)	(0.001)	(0.032)	(0.001)
CDR											-0.064	-0.412	-0.076
											(0.001)	(0.001)	(0.001)
Leverage												0.066	0.001
												(0.001)	(0.792)
Size													0.068
													(0.001)

Table 2 reports Pearson correlation coefficients for variables used in the analysis. *UGL_P4, UGL_P2, UGL_P1, and UGL_CUML* are variants of *Unrealized Gains (Losses)/Assets$_{t-1}$* based on unrealized gains (losses) recognized during the past four quarters, the past two quarters, the past one quarter, and cumulative as of the beginning of the quarter, respectively. *BVSR* refers to *Historical Costs of Securities/Asset,* PLOANR refers to *Nonperforming Loans/Loans, ROEO* refers to *Non-securities ROE, ROES* refers to *Securities ROE,* and *CDR* refers to *Core Deposits/Assets.* All variables are calculated as defined in the Appendix. Statistical significance is based on two-sided t-tests and is indicated as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Table 3. Whether Fair Value Accounting Exacerbates Pro-cyclicality in Lending

$$\Delta Loan_{i,t} = \alpha_0 + \alpha_1 FVA_{i,t-1} + \alpha_2 FVA_{i,t-1} * \mathrm{Re}\,cession_t + \alpha_3 \mathrm{Re}\,cession_t$$

$$+ \sum \alpha_k Control\ Variable_{i,t-1}^{k} + Quarter\ Fixed\ Effects_t + \varepsilon_{i,t} \tag{1}$$

Panel A: Full sample and size subsamples **(**Dependent variable: quarterly loan growth $\Delta Loan_{i,t}$)

VARIABLES	Full sample	Small banks (Total assets ≤ $1B)	Large banks (Total assets > $1B)
Intercept	0.04	0.01	0.06
	(12.96)***	(2.14)**	(10.04)***
FVA _i,t-1_	0.002	**0.003**	-0.0002
	(1.29)	**(1.95)****	(-0.06)
FVA _i,t-1_ *Recession _t_	-0.003	0.001	**-0.010**
	(-0.80)	(0.25)	**(-1.66)***
*Recession _t_*	-0.02	-0.01	-0.02
	(-5.60)***	(-3.34)***	(-3.80)***
*Historical Costs of Securities/Assets _i,t-1_*	-0.03	-0.03	-0.02
	(-14.72)***	(-15.5)***	(-4.36)***
*Recession _t_ * Historical Costs of Securities/Assets _i,t-1_*	0.01	0.01	0.02
	(3.26)***	(2.05)**	(2.37)**
*Nonperforming Loan/Loan _i,t-1_*	-0.33	-0.36	-0.26
	(-24.03)***	(-23.17)***	(-10.36)***
*Non_securities ROE _i,t-1_*	0.05	0.04	0.05
	(11.51)***	(7.69)***	(9.48)***
*Securities ROE _i,t-1_*	0.01	0.04	-0.02
	(0.59)	(1.27)	(-0.8)
*Core Deposits/Assets _i,t-1_*	-0.01	-0.01	-0.01
	(-4.96)***	(-3.86)***	(-3.72)***
*Recession * Core Deposits/Assets _i,t-1_*	0.010	0.007	0.004
	(2.92)***	(1.47)	(0.79)
*Leverage _i,t-1_*	0.0004	0.0004	0.0003
	(10.49)***	(9.84)***	(3.17)***
*Size _i,t-1_*	-0.001	0.001	-0.002
	(-4.41)***	(4.42)***	(-7.45)***
FVA _i,t-1_ + FVA _i,t-1_ *Recession _t_	-0.001	0.004	-0.011
Clustered t-stat of FVA _i,t-1_ + FVA _i,t-1_ *Recession _t_	-0.24	0.92	-1.52
Quarter fixed effects	Yes	Yes	Yes
Standard errors clustered by firm	Yes	Yes	Yes
Observations	69,578	52,890	16,688
Adjusted R-squared	0.18	0.16	0.25

Table 3. Whether Fair Value Accounting Exacerbates Pro-cyclicality in Lending (Cont'd)

$$\Delta Loan_{i,t} = \alpha_0 + \alpha_1 FVA_{i,t-1} + \alpha_2 FVA_{i,t-1} * \text{Re}cession_t + \alpha_3 \text{Re}cession_t$$

$$+ \sum \alpha_k Control\ Variable_{i,t-1}^k + Quarter\ Fixed\ Effects_t + \varepsilon_{i,t} \tag{1}$$

Panel B: Leverage subsamples (Dependent variable: quarterly loan growth $\Delta Loan_{i,t}$)

VARIABLES	Low-leverage Banks (Leverage at the bottom tercile)	High-leverage Banks (Leverage at the top tercile)
Intercept	0.03	0.04
	(7.08)***	(8.82)***
$FVA_{i,t-1}$	0.003	0.001
	(1.56)	(0.43)
$FVA_{i,t-1}$ *$Recession_t$	0.003	-0.007
	(0.49)	(-0.85)
$Recession_t$	-0.01	-0.01
	(-2.08)**	(-2.95)***
Historical Costs of Securities/Assets $_{i,t-1}$	-0.02	-0.02
	(-10.25)***	(-7.41)***
*$Recession_t$ * Historical Costs of Securities/Assets $_{i,t-1}$*	0.01	0.01
	(1.93)**	(1.38)
Nonperforming Loan/Loan $_{i,t-1}$	-0.29	-0.34
	(-14.36)***	(-15.79)***
Non_securities ROE $_{i,t-1}$	0.06	0.03
	(4.25)***	(6.09)***
Securities ROE $_{i,t-1}$	0.07	0.00
	(1.90)*	(-0.05)
Core Deposits/Assets $_{i,t-1}$	-0.01	-0.01
	(-2.95)***	(-2.47)***
*Recession * Core Deposits/Assets $_{i,t-1}$*	0.004	0.012
	(0.55)	(1.90)
Leverage $_{i,t-1}$	0.0004	0.0002
	(2.46)***	(3.01)***
Size $_{i,t-1}$	-0.0003	-0.0010
	(-1.39)	(-4.1)***
$FVA_{i,t-1}$ + $FVA_{i,t-1}$ *$Recession_t$	0.006	-0.006
Clustered t-stat of $FVA_{i,t-1}$ + $FVA_{i,t-1}$ *$Recession_t$	1.02	-0.64
Quarter fixed effects	Yes	Yes
Standard errors clustered by firm	Yes	Yes
Observations	23,172	23,195
Adjusted R-squared	0.14	0.22

Table 3 presents results of whether fair value accounting exacerbates the pro-cyclicality in lending. *t*-statistics are based on standard errors clustered at the firm level. Quarter fixed effects are included in the model. All variables are winsorized at the 1% and 99% levels, and are calculated as defined in the Appendix. Panel A presents results for the full sample, small-bank subsample, and large-bank subsample. Panel B reports results for low-leverage banks and high-leverage banks. Statistical significance is based on two-sided t-tests and is indicated as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Table 4. Whether Unrealized Gains (Losses) Affect Banking Lending

$$\Delta Loan_{i,t} = \alpha_0 + \alpha_1 Unrealized\ Gains\ (Losses)/Assets_{i,t-1} + \alpha_2 Unrealized\ Gains\ (Losses)/Assets_{i,t-1} * Post_t$$

$$+ \alpha_3 Post_t + \sum \alpha_k Control\ Variable_{i,t-1}^k + Quarter\ Fixed\ Effects_t + \varepsilon_{i,t} \qquad (2)$$

Dependent variable: quarterly loan growth $\Delta Loan_{i,t}$

| VARIABLES | Unrealized Gains (Losses) Occurred at Different Time Horizons as the Main Independent Variable | | | |
| | (1) | (2) | (3) | (4) |
	Unrealized Gains (Losses) Occurred during Past Four Quarters	Unrealized Gains (Losses) Occurred during Past Two Quarters	Unrealized Gains (Losses) Occurred during Past One Quarter	Cumulative Unrealized Gains (Losses)$_{t-1}$ at the Beginning of the Quarter
Intercept	0.02	0.02	0.02	0.02
	(9.39)***	(9.41)***	(9.35)***	(9.34)***
Unrealized Gains (Losses)/Assets $_{i,t-1}$	0.011	0.032	**0.077**	**0.062**
	(0.54)	(1.34)	**(2.04)****	**(1.97)****
Unrealized Gains (Losses)/Assets $_{i,t-1}$ * Post	**0.24**	**0.29**	**0.17**	-0.11
	(5.37)***	**(5.03)*****	**(2.38)*****	(-2.09)***
Post	-0.01	-0.01	0.00	0.00
	(-5.11)***	(-5.25)***	(-4.76)***	(-4.38)***
Historical Costs of Securities/Assets $_{i,t-1}$	-0.02	-0.02	-0.02	-0.02
	(-17.94)***	(-17.98)***	(-17.98)***	(-17.93)***
Nonperforming Loan/Loan $_{i,t-1}$	-0.32	-0.32	-0.32	-0.32
	(-32.93)***	(-32.93)***	(-32.90)***	(-32.87)***
ROE $_{i,t-1}$	0.05	0.05	0.05	0.05
	(16.37)***	(16.41)***	(16.40)***	(16.33)***
Core Deposits/Assets $_{i,t-1}$	-0.01	-0.01	-0.01	-0.01
	(-4.10)***	(-4.10)***	(-4.10)***	(-4.11)***
Leverage $_{i,t-1}$	0.0002	0.0002	0.0002	0.0002
	(5.95)***	(5.89)***	(5.85)***	(5.70)***
Size $_{i,t-1}$	-0.001	-0.001	-0.001	-0.001
	(-5.32)***	(-5.32)***	(-5.32)***	(-5.34)***
Unrealized Gains (Losses)/Assets $_{i,t-1}$ +				
Unrealized Gains (Losses)/Assets $_{i,t-1}$ * Post	**0.25**	**0.32**	**0.25**	-0.05
(Clustered t-stat)	**(6.27)*****	**(6.20)*****	**(4.06)*****	(-1.11)
Quarter fixed effects	Yes	Yes	Yes	Yes
Standard errors clustered by firm	Yes	Yes	Yes	Yes
Observations	85,621	85,621	85,621	85,621
Adjusted R-squared	0.19	0.19	0.19	0.19

Table 4 presents results on whether unrealized gains (losses) affect banks' subsequent lending during the pre-fair-value-accounting period of 1988-1991 versus the fair-value-accounting period of 1995-2010. In columns 1, 2, 3, and 4, the main independent variable of unrealized gains (losses) are those occurred during the past four quarters, the past two quarters, the past one quarter, and cumulative as of the beginning of the quarter, respectively.

t-statistics based on standard errors clustered at the firm level are in parentheses. Quarter fixed effects are included in the model. All non-dummy variables are winsorized at the 1% and 99% levels. *Post* is a dummy variable equal to 1 for the fair-value-accounting period of 1995-2010 and 0 for the pre-fair-value-accounting period of 1988-1991. All other variables are calculated as defined in the Appendix. Statistical significance is based on two-sided t-tests and is indicated as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Table 5. Whether Fair Values are Pro-cyclical: Industry-level Analysis

Panel A

Industry Sum of Unrealized Gains $(Losses)_t = \alpha_0 + \alpha_1 \operatorname{Re}cession_t + \varepsilon_t$ (3A)

VARIABLES	COEFFICIENTS (t-value)
Intercept	0.96
	(0.90)
Recession $_t$	-1.21
	(-0.43)
Observations	63
Adjusted R-squared	0.003

Panel B

Industry Sum of Unrealized Gains $(Losses)_t = \beta_0 + \beta_1 GDPgrowth_t + \varepsilon_t$ (3B)

VARIABLES	COEFFICIENTS (t-value)
Intercept	1.49
	(1.17)
GDPgrowth $_t$	-1.17
	(-0.86)
Observations	63
Adjusted R-squared	0.012

Table 5 reports results on whether fair values are pro-cyclical at the industry level, i.e., whether the banking industry as a whole tends to recognize unrealized gains during economic upturns and incur unrealized losses during downturns. Panel A uses the dummy variable *Recession$_t$* as the independent variable, and Panel B uses quarterly real GDP growth rate as the independent variable. All variables are calculated as defined in the Appendix.

Table 6. Whether Fair Values are Pro-cyclical: Firm-level Analysis

$$Unrealized\ Gains\ (Losses) / Assets_{i,t} = \alpha_0 + \alpha_1 FVA_{i,t-1} + \alpha_2 FVA_{i,t-1} * \operatorname{Re} cession_t + \alpha_3 \operatorname{Re} cession_t$$

$$+ \sum \alpha_k Control\ Variable_{i,t-1}^k + Quarter\ Fixed\ Effects_t + \varepsilon_{i,t} \qquad (4)$$

Dependent variable: *Unrealized Gains (Losses)/Assets$_{i,t}$*

VARIABLES	Full sample	Small banks (Total assets ≤ $1B)	Large banks (Total assets > $1B)
Intercept	0.00	0.00	0.00
	(22.36)***	(12.66)***	(8.86)***
FVA $_{i,t-1}$	**-0.0001**	**-0.0002**	**0.0003**
	(-2.46)*	**(-4.09)***	**(2.88)***
FVA $_{i,t-1}$ *Recession $_t$	-0.0002	0.0001	**-0.0009**
	(-0.84)	(0.26)	**(-1.76)***
Recession $_t$	-0.001	-0.001	-0.001
	(-14.02)***	(-13.40)***	(-6.40)***
Securities ROE $_{i,t-1}$	-0.01	-0.02	-0.01
	(-8.10)***	(-6.99)***	(-4.35)***
Leverage $_{i,t-1}$	0.000006	0.000008	0.000001
	(5.36)***	(6.38)***	(-0.28)
Size $_{i,t-1}$	0.000004	0.000005	0.000001
	(1.38)	(0.56)	(0.21)
FVA $_{i,t-1}$ + FVA $_{i,t-1}$ *Recession $_t$	-0.0003	-0.0001	-0.0006
Clustered t-stat of FVA $_{i,t-1}$ + FVA $_{i,t-1}$ *Recession $_t$	-1.39	-0.69	-1.26
Qarterly time dummies	Yes	Yes	Yes
Standard errors clustered at the firm level	Yes	Yes	Yes
N	69578	52890	16688
Adjusted R^2	0.49	0.49	0.49

Table 6 presents results on whether fair values are pro-cyclical at the firm level. *t*-statistics are based on standard errors clustered at the firm level. Quarter fixed effects are included in the model. All variables are winsorized at the 1% and 99% levels, and are calculated as defined in the Appendix. Statistical significance is based on two-sided t-tests and is indicated as follows: *** p<0.01, ** p<0.05, and * p<0.1.

Table 7. Whether Changes in Fair Value are Related to Interest Rate Changes

Panel A

$$\textit{Industry Sum of Unrealized Gains (Losses)}_t = \alpha_0 + \alpha_1 \Delta \textit{Interest Rates}_t + \varepsilon_t \qquad (5A)$$

VARIABLE	COEFFICIENT (t-value)
Intercept	0.51
	(0.55)
Δ*Interest Rates $_t$*	**-5.49**
	(-3.13)***
Observations	62
Adjusted R-squared	0.13

Panel B

$$\textit{Industry Sum of Unrealized Gains (Losss)}_t = \beta_0 + \beta_1 \Delta \textit{Risk free Rate}_t + \beta_2 \Delta \textit{Term Spread}_t$$
$$+ \beta_3 \Delta \textit{Default Spread}_t + \varepsilon_t \qquad (5B)$$

VARIABLE	COEFFICIENT (t-value)
Intercept	0.53
	(-0.58)
Δ*Risk Free Rate $_t$*	**-5.66**
	(-2.34)***
Δ*Term Spread $_t$*	**-4.62**
	(-2.55)***
Δ *Default Spread $_t$*	**-13.98**
	(-3.76)***
Observations	62
Adjusted R-squared	0.19

Table 7 reports results on whether changes in fair values for the banking industry are associated with change in interest rates and changes in the three components of interest rates, namely risk-free rate, term spread, and default spread. Panel A uses quarterly changes in interest rates as the independent variable, and Panel B uses quarterly changes in the three components of interest rates as the independent variable. All variables are calculated as defined in the Appendix. Statistical significance is based on two-sided t-tests and is indicated as follows: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$.

Figure 1. Potential Relationship between Fair Value Accounting and Bank Lending
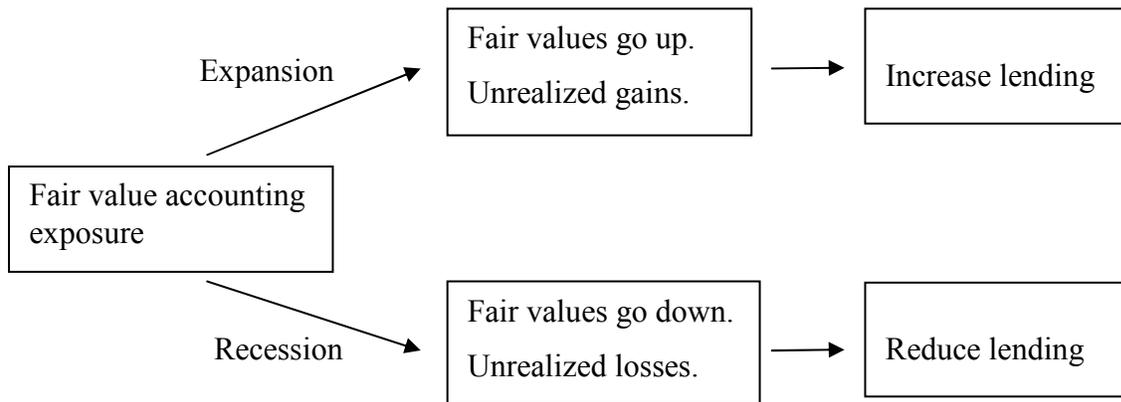

Figure 2. Intrinsic Pro-cyclicality of Bank Lending
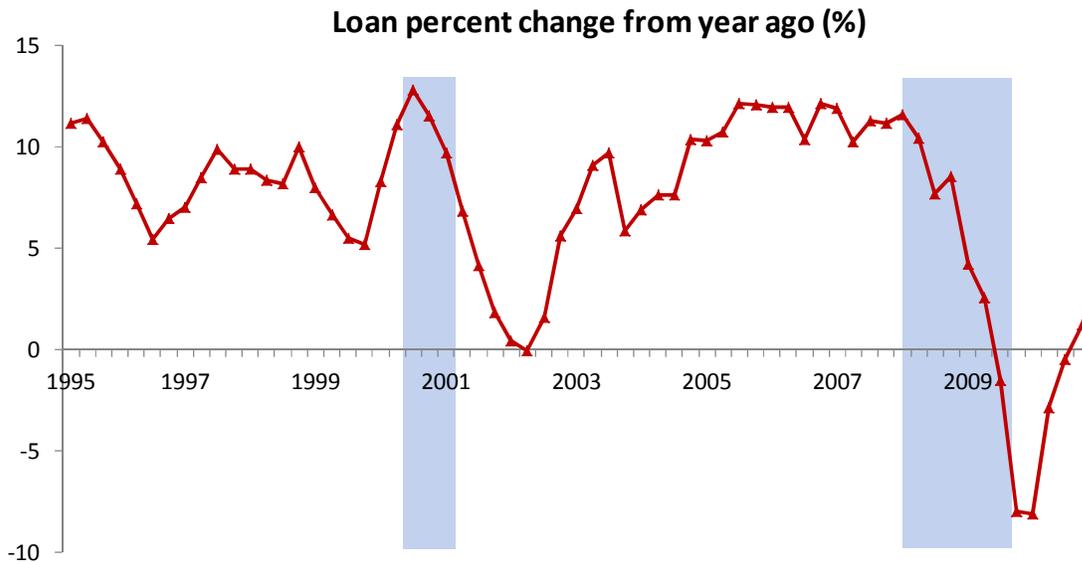

Figure 2 shows the percent change of total loans and leases outstanding at all U.S. commercial banks. Data are from St. Louis Fed.

Figure 3. Industry Aggregate Unrealized Gains (Losses) Recognized during the Year
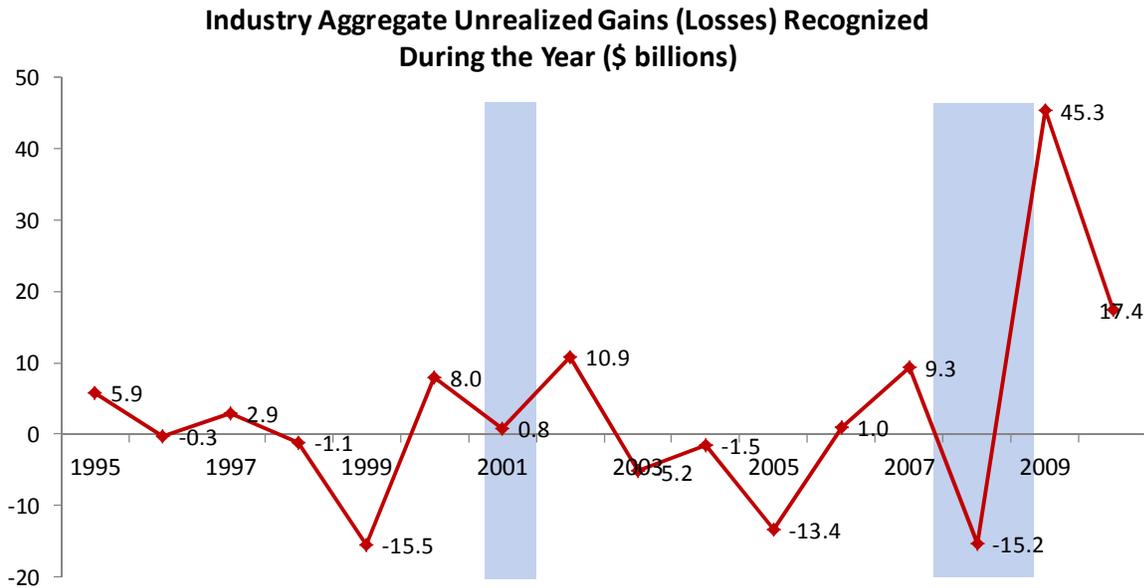

Figure 3 illustrates industry aggregate unrealized gains (losses) recognized during the year (in $billion). The shaded areas denote NBER-dated recessions.

Figure 4. Time Series of Unrealized gains (Losses) Recognized during the Quarter for the Banking Industry in Relation to risk-free rate during 1995-2010
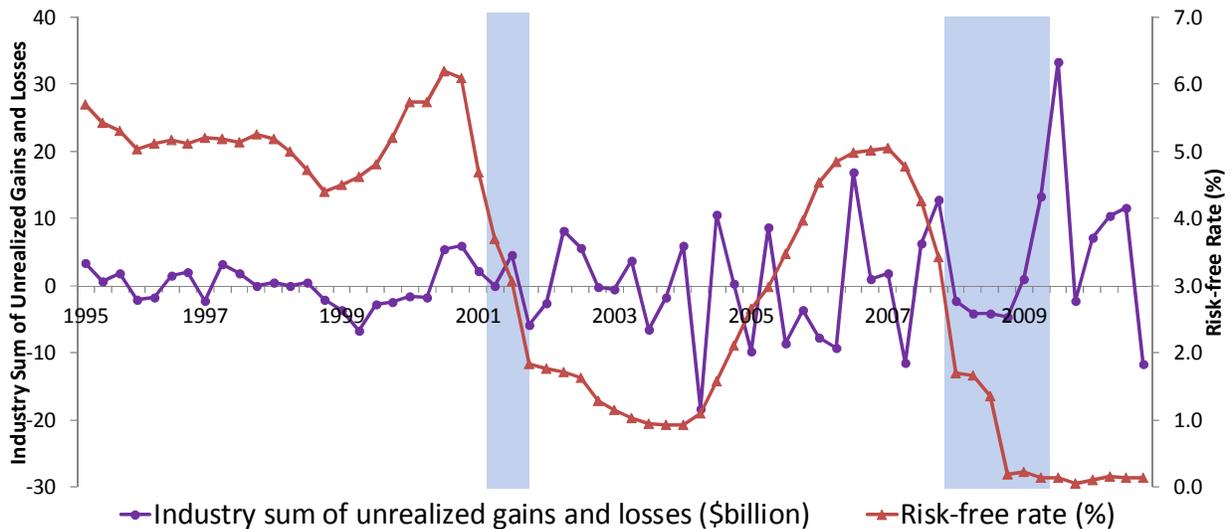

Figure 4 presents the times series of industry aggregate unrealized gains (losses) recognized during the quarter in relation to risk-free rate during 1995-2010. The shaded areas denote NBER-dated recessions.

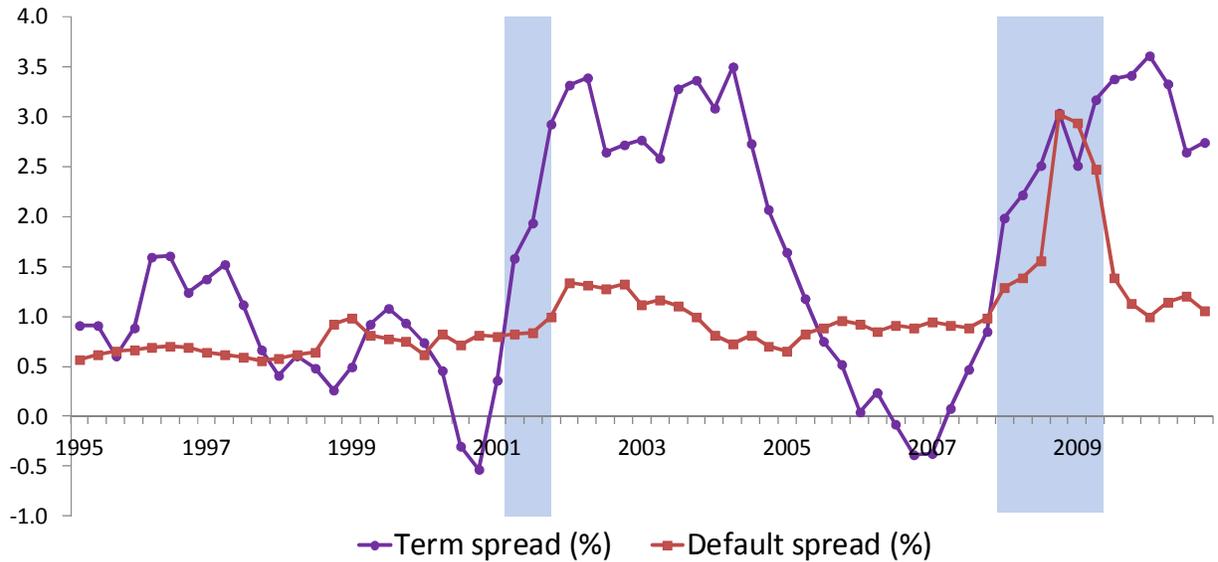**Figure 5. Times Series of Term Spread and Default Spread during 1995-2010**

Figure 5 illustrates the times series of quarterly term spread and default spread during 1995-2010. The shaded areas denote NBER-dated recessions.

Figure 6. Time Series of Unrealized gains (Losses) Recognized during the Quarter for the Banking Industry in Relation to the Interest Rate during 1995-2010
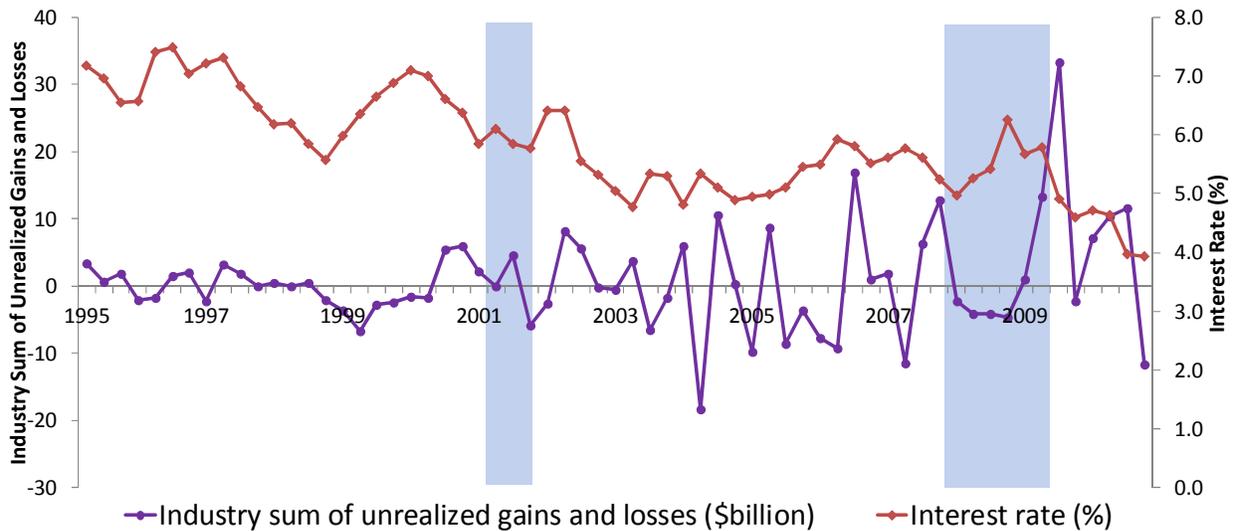

Figure 6 illustrates the time series of industry aggregate unrealized gains (losses) recognized during the quarter in relation to interest rates (the sum of risk-free rate, term spread, and default spread) during 1995-2010. The shaded areas denote NBER-dated recessions.

Appendix: Variable definitions

Variable	Definition
Main variables of interest	
$\Delta Loan$	Quarterly loan growth, measured as $(Loan_t - loan_{t-1}) / Assets_{t-1}$, where $Loan_t$ is total loans and leases outstanding (bhck2122) at the end of quarter t, $Loan_{t-1}$ is total loans and leases outstanding at the beginning of quarter t, and $Assets_{t-1}$ is total assets at historical cost, measured as total assets (bhck2170) minus cumulative fair value unrealized gains and losses (bhck8434).
FVA	Individual banks' exposure to fair value accounting, measured as fair-valued assets deflated by total assets. Fair-valued assets are assets carried at fair value on the balance sheet, measured as the sum of fair value of trading assets (bhck3545) and fair value of available-for-sale securities (bhck1773) during 1995-2007, and the sum of fair value of trading assets, fair value of available-for-sale securities, and fair value of other assets elected to use fair value accounting under FAS 159 during 2008-2010.
Unrealized Gains (Losses)/Assets	Changes in fair values, measured as unrealized gains (losses) divided by total assets at historical cost. During the fair-value accounting period of 1995-2010, the unrealized gains (losses) are those recognized on the balance sheet from available-for-sale securities during the past four/two/one quarter(s), the current quarter, or cumulative unrealized gains (losses) (bhck8434). During the pre-fair-value accounting period of 1988-1991, the unrealized gains (losses) are holding gains (losses) of investment securities that occurred during the past four/two/one quarter(s), the current quarter, or cumulative holding gains (losses) (the difference between market value of investment securities (bhck0391) and book value of investment securities (bhck0390)).
Industry Sum of Unrealized Gains (Losses)	Industry aggregate unrealized gains (losses) recognized during quarter t for all bank holding companies in the sample.
Post	A dummy variable indicating whether the quarter belongs to the pre-fair-value-accounting period of 1988-1991 (*Post*=0) or the fair-value-accounting period of 1995-2010 (*Post*=1).
Recession	Business cycle indicator based on NBER business cycle dates. *Recession* takes the value of 1 for recession quarters 2001Q2-2001Q4 and 2008Q1-2009Q2, and 0 for expansion quarters (i.e., remaining quarters during 1995-2010).
Control variables	
Historical Costs of	The fraction of total assets that is securities, measured as

Securities/Assets	historical costs of securities divided by total assets at historical cost. Historical costs of securities is the sum of trading assets at fair value (bhck3545), available-for-sale securities at fair value (bhck1773), and held-to-maturity securities at fair value (bhck1754), minus cumulative unrealized gains and losses (bhck8434).
Nonperforming Loan/Loan	Quality of preexisting loan portfolios, measured as nonperforming loan divided by total loans (bhck2122). Nonperforming loans are the sum of loans past due for 90 days or more (bhck5525) and loans no longer accruing interest revenue (bhck5526).
Securities ROE	Profitability of securities businesses, measured as the sum of realized gains (losses) on available-for-sale securities (bhck3196) and realized gains (losses) on held-to-maturity securities (bhck3521) during the last quarter, divided by average total equity capital (bhck3210) during the last quarter.
Non-securities ROE	The profitability of non-securities businesses, measured as total return on equity (ROE) minus *Securities ROE*.
Core Deposits/Assets	Reliance on core deposits as a stable source of financing, measured as core deposits divided by total assets at historical cost. Core deposits are the sum of deposits under \$100,000 plus all transactions deposits, and are measured as bhcb2210 + bhcb 3187 + bhcb 2389 + bhcb 6648 + bhod3189 + bhod 3187 + bhod 2389 + bhod 6648. Total assets at historical cost are total assets (bhck2170) minus cumulative unrealized gains and losses (bhck8434).
Leverage	Total assets (bhck2170) divided by equity capital (bhck3210).
Size	Firm size, measured as the natural log of total assets (bhck2170).
Macroeconomic variables	
Δ *Risk Free Rate*	Quarterly changes in risk-free rate. Risk-free rate is 3-month Treasury bill rate from CRSP.
Δ *Term Spread*	Quarterly changes in term spread. Term spread is measured as yield of 10-year treasury with constant maturity minus risk-free rate. Data on yield of 10-year treasury come from St. Louis Fed.
Δ *Default Spread*	Quarterly changes in default spread measured as Moody's Seasoned Baa Corporate Bond Yield minus Moody's Seasoned Aaa Corporate Bond Yield. Data come from St. Louis Fed.
Δ *Interest Rates*	Quarterly changes in interest rates. Interest rates are the sum of risk-free rate, term spread, and default spread.
GDPgrowth	GDP growth rate adjusted for inflation. Data come from St. Louis Fed.

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   "Does Fair Value Accounting Exacerbate the Pro-cyclicality of Bank Lending?" (*Job market paper; under 2nd round review at Journal of Accounting Research /New York Fed conference*)

   "The 'Out-of-sample' Performance of Long-Run Risk Models" (*with Wayne Ferson and Suresh Nallareddy; revising for 3rd round at Journal of Financial Economics*)

   "The Impact of SFAS 131 on Earnings Management at the Segment Level: Loss Avoidance and Cross-subsidization" (*with Rebecca Hann and Yvonne Lu*)

TEACHING EXPERIENCE

Instructor, Core Concepts of Management Accounting, Spring 2009, University of Southern California, Leventhal School of Accounting (Business undergraduate core course; teaching rating 3.96 on a 5-point scale; 46 students enrolled; responsible for all aspects of the class)

Teaching Assistant, Core Concepts of Financial Accounting, Fall 2008, University of Southern California, Leventhal School of Accounting

PROFESSIONAL EXPERIENCE

University of Southern California, Leventhal School of Accounting, 2006-2011
　　　Research Assistant for professors: Rebecca Hann, Yaniv Konchitchki, K.R. Subramanyam, and Jieying Zhang

Sinobull Financial Services Inc., Shanghai, 2001
　　　Financial Data Services Representative

Shanghai Chuanqifood Co., Ltd., 1999-2000
　　　Researcher in R&D Center

AWARDS AND ACADEMIC DISTINCTIONS

Dissertation Completion Fellowship, University of Southern California, 2011-2012
Marshall Doctoral Fellowship, University of Southern California, 2006-2011
Honors Tuition Waiver Scholarship, Tulane University, 2005-2006
Best Thesis Award, Shanghai University of Finance and Economics (SUFE), 2005
Scholarship for Academic Excellence, SUFE, 2002-2004
Renmin Scholarship for Academic Success, Fudan University, 1996-1998

PRESENTATIONS AND DISCUSSIONS

AAA Western Region Meeting, presenter, "The Impact of SFAS 131 on Earnings Management at the Segment Level: Loss Avoidance and Cross-subsidization", 2011
AAA Western Region Meeting, discussant, "The timeliness of stock price adjustments to accounting fundamentals", by Asher Curtis, 2011
Finance Brownbag, University of Southern California, 2011
Accounting Research Forum, University of Southern California, 2008, 2011

CONFERENCES PARTICIPATION

AAA Annual Meeting, 2011, 2010, 2008
FARS Mid-year meeting, 2010
Annual SEC and Financial Reporting Institute Conference, 2010, 2007
PAC 10 Doctoral Consortium, 2007

REFERENCES

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ABSTRACTS OF WORKING PAPERS

Does Fair Value Accounting Exacerbate the Pro-cyclicality of Bank Lending? *(Job market paper; under 2nd round review at Journal of Accounting Research /New York Fed conference)*

This paper examines whether fair value accounting increases the pro-cyclicality of banks' lending behavior. Exploiting cross-sectional variation in individual banks' exposure to fair value accounting, I find that fair value accounting does *not* exacerbate the pro-cyclicality of bank lending over the past two business cycles during 1995-2010. This result holds despite the fact that every one dollar of unrealized gains (losses) is associated with at least 25 cents of new lending (cutbacks in lending). The probable cause of this non-exacerbation finding is that interest rates rise (fall) during some of the expansionary (recessionary) periods, resulting in movements of bank assets' fair value that are not pro-cyclical.

The "Out-of-sample" Performance of Long-Run Risk Models (*with Wayne Ferson and Suresh Nallareddy; revising for 3rd round at Journal of Financial Economics*)

This paper studies the ability of long-run risk models to explain out-of-sample asset returns during 1931-2009. The long-run risk models perform relatively well on the momentum effect. A cointegrated version of the model outperforms the classical, stationary version. Both the long-run and the short run consumption shocks in the models are empirically important for the models'

performance. The models' average pricing errors are especially small in the decades from the 1950s to the 1990s. When we restrict the risk premiums to identify structural parameters, this results in larger average pricing errors but often smaller error variances. The mean squared errors are not substantially better than those of the classical CAPM, except for Momentum.

The Impact of SFAS 131 on Earnings Management at the Segment Level: Loss Avoidance and Cross-subsidization (*with Rebecca Hann and Yvonne Lu*)

This paper examines the impact of SFAS 131 on managerial manipulation of segment earnings to avoid reporting segment losses through shifting income (costs or revenues) across segments. We first document that diversified firms reporting a loss segment tend to have a greater value loss associated with diversification than those without a loss segment, suggesting that managers have incentives to conceal segment losses. We next document a significant discontinuity or "kink" at zero in the frequency distribution of segment earnings prior to SFAS 131 but not after the implementation of SFAS 131. Further, we find that the extent of cross-segment income shifting is significantly greater for small-profit segments than for small-loss segments only in the pre-SFAS 131 period. These results suggest that the increased consistency between external and internal reporting under SFAS 131 has deterred earnings management to conceal segment losses via cross-segment transfers.