Does Fair Value Accounting Contribute to Systemic Risk in the Banking Industry?*

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Abstract: Critics have blamed fair value accounting for amplifying the subprime crisis and for causing a financial meltdown. It has been alleged that fair value accounting created a vicious circle of falling prices, thereby increasing the overall risk in the financial system. In this paper, I investigate whether fair value accounting is associated with an increase in the risk of failure of the banking system as a whole. I find that the extent of fair value reporting is associated with an increase in contagion among banks. The increase in bank contagion is most severe during periods of market illiquidity. Further, my cross-sectional analyses suggest that increased bank contagion associated with fair value accounting is more likely to spread to banks that are poorly capitalized or have a relatively higher proportion of fair value assets.

Keywords: Fair value accounting, mark-to-market, systemic risk, contagion, financial crises, banking.

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1. INTRODUCTION

Several parties have blamed fair value accounting for amplifying and extending the subprime crisis and the credit crunch that followed, which is considered by many the worst economic crisis in the United States since the Great Depression (Ryan 2008a). The critics of fair value accounting, who include politicians, policymakers, auditors, and industry professionals, have argued that fair value accounting created a vicious circle of falling prices and led to a financial meltdown (Hughes and Tett 2008; Johnson 2008; and Rummell 2008). Also, several recent analytical papers show that mark-to-market accounting has the potential of exacerbating contagion (i.e., the spread of market shocks – especially, on the downside – a process observed through co-movements in stock prices) among banks, thereby increasing systemic risk in the banking industry. Systemic risk is the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components (Kaufman and Scott, 2000).

In contrast, several commentators (e.g., Badertscher et al. 2010; Laux and Leuz, 2010; Ryan 2009) point out that it is unlikely that fair value accounting added to the severity of the crisis as there is little evidence of fair value accounting directly resulting in asset fire-sales or of fair value accounting forcing banks to take excessive write-downs.

In this paper, I empirically test whether fair value accounting is associated with an increase in systemic risk in the network of banks. I also investigate whether the association between fair value accounting and systemic risk is greater during periods of market illiquidity. I further examine whether banks that are poorly capitalized or have
relatively more fair value assets are more likely to be affected by the increase in systemic risk associated with fair value accounting.

Fair value accounting has the potential of provoking contagion in financial markets.¹ Banks can be forced to sell assets at prices below fundamental values when prices decline and the prices from these sales become relevant to other banks that are required under a fair value-based reporting regime to mark their assets to market (Laux and Leuz, 2009).² Following a decline in asset prices, banks can be forced to recognize impairments on assets leading to reduced earnings and regulatory capital.³ Due to concerns about regulatory intervention (Cifuentes et al., 2005 and Allen and Carletti, 2008) or because managers focus on accounting earnings (Plantin et al., 2008), in a fair value-based reporting regime banks can be forced to further sell assets following price declines creating a feedback loop of falling prices and asset sales (Bhat et al., 2011), increasing the risk of systemic failure of the financial system. Accordingly, I first investigate whether fair value accounting is associated with an increase in systemic risk in the banking industry.

Sales of assets have a greater impact on prices in the short-term when asset markets are illiquid (Amihud, 2002). Thus, concerns about the interaction of fair value accounting with other constraints (such as regulatory solvency ratios or reporting of

¹ Contagion describes a situation where there is excess correlation and poor performance spreads across countries, asset classes, or investment strategies for reasons not related to correlations in fundamentals (see Bekaert, Harvey, and Ng, 2005; Boyson et al. 2010).
² I define a ‘fair value-based reporting regime’ to be a financial reporting regime in which standard setters and regulators require financial institutions to report their assets using fair value. The extent to which the reporting regime is fair value-oriented varies over time. The variation is jointly due to changes in standards and reporting rules requiring reporting of assets at fair value and changes in financial institutions’ holdings of assets that need to be reported at fair value.
³ Banks may have to record other-than-temporary impairments under a historical cost-oriented reporting regime as well. However, impairment testing under historical cost accounting is less strict and arguably offers more discretion than under fair value accounting (see, Laux and Leuz, 2009 and Ramanna and Watts, 2008).
lower earnings) are likely to be exacerbated when markets are illiquid potentially leading to procyclical trades and an increase in systemic risk. Hence, I next examine whether the association between a more fair value-based reporting regime and increase in systemic risk in the bank industry is greater during periods of market illiquidity.

Finally, I investigate whether in the cross-section the increase in systemic risk associated with a more fair value-based reporting regime is more likely to affect banks with: (i) a larger proportion of assets reported at fair value and, (ii) lower levels of regulatory capital. First, a bank that reports a relatively larger proportion of its assets using fair value is likely to face more pressure to sell its assets in a declining market to avoid violating binding constraints because a fall in asset prices will have a larger effect on the carrying value of its assets and liabilities. So, I predict that a more fair value-oriented bank is more likely to be affected by the increase in systemic risk associated with fair value accounting. Second, a bank that is poorly-capitalized and has less ability to absorb losses from a fall in the value of assets without resulting in violation of binding constraints is more likely to dispose its assets in a distressed transaction. Hence, I predict that the increase in systemic risk associated with fair value accounting is more likely to affect banks that are poorly capitalized.

De Bandt and Hartmann (2000) review the systemic risk literature and note that bank contagion risk may be viewed as the classical case of systemic risk. Also, prior studies examining increases in systemic risk have tested whether contagion among banks has increased. Therefore, to examine whether fair value accounting is associated with an increase in systemic risk, I empirically investigate the association between fair value accounting and bank contagion.
Using a sample that essentially includes all publicly traded bank holding companies, I estimate logit regressions to test whether a more fair value-based reporting regime is associated with an increase in contagion among banks. In particular, I examine whether the probability that a bank experiences extreme negative stock returns when money center banks are performing poorly is higher under a more fair value-based reporting regime.\(^4\) To proxy for the extent to which the reporting regime is fair value-based at a certain point in time, I estimate the ratio of the sum of assets recognized or disclosed using fair value by all the banks in my sample to the sum of total loans held-for-investment by these banks. The higher this ratio, the more fair value-oriented is the reporting regime.

The results indicate that a more fair value-based reporting regime is associated with an increase in bank contagion above and beyond the contagion that exists due to trade and financial linkages in the banking industry, i.e., the probability that a bank experiences extreme negative returns when the money center banks are performing poorly is higher when fair values are used more extensively in financial reporting. Further, the association of fair value accounting with bank contagion is enhanced during periods of market illiquidity.

The results of the cross-sectional tests indicate that the increased bank contagion associated with fair value reporting is more likely to spread to banks that have lower capital adequacy ratios or are more fair value-oriented. These cross-sectional tests serve two important purposes. First, it is important and interesting to identify in the cross-section which banks are more likely to be affected by fair value-related contagion and the

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\(^4\) Money center banks are amongst the biggest banks in the economy. Many of them are considered too-big-to-fail by the central banks and are crucial for the stability of the banking system.
channels through which contagion can spread. Second, the cross-sectional tests add confidence to the validity of the test of the main hypotheses. Because if the results of the main hypotheses were an artifact of an omitted variable correlated with the extent to which the assets are reported at fair value over time, then it would be unlikely that I would find results consistent with the cross-sectional predictions.

I believe this is one of the first studies to provide empirical evidence of the impact of a fair value-based reporting system on systemic risk and contagion in the banking industry. The findings of this paper add to the emerging literature on the 2008-09 financial crisis in general and on the role of using fair values in financial reporting in banking crises in particular. The results of this study can also have important policy implications. The Emergency Economic Stabilization Act of 2008 gave the SEC the power to suspend mark-to-market accounting because several parties blamed fair value accounting for exacerbating the credit crunch that has followed the financial crisis. As the standard setters and bank regulators continue to grapple with the extent to which fair values should be used in financial reporting, the evidence presented in this paper can help in analyzing the impact of fair value accounting on systemic risk in banks, and help them in determining the costs and benefits of a fair value-based reporting regime for banks.

It is important to note that fair value accounting rules may exacerbate contagion only when they interact with other constraints (such as, regulatory capital ratios or managerial incentives). Moreover, the entire blame for fair value accounting potentially exacerbating financial crises should not be placed only on accounting standard setters. It can be argued that bank regulators are to blame as well since they are not bound to use fair values in regulatory reporting and filings only because accounting rules mandate reporting of certain assets at fair value for financial reporting purposes. Given that
accounting numbers are used in multiple contexts, it might be more appropriate to adjust banking regulations and other contracts rather than suspend and/or modify fair value accounting rules. For example, as suggested by Laux and Leuz (2009), it may be better to design prudential regulation that accept fair value accounting as a starting point but sets explicit counter-cyclical capital requirements to address the issue of financial stability.

The rest of the paper is organized as follows. I develop my hypotheses and discuss related literature in Section 2. Section 3 describes my research design. Section 4 discusses data. Section 5 and Section 6 present the results of the test of the hypotheses and the cross-sectional tests, respectively. In section 7, I perform robustness tests. Finally, I conclude in Section 8.

2. HYPOTHESES DEVELOPMENT AND RELATED LITERATURE

2.1. Fair value accounting and systemic risk

In the wake of the 2008 financial crisis, critics have argued that a cost associated with a fair value-based reporting regime is that it can create contagion and increase the risk of failure of the financial system as a whole. Various stories link fair value accounting with incentives to sell assets following a decline in asset prices. Regulatory capital requirements, debt and compensation contracts can play a role in motivating banks to sell distressed assets following a shock that reduces asset prices. In an analytical framework, Cifuentes et al. (2005) show that a shock that depresses the market value of assets carried on the balance sheets of financial institutions at fair value can lead to forced disposal of assets to avoid violation of solvency ratios. Additional disposal of

5 As a part of their capital adequacy assessment, regulatory agencies convert a bank’s assets to risk equivalent assets. For example, cash held and U.S. government securities are weighted zero, meaning that the bank is not required to hold any capital for these securities. Assets that pose greater risk are weighted 20, 50, or 100 percent of their dollar value, indicating the amount of capital support they require. Thus, when a bank finds itself potentially violating regulatory capital requirements, it can sell a riskier asset (an
assets that have declined in value can further depress prices and create a vicious circle of falling prices and additional asset disposals. The authors conclude that the combination of mark-to-market accounting and externally imposed solvency constraints can lead to a downward spiral in asset prices and become an important source of systemic risk in the financial system.

Allen and Carletti (2008) argue that during financial crises, asset prices reflect the amount of liquidity available rather than the assets’ fundamental value. They show that in such scenarios, a fair value-based reporting regime is not desirable because in a crisis fair value losses can cause banks to be declared insolvent by regulators. Bank insolvencies result in forced liquidations that reduce asset prices even further leading to excessive and artificial volatility in asset prices in the short-term. In contrast, under a historical cost-based reporting regime, banks can continue and meet all their future liabilities.

Bhat et al. (2011) provide empirical evidence of the feedback effect between asset price declines and asset sales by documenting liquidation of non-agency mortgage-backed securities by banks following a decline in the prices of such securities. Banks that have lower regulatory capital ratios are more likely to sell non-agency MBS following a decline in their prices. They further provide evidence of the feedback effect related to fair

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6 Banks are required to follow SFAS 115 for regulatory reporting purposes and unrealized gains and losses on available-for-sale securities other than equity securities are excluded from the definition of Tier 1 capital. However, if the losses on investment securities are other-than-temporary, then the loss must be recognized in income statement and is included in the calculation of Tier 1 capital. Impairment testing is also required under historical cost accounting (HCA), but compared to fair value accounting, under HCA impairment testing is less strict and arguably offers more discretion in recording other-than-temporary impairments (see, Laux and Leuz, 2009; Ramanna and Watts, 2008).
value accounting by showing that the relaxation of fair value accounting rules during the 2008 financial crisis reduced the feedback-related selling of non-agency MBS by banks.

Plantin et al. (2008) assume that a bank manager seeks to maximize accounting earnings and show that under a fair value-oriented reporting regime in response to an exogenous shock that reduces asset prices, banks rush to be the first to sell the assets before others, thereby flooding the market with excess supply of assets and pushing asset prices further below their fundamental values. They conclude that concerns about the effects of fair value losses on reported earnings under fair value accounting can lead to procyclical trades that amplify the price fall and volatility in prices in the short-term and can increase systemic risk in the banking system. Accordingly, I hypothesize:

**H1: A more fair value-based reporting regime is associated with an increase in systemic risk in the banking system.**

2.2. *Impact of market illiquidity on the association between fair value accounting and systemic risk*

Strategic concerns (such as, avoiding violating regulatory solvency ratios or avoiding reporting lower earnings) under a fair value based reporting regime that can lead to procyclical trades are enhanced when markets are illiquid. The reason being, during periods of market illiquidity the sale of assets has a greater impact on short-run price than sales during periods of liquidity (Amihud, 2002). Therefore, relative to periods of greater market liquidity, fair value accounting is associated with a greater increase in systemic risk in the banking system during periods of market illiquidity. Accordingly I hypothesize:

**H2: A more fair value-based reporting regime is associated with a greater increase in systemic risk in the banking system during periods of market illiquidity.**

2.3. *Other related literature*
There is a growing and emerging academic literature on the 2008-09 financial crisis in general and on the role of fair value accounting in banking crises in particular. A few recent papers have investigated whether fair value accounting contributed to selling of assets at distressed or fire-sale prices. Bhat et al. (2011) document that fair value reporting accentuates the feedback effect between asset price declines and asset sales in the market for non-agency mortgage-backed securities. Using a sample of 5,014 repeat transactions of non-agency residential mortgage backed securities (RMBS) by insurance companies from 2006-2009, Merrill et al. (2012) show that insurance companies that became capital constrained due to operating losses and recognized fair value losses sold comparable RMBS at much lower prices than other non-constrained insurance firms during the financial crisis of 2008-2009. Also, Bowen and Khan (2013) conduct an event study around relaxation of fair value accounting and impairment rules in the banking industry during the financial crisis of 2008-09 and find a positive reaction of bank stocks prices to events signaling potential relaxation of fair value accounting and impairment rules. Their findings indirectly support the claim that fair value accounting contributed to the recent crisis by exacerbating contagion. On the other hand, Badertscher, Burks and Easton (2010) examine the effects of fair value losses on bank regulatory capital and sale of securities during the financial crisis of 2009. They find fair value losses had a small impact on regulatory capital of banks and find some evidence of fair value accounting charges triggering security sales.

Unlike this study, none of the above mentioned papers examine the implications of fair value accounting for bank contagion. They have mostly examined the influence of fair value accounting in specific asset markets and over relatively short time periods. For example, Bhat et al. (2011) document that fair value accounting accentuated the feedback
effect of illiquidity in the non-agency MBS market. And, they acknowledge that magnitude of the accentuating effect of fair value accounting in the non-agency MBS market is unlikely to lead to significant economy-wide consequences. Similarly, Badertscher et al. (2010) find that fair value losses had a relatively small impact on the regulatory capital of banks. Thus, it is not obvious that the increasing use of fair values will result in economy-wide consequences such as increase in systemic risk or contagion amongst banks. This study contributes to the existing literature by being amongst the first to provide empirical evidence of an association between the use of fair value in financial reporting and increased bank contagion among extreme bank stock returns using a sample that comprises essentially all publicly traded U.S. bank holding companies with available date over a 20-year period. Further, in contrast to the relatively small sample periods (restricted to the 2007-2009 financial crisis) of the above mentioned studies, the 20-year long sample period examined in this paper includes several banking crises and significant variation in the use of fair values in financial reporting by banks. Therefore, the findings of this study are not specific to any one crisis and are more generalizable.

3. **RESEARCH DESIGN AND VARIABLE MEASUREMENT**

3.1. *Test of the association between fair value accounting and bank contagion*

De Bandt and Hartmann (2000) reviews the systemic risk literature and notes that bank contagion risk may be viewed as the classical case of systemic risk. Therefore, to examine whether fair value accounting is associated with an increase in systemic risk, I empirically investigate the association between the extent of fair values used in financial reporting and bank contagion. I use a logit model to test whether in a given month the likelihood of a bank experiencing returns in the lowest decile of its time-series of returns
and an index of money center banks also experiencing very poor returns (returns in the lowest quartile of their time-series of returns) has increased as the reporting regime has become more fair value based. I choose a logit model because, unlike measuring returns correlations or some other approaches used to examine contagion, a logit model takes into account nonlinearities in returns correlations during extreme market conditions like financial crises, allows for conditioning on additional risk factors and does not parameterize tail dependencies.\footnote{There is a large literature on measuring contagion and most of this literature has focused on testing whether return correlations increase during crises. However, correlations are linear measures of association that are not appropriate to measure returns correlations during extreme market conditions. Two other approaches used to measure contagion include Extreme Value Theory (EVT) and applying regime-switching models (as in Chan, Getmansky and Lo, 2005). Unlike using a logit model, both these approaches can result in giving too much weight to extremely rare observations.} A similar approach is adopted in Eichengreen et al. (1996), Bae et al. (2003) and Boyson et al. (2010) to examine contagion. Accordingly, I estimate the following logit model:

\[
EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t \times FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + \beta_7 LOANS_{i,t} + \beta_8 LOANS\_FS_{i,t} + \beta_9 DERR_{i,t} + \beta_{10} LOANS\_ALL_t + \beta_{11} LOANS\_FS\_ALL_t + \beta_{12} DERR\_ALL_t + \text{Fixed-Year Effects} + \text{Fixed-Firm Effects} + \text{error}_{i,t}
\]

The dependent variable, \(EXTREMENEG_{i,t}\), is set to one if bank i’s return for month t is below the 10\textsuperscript{th} percentile (i.e., in the bottom decile) of the entire time-series of monthly returns of bank i, and zero otherwise.\footnote{Following Boyson et al. (2010), I use a lower 10\% cutoff of the entire time-series distribution of returns to identify firm-specific “extreme” negative returns.}

\(D\_BANKRET\) is a proxy for financial difficulties in the banking system. Since the failure of a money center bank can have serious negative consequences for the rest of the financial system participants, many money center banks are considered too-big-to-fail by the central banks and are crucial for the stability of the banking system. Therefore, to proxy for financial difficulties in the banking system I estimate the returns on an equally-
weighted index of money center banks in the U.S. D_BANKRET is an indicator variable that equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile (i.e., in the bottom quartile) of the entire time-series of monthly returns for this index, and zero otherwise. Appendix A lists the seventeen money center banks included in the equally-weighted index.

FV_ALL measures the extent to which the reporting regime is fair value based and how prevalent is the use of fair values in financial reporting. This includes reporting to the SEC through the filing of quarterly and annual financial statements as well as reporting to bank regulators through regulatory filings. FV_ALL is the ratio of the sum of assets recognized or disclosed at fair value (i.e., held-to-maturity securities, available-for-sale securities, trading assets, mortgage servicing rights, other financial assets, and derivative contracts) by the banks in my sample to the sum of total loans held-for-investment held by these banks.

Generally, only the fair value amounts that are recognized in income and retained earnings in accordance with U.S. GAAP are included in the calculation of regulatory

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9 I use a cutoff of returns in the lowest quartile to define D_BANKRET (versus a cutoff of lowest decile to code EXTREMENEG) to allow for variation in the dependent variable, EXTREMENEG.
10 SFAS No. 107 required banks to disclose the fair value of loans for fiscal years ending after December 15, 1992. However, fair value of loans is not included in the estimation of FV_ALL for two reasons. First, the fair value of loans was disclosed on an annual basis until the second quarter of 2009. So, including the fair value of loans in FV_ALL would require performing the analysis on an annual basis which will bias against finding results. Second, while the fair value of loans was disclosed in the 10-Ks, the FR-Y9C report does not contain it. Thus, inclusion of the fair value of loans in the estimation of FV_ALL would require hand collection. This would be a mammoth task given the sample contains more than 85,000 observations. However, while the exclusion of fair value of loans induces measurement error in FV_ALL as it is not a perfect proxy for the ratio of assets reported at fair value. It does not result in incorrect inferences about the influence of fair value reporting on bank contagion. The reason being that loans held-for-investment (whose fair value is excluded in the calculation of FV_ALL), unlike securities, are immune to the feedback loop of falling prices and asset sales that is exacerbated by fair value reporting and can increase contagion amongst banks.
11 Nissim and Penman (2007) adopt a similar approach to examine the application of fair value accounting in the banking industry. They estimate the proportion of assets and liabilities that are recognized at or close to fair value on the balance sheet, have related unrealized gains and losses in income, or have fair values disclosed in footnotes to document the extent to which bank balance sheets are fair value-oriented.
capital. I include disclosed fair value amounts along with recognized fair value amounts in the estimation of FV\_ALL for three reasons. First, risk-based capital ratios focus principally on broad categories of credit risk and do not take into account many other factors that can affect a bank’s financial condition, e.g., interest rate risk exposure, liquidity, funding and market risks, quality of investments, etc. Therefore, in judging a bank’s capital adequacy regulators take into account additional factors other than regulatory solvency ratios. Disclosed fair value amounts (such as unrealized gains and losses on available-for-sale securities) are one such item used by the regulators as an additional factor in assessing a bank’s overall capital adequacy even though they are not included in the estimation of regulatory solvency ratios.

Second, banks use fair value of assets that are only disclosed, and not necessarily recognized, under financial and regulatory reporting rules in internal risk management. For example, the fair value of a position (which might not be recognized under US GAAP, but only disclosed) influences decisions on haircuts and margin requirements and whether certain exposures are to be retained or sold. And, Cifuentes et al. (2005) shows that fair values used in internal risk management models can interact with changes in market conditions to increase bank contagion.

Third, disclosed fair value amounts may be used as inputs in managerial compensation contracts. Use of accounting amounts that are only disclosed and not recognized under the current reporting rules in compensation contracts can create incentives for managers to make procyclical trades that have the potential of increasing bank contagion (Plantin et al., 2008).

Higher values of FV\_ALL proxy for a more fair value-based reporting regime.

Since, the dependent variable, EXTREMENEG, is measured on a monthly frequency but
banks are required to file the FR Y-9C report on a quarterly basis, I use the most recently filed FR Y-9C data to calculate FV_ALL for each month.

To control for macro-economic factors, I include MKTRET and TBILL as control variables. MKTRET is the monthly CRSP equally-weighted market return and TBILL is the monthly 3-month Treasury bill rate. For instance, in time periods when the prices of assets reported at fair value are rising, the ratio of assets reported at fair value to total loans (i.e., FV_ALL) is higher by the virtue of its construction despite no change in reporting rules. Therefore, I include MKTRET and TBILL in the regression to control for the influence of such changes in market conditions on the relationship between bank contagion and the extent to which the reporting regime is fair value based.

De Bandt and Hartman (2000) find that over time banks have become more involved in financial trading activities as opposed to traditional lending. Thus, to control for changes in bank contagion due to changes in the business model of banks over time, I include bank-specific asset holdings. The inclusion of bank-specific asset holdings also helps to control for changes in FV_ALL unrelated to rule changes. I include LOANS, LOANS_FS, and DERR as proxies of bank-specific asset holdings in equation 1. LOANS (LOANS_FS) is the ratio of loans and leases held-for-investment (loans held-for-sale) to total assets. DERR is the ratio of the notional value of all derivatives held by a bank to total loans and lease financing receivables.

In addition, I also control for the total amount of loans and leases held-for-investment, loans held-for-sale, and derivative holdings in the entire banking sector. I do so because changes in the asset holdings of the banking sector as a whole over time can have consequences for an individual bank’s exposure to contagion beyond an individual bank’s asset composition. LOANS_ALL (LOANS_FS_ALL) is the sum of loans and
leases held-for-investment (loans held-for-sale) for all banks in the sample scaled by the
sum of total assets for all banks. DERR_ALL is the sum of notional value of derivatives
held by all the banks scaled by the sum of loans and lease financing receivables for all
banks.

I include fixed-year effects to control for omitted cross-sectional variable that
may be correlated with the spread of contagion. Finally, to control for the effect of
omitted bank-specific characteristics on the relationship between bank contagion and fair
value reporting, I include fixed-firm effects in my model.

In interpreting my results, a positive and significant coefficient on D_BANKRET,
$\beta_2$, is evidence of contagion among banks that exists due to trade or financial linkages in
the banking industry. A positive and statistically significant coefficient on the interaction
of FV_ALL and D_BANKRET, $\beta_4$, would be evidence of a positive association between
a more fair value-based reporting regime and increase in bank contagion, as predicted
under H1. Thus, my approach is carefully constructed to test for increase in contagion
above and beyond contagion that exists among banks due to trade or financial linkages as
the reporting regime becomes more fair value-oriented.

3.2. Test of the impact of market illiquidity on the association between bank contagion
and fair value accounting

To investigate H2, I expand equation (1) to include a proxy for market illiquidity:

\[ \text{contagion} = \beta_0 + \beta_1 \text{D_BANKRET} + \beta_2 \text{FV_ALL} + \beta_3 \text{DERR_ALL} + \beta_4 \text{D_BANKRET} \cdot \text{FV_ALL} + \epsilon \]

\[ \text{D_BANKRET} \] is the difference in the proportion of assets reported at fair value between
the current year and the previous year for all banks. \( \text{FV_ALL} \) is the sum of notional value of derivatives
held by all the banks scaled by the sum of loans and lease financing receivables for all
banks. 

\[ \text{DERR_ALL} \] is the difference in the proportion of assets reported at fair value between
the current year and the previous year for all banks.

\[ \text{FV_ALL} \] is the sum of notional value of derivatives held by all the banks scaled by the sum of loans and lease financing receivables for all
banks.

\[ \text{D_BANKRET} \cdot \text{FV_ALL} \] is the interaction term between \text{D_BANKRET} and \text{FV_ALL}.

\[ \epsilon \] is the error term.

\[ \text{contagion} \] is the dependent variable that represents the spread of contagion.

\[ \beta_0 \] is the intercept.

\[ \beta_1 \] is the coefficient on \text{D_BANKRET}.

\[ \beta_2 \] is the coefficient on \text{FV_ALL}.

\[ \beta_3 \] is the coefficient on \text{DERR_ALL}.

\[ \beta_4 \] is the coefficient on \text{D_BANKRET} \cdot \text{FV_ALL}.

If contracting parties and managers consider fair value estimates informative, they may produce and use
them in private contracts and decision models even in the absence of regulations that require the use of fair
values in financial reporting. However, it is not possible to infer the change in the extent to which fair value
estimates are privately used based on publicly available data. Therefore, \text{FV_ALL} captures the change in
the proportion of assets reported at fair value due to various reporting regulations. If the use of fair values
in private contracts and decision models is correlated with the use of fair values in financial reporting, then
a part of the increase in contagion associated with an increase in the proportion of assets reported at fair
value may be attributable to the increasing use of fair values in private contracts and bank decision models.
\[ EXTREMENEG_{i,t} = \beta_1 + \beta_2 D_{BANKRET} + \beta_3 FV_{ALL} + \beta_4 D_{BANKRET} \cdot FV_{ALL} + \beta_5 D_{ILLIQ} + \beta_6 D_{BANKRET} \cdot D_{ILLIQ} \cdot FV_{ALL} + \beta_7 MKTRET + \beta_8 TBILL + \beta_9 LOANS_{i,t} + \beta_{10} LOANS_{FS, i,t} + \beta_{11} DERR_{i,t} + \beta_{12} LOANS_{ALL} + \beta_{13} LOANS_{FS, ALL} + \beta_{14} DERR_{ALL} + \text{Fixed-Year Effects} + \text{Fixed-Firm Effects} + \text{error}_{i,t} \] 

(2)

D_{ILLIQ} is a proxy for periods of market illiquidity. It is an indicator variable that equals one when market illiquidity is in the top quartile, and zero otherwise. I use the liquidity measure of Amihud (2002) as modified by Boyson et al. (2010) to proxy for monthly market-wide illiquidity. Amihud’s (2002) proxy for market illiquidity is the ratio of daily absolute return to dollar trading volume on that day. I calculate a daily ratio of absolute return to dollar volume for each common stock on CRSP with listing on NYSE and positive share volume. After eliminating the top and bottom 1% observations to remove outliers, I calculate a monthly raw market-wide liquidity measure as the market cap-weighted average of all individual daily measures. To normalize the raw measure, I multiply it by the lagged ratio of CRSP market cap to CRSP market cap in the first month of the sample period. On June 24, 1997, NYSE changed the tick size from 1/8 to 1/16, and from 1/16 to $0.01 on January 29, 2001. To remove the impact of these changes on the proxy for market illiquidity, I regress the normalized monthly measure of market illiquidity on two tick size change indicator variables. The residual from this regression is a monthly measure of market-wide illiquidity, ILLIQ. A higher value of ILLIQ implies greater market-wide illiquidity. The indicator variable D_{ILLIQ} is coded such that it equals one when ILLIQ is in the top quartile, and zero otherwise.

It can be argued that D_{ILLIQ} only captures the illiquidity in the equity markets as it is estimated using NYSE data, whereas banks can hold assets that are traded in markets other than the equity markets. Chordia, Sarkar, and Subramanyam (2005) study the joint dynamics of liquidity, trading activity, returns, and volatility in stock and U.S.
Treasury bond markets. They find that liquidity co-varies across the asset markets. Shocks to spreads in one market increase spreads in other market. Therefore, even though D_ILLIQ is estimated using equity market data, I expect it to capture illiquidity in other asset markets as well with some amount of measurement error.

A positive and significant coefficient on the interaction of D_BANKRET, D_ILLIQ, and FV_ALL, $\beta_6$, would be evidence consistent with the hypothesis that a more fair value-based reporting regime is associated with a greater increase in bank contagion during periods of market illiquidity. H2 predicts a positive and significant $\beta_6$.

4. DATA

To test my hypotheses, I use U.S. bank holding companies as my sample. The central bank governors of the Group of Ten (G-10) countries adopted the Basel Capital Accord in 1988. The 1988 Basel Capital Accord, as implemented in the U.S., risk-weights the assets and the off-balance sheet items based on their perceived credit risk. The increasing size and complexity of banks led to an eventual review of the original 1988 Basel Accords in June, 2006. The regulatory agencies adopted a new risk-based capital adequacy framework in December, 2007 and the new rules were effective beginning April 1, 2008. Since the purpose of this study is to examine the impact of fair value accounting on systemic risk in banks, I restrict my sample to the years 1988 to 2007 to avoid noise and biases in the data due to changes in capital adequacy rules.

The sample comprises all U.S. bank holding companies that file the FR Y-9C report and have financial data available for the period 1988 to 2007 on The Bank Holding Companies Database maintained by the Federal Reserve Bank of Chicago and stock price data on CRSP. The final sample consists of 86,237 bank-month observations.

5. RESULTS
Table 1 reports the summary statistics of the variables used in this study. The mean of FV_ALL, i.e., the extent to which the reporting regime is fair value based, is 0.59. In other words, in the banking sector as a whole, on average, the assets reported at fair value amount to 59% of the total loans during the sample years 1988 to 2007. The mean of FV_BANK, i.e., the extent to which each individual bank is fair value-oriented, is 0.54.

5.1. Trends in the Extent to which the Reporting Regime is Fair Value-Oriented over Time

The proxy for the extent to which the reporting regime is fair value based, FV_ALL, is plotted over time in Figure 1. The time trend in Figure 1 is consistent with an increase in the use of fair value in financial reporting by banks over time. Over the sample period, FV_ALL is at a minimum of 0.24 from October to December, 1988 and achieves a maximum value of 1.02 during April to June, 2003.

Figure 1 also indicates the point in time when some of the significant changes in rules requiring reporting of fair values took place. In May 1993, FASB issued SFAS No. 115, Accounting for certain investments in debt and equity securities, which required the classification of debt and equity securities into three categories: held-to-maturity, trading, and available-for-sale securities. Also, required was the disclosure of fair value of securities classified as trading and available-for-sale. SFAS No. 115 was effective for all fiscal years ending after December 31, 1993. However, this did not result in a dramatic increase the amount of assets reported at fair value because banks were already disclosing the fair values of their investment securities.

SFAS No. 119, Disclosures about derivative financial instruments and fair value of financial instruments, become effective for fiscal years ending after December 31,
1994 (December 31, 1995 for entities with less than $150 million in total assets). SFAS No. 119 required disclosure of fair value estimates of derivative financial instruments. It also required disclosure of estimates of holding gains and losses for instruments that are held for trading purposes. Following SFAS No. 119, FV_ALL increased from 0.45 to 0.64.

In June, 1998 FASB issued SFAS No. 133, *Accounting for derivative instruments and hedging activities*, which superseded SFAS No. 119. SFAS No. 133 requires that a firm recognize all derivatives as assets or liabilities on the balance sheet at fair value. SFAS No. 133 was effective for all fiscal quarters of all fiscal years beginning after June 15, 2000.\(^\text{13}\)

Since SFAS No. 119 already required disclosure of fair value of derivatives and SFAS No. 133 only mandated recognition of derivatives as assets or liabilities, FV_ALL does not change significantly around the date when SFAS No. 133 became effective. FV_ALL already included the fair value of derivatives disclosed under SFAS No. 119, which subsequent to June 15, 2000 needed to be recognized as assets and liabilities. FV_ALL increased from 0.70 on March 31, 2002 to 0.92 percent on September 30, 2002 primarily due to the reporting of fair value of credit derivatives. The Federal Reserve required the banks to report the fair value of credit derivatives in the FY-9C reports beginning March 31, 2002. The FASB subsequently mandated the reporting of fair value of credit derivatives when it issued FIN 45 which was effective for financial statements of interim or annual periods ending after December 15, 2002.

Figure 2 shows the monthly distribution of the number of banks experiencing returns in the lowest decile of their time-series of returns over the sample period (i.e.,

\(^{13}\) As issued, SFAS No. 133 was effective for all fiscal quarters of all fiscal years beginning after June 15, 1999. SFAS No. 137 deferred the effective date of SFAS No. 133 to June 15, 2000.

5.2. Univariate analysis

The results from the univariate tests are reported in Table 2. I calculate the mean value of the EXTREMENEG variable conditional on the realization of the indicator variables, D_BANKRET, the interaction of D_BANKRET with D_FV_ALL and D_ILLIQ, and perform t-tests for differences in means. For the purpose of the univariate tests, I create an indicator variable D_FV_ALL which equals one when the value of FV_ALL is above or equal to its median value in the time series, and zero otherwise. A higher average for EXTREMENEG when the test variable is one implies an increase in contagion among banks.

The results in Table 2 indicate that the test variables, the interaction of D_BANKRET and D_FV_ALL, and the interaction of D_BANKRET, D_FV_ALL, and D_ILLIQ, are strongly associated with an increase in bank contagion. When D_BANKRET equals one, an average of 22% monthly-bank returns are in the bottom decile of the time-series of monthly-bank returns compared to only 7% when D_BANKRET is not equal to one. This is evidence consistent with existence of bank contagion, i.e., more banks in the financial system experience extreme negative returns (i.e., returns in the bottom decile) when the money center banks face financial difficulties. The difference between the means of EXTREMENEG is statistically significant. When both D_BANKRET and D_FV_ALL equal one, 23% of the banks in the sample have monthly returns in the bottom decile of their time-series of returns whereas only 8% of the sample banks have returns in the bottom decile of their time-series of returns when
D_BANKRET or D_FV_ALL do not equal one. This evidence shows that more banks perform poorly in the same month when the returns of the equally-weighted index of money center banks are in the bottom quartile and the reporting regime is relatively more fair value based. This is evidence consistent with H1, suggesting that a more fair value-based reporting regime is associated with an increase in bank contagion.

To investigate the impact of market illiquidity on the positive association between a fair value-oriented reporting regime and bank contagion, I interact D_BANKRET, D_FV_ALL, and D_I LIQ and estimate the means of the variable EXTREMENEG. The EXTREMENEG variable has a mean of 0.29 in the joint presence of money center banks performing poorly (D_BANKRET equals one), the reporting regime being more fair value based (the FV_ALL variable has a value greater or equal to its median), and markets being illiquid (D_I LIQ equals one), and 0.09 otherwise. This evidence is consistent with H2 and indicates that during periods of illiquidity, the positive association between bank contagion and a fair value-oriented reporting regime is greater.

5.3. Multivariate analysis

5.3.1. Fair value accounting and bank contagion

While the univariate analysis provides some initial evidence consistent with H1 and H2, in this section I estimate multivariate regressions controlling for several factors that can influence the relationship between fair value reporting and bank contagion to allow for better identification. The results of estimating equation (1) are reported in Table 3. Model 1 does not include fixed-year or fixed-firm effects. Model 2 includes fixed-year effects only, and model 3 includes both fixed-year and fixed-firm effects. Since, for the most part the inferences drawn from the three models do not differ, for the purpose of brevity, I only discuss the results of the most robust model that includes both fixed-year
and fixed-firm effects. Nonetheless, I do highlight the instances when the inferences drawn are different across the three models.

The coefficient on $D_{\text{BANKRET}}$, $\beta_2$, is positive and statistically significant\(^{14}\), indicating that a bank is more likely to experience extremely poor performance (i.e., returns below the 10\(^{th}\) percentile its time-series of returns) when the money center banks are experiencing financial difficulties. This is evidence of contagion among banks.

Consistent with H1, the coefficient on the interaction of $D_{\text{BANKRET}}$ and $FV_{\text{ALL}}$, $\beta_4$, is positive and statistically significant in models 2 and 3. In model 1, the coefficient is positive but not statistically significant which highlights the importance of including fixed- year and firm effects in the regressions. These results suggest that a more fair value based reporting regime is associated with an increase in contagion in the banking system.

Importantly, this evidence is obtained after controlling for contagion that exists in the banking industry exclusive of the financial reporting regime in place and after controlling for bank-specific as well banking sector-wide asset holdings.\(^{15}\)

Amongst the control variables, the coefficient on $MKTRET$, $\beta_5$, is negative and significant. This is consistent with banks being more likely to have extreme negative

\(^{14}\) I report unadjusted standard errors in the tables. Standard errors from a regression run on a panel dataset maybe biased in the presence of time-series dependence or cross-sectional dependence in residuals (see Petersen 2008). Since I include fixed-bank effects in my model, it is unlikely that residuals have time-series dependence in my setting. However, even though I include $MKTRET$ and $TBILL$ as independent variables and they should extract cross-sectional dependence from $EXTREMENEG$, the dependent variable; it may be the case that the standard errors are biased due to some leftover cross-sectional dependence in the residuals. To address the concern about cross-sectional dependence in the residuals, I re-estimate the standard errors by clustering them by quarter. Further, I also re-estimate the standard errors by clustering them by bank and by quarter to account for time-series and cross-sectional dependence in the residuals. Untabulated results indicate that the inferences drawn based on clustered standard errors remain unchanged.

\(^{15}\) Drawing conclusions based on the sign of the estimated coefficient on an interaction term in a logit regression may lead to erroneous inferences because under certain conditions the sign of the coefficient on the interaction term maybe different from the sign of the marginal effect of the interaction or the interaction effect may have different signs for different values of covariates. Therefore to ensure that I am not drawing incorrect inferences, I re-compute the logit model using the “inteff” command in Stata (see Norton, Ai, and Wang 2004). Untabulated results indicate that the coefficient on the interaction of $D_{\text{BANKRET}}$ and $FV_{\text{ALL}}$, $\beta_4$, is positive and statistically significant at the 10 percent level for all values of the covariates. Thus, inferences drawn based on the sign of $\beta_4$ are not incorrect.
returns when the equity market is doing poorly. The coefficient on TBILL, $\beta_6$, is positive and significant in model 1. However, after the inclusion of fixed-year and fixed-firm effects, the coefficient on TBILL turns negative. Also, the coefficients on LOAN_FS, LOANS_ALL, and DERR_ALL are consistently positive and statistically significant in all three models.

5.3.2. Market illiquidity's impact on the association between fair value accounting and bank contagion

Results of estimating equation (2) are presented in Table 4. Results indicate that after the inclusion of D_ILLIQ, the proxy for market illiquidity, there is still evidence of contagion among banks. The coefficient on D_BANKRET, $\beta_2$, remains positive and significant. The coefficient on the interaction of D_BANKRET and FV_ALL, $\beta_4$, is no longer statistically significant. This suggests that during periods of market liquidity, a more fair value-oriented reporting regime is not associated with an increase in bank contagion. Consistent with the prediction in H2, I find that the coefficient on the interaction of D_BANKRET, D_ILLIQ, and FV_ALL, $\beta_6$, is positive and significant. Thus, during periods of market illiquidity fair value accounting is associated with a greater increase in contagion among banks relative to periods when markets are liquid.

In summary, using multivariate logit models that control for macro-economic risks, bank-specific and bank-sector wide asset holdings, and include fixed-year and fixed-firm effects, I find that fair value accounting is positively associated with an increase in bank contagion above and beyond contagion that exists due to trade and
financial linkages in the banking industry. Further, the positive association between fair value accounting and bank contagion only occurs during periods of market illiquidity.\textsuperscript{16}

6. CROSS-SECTIONAL TESTS

In this section, I investigate whether the additional bank contagion associated with a more fair value-oriented reporting regime spreads as a function of bank-specific characteristics. More specifically, I examine whether the extent to which each bank holding company’s balance sheet is fair value-oriented and the level of bank capital affects the spread of additional contagion to individual banks.

6.1. Extent to which a bank’s balance sheet is fair value-oriented and the spread of contagion

In the cross-section, there is variation in the extent to which each bank’s balance sheet is fair value based because the amount of assets held by each bank that are required to be accounted for using fair value varies. So, even though the reporting regime for banks has become more fair value based over time (see Figure 1), the pressure from strategic concerns faced by banks that can lead to procyclical trades under a fair value based reporting regime would vary based on the proportion of assets each bank that are reported at fair value. In the extreme, a bank that does not hold any assets that are reported at fair value (i.e., its entire balance sheet consists of assets that are reported at historical or amortized cost) would be immune to the pressure to preempt a fall in prices from the selling of assets by other banks. This is because a fall in the prices of assets does not impact the carrying values of assets on its balance sheet. On the other hand, a bank whose entire balance sheet is composed of assets that are reported at fair value would be

\textsuperscript{16} The results are robust to using the 5\textsuperscript{th} percentile of time-series of returns as a cutoff for coding EXTREMENEG. Therefore, reported the results are not sensitive to using the 10\textsuperscript{th} percentile of time-series of returns as cutoff for classifying whether a bank is experiencing extremely poor returns in a given month.
most sensitive to the feedback effect of fair value accounting. I investigate whether the spread of bank contagion under a fair value-based reporting regime varies by the extent to which individual bank’s balance sheet is fair value-oriented. To do so, I estimate the following logit model:

$$\text{EXTREMENEG}_{i,t} = \beta_1 + \beta_2 D_{\text{BANKRET}} + \beta_3 FV_{\text{ALL}} + \beta_4 D_{\text{BANKRET}} \times FV_{\text{ALL}} + \beta_5 FV_{\text{BANK}} + \beta_6 D_{\text{BANKRET}} \times FV_{\text{BANK}} \times FV_{\text{ALL}} + \beta_7 \text{MKTRET} + \beta_8 \text{TBILL} + \beta_9 \text{LOANS} \times FV_{\text{BANK}} + \beta_{10} \text{LOANS}_{FS} \times FV_{\text{BANK}} \times FV_{\text{ALL}} + \beta_{11} \text{DERR} + \beta_{12} \text{LOANS}_{ALL} + \beta_{13} \text{LOANS}_{FS} \times FV_{\text{ALL}} + \beta_{14} D_{\text{BANKRET}} \times FV_{\text{ALL}} + \text{Fixed-Year Effects} + \text{Fixed-Firm Effects} + \text{error}_{i,t} \quad (3)$$

$FV_{\text{BANK}}$ measures the extent to which a bank’s balance sheet is fair value-oriented. $FV_{\text{BANK}}$ is the ratio of the sum of assets recognized or disclosed at fair value by the bank scaled by its loans held-for-investment. A positive and statistically significant coefficient on the interaction of $D_{\text{BANKRET}}, FV_{\text{BANK}}, \text{and FV}_{\text{ALL}}, \beta_6$, would be evidence consistent with the notion that under a more fair value based reporting regime, financial difficulties at the money center banks are more likely to spread to banks that are themselves more fair value-oriented. The other variables in equation 3 have been defined before.

The results of estimating equation (3) are reported in Table 5. In all three models, the coefficient on $D_{\text{BANKRET}}, \beta_2$, is positive and significant. This is evidence of contagion among banks. The coefficient on the interaction of $D_{\text{BANKRET}}$ and $FV_{\text{ALL}}, \beta_4$, is significant in models 2 and 3 providing evidence of fair value-related contagion. Finally, the coefficient on the interaction of $D_{\text{BANKRET}}, FV_{\text{BANK}}, \text{and FV}_{\text{ALL}}, \beta_6$, is positive and statistically significant in all three models. This suggests that in a more fair value-oriented reporting regime, the increased bank contagion associated with fair value reporting is more likely to spread to banks that are more fair value-oriented themselves.
6.2. Bank capital and the spread of contagion

Cifuentes et al. (2005) show that the interaction of mark-to-market accounting with externally imposed solvency requirements has the potential of increasing contagion in the financial system. The authors argue that following a shock that depresses the market value of assets carried on the balance sheet, concerns about violation of regulatory capital adequacy ratios would lead to forced disposal of assets. However, a bank that is well-capitalized and has the ability to absorb losses from the decrease in the value of assets without resulting in a violation of capital adequacy ratios is less likely to dispose its assets in a fire-sale. Thus, the additional bank contagion introduced by fair value accounting is more likely to spread to banks that are poorly capitalized.

To test if increase in bank contagion associated with a more fair value-oriented reporting regime is more likely to spread to banks that are poorly capitalized, I estimate the following logit model:

\[
\text{EXTREMENEG}_{i,t} = \beta_1 + \beta_2 D_{\text{BANKRET}}_{i,t} + \beta_3 \text{FV} \_\text{ALL}_{i,t} + \beta_4 D_{\text{BANKRET}}_{i,t} \ast \text{FV} \_\text{ALL}_{i,t} + \\
+ \beta_5 \text{CAP}_{i,t} + \beta_6 D_{\text{BANKRET}}_{i,t} \ast \text{CAP}_{i,t} \ast \text{FV} \_\text{ALL}_{i,t} + \beta_7 \text{MKTRET}_{i,t} + \beta_8 \text{TBILL}_{i,t} + \beta_9 \text{LOANS}_{i,t} + \\
+ \beta_{10} \text{LOANS} \_\text{FS}_{i,t} + \beta_{11} \text{DERR}_{i,t} + \beta_{12} \text{LOANS} \_\text{ALL}_{i,t} + \beta_{13} \text{LOANS} \_\text{FS} \_\text{ALL}_{i,t} + \\
\beta_{14} \text{DERR} \_\text{ALL}_{i,t} + \text{Fixed-Year Effects} + \text{Fixed-Firm Effects} + \text{error}_{i,t} \tag{4}
\]

CAP is an indicator variable that proxies for the level of bank capital. CAP equals one if a bank is classified as well-capitalized as per the Prompt Corrective Action (PCA) of the Federal Deposit Insurance Corporation Improvement Act, two if a bank is classified as adequately capitalized, three if a bank is undercapitalized, and four if a bank is significantly or critically undercapitalized. Thus, the higher the value of CAP, the worse off is the bank in terms of adequate capital. Consistent with the prediction that additional contagion associated with a more fair value-oriented reporting regime is likely to spread to banks that lack adequate capital, I expect the coefficient on the interaction of
D_BANKRET, CAP, and FV_ALL, $\beta_6$, to be positive and statistically significant. The other variables in equation (4) have been defined before.

The Bank Holding Companies Database has data for the capital adequacy ratios beginning March 31, 2001. So, for the purpose of the analysis in this section, my sample period is restricted to the years 2001 to 2007. Equation (4) is estimated using a total of 33,121 bank-month observations.

The results of estimating equation (4) are reported in Table 6. The coefficient on D_BANKRET, $\beta_2$, is no longer statistically significant. The coefficient on the interaction of D_BANKRET and FV_ALL, $\beta_4$, is positive and statistically significant. Thus, there is evidence of a positive association between the increase in bank contagion and a more fair value-based reporting regime. As predicted, $\beta_6$, the coefficient on the interaction of D_BANKRET, CAP, and FV_ALL is positive and statistically significant in each of the three models. This is evidence consistent with the notion that in a more fair value based reporting regime, the increased bank contagion is more likely to spread to banks with lower capital buffers.

Given the restrictions placed on poorly capitalized banks, strong efforts are made by bank management to keep their banks well-capitalized for PCA purposes and to avoid the three undercapitalized categories. The Federal Reserve Bank of St. Louis notes that it is very unusual for a bank not to be well-capitalized and even more unusual for a bank to be in one of the three undercapitalized categories. To ensure that the results in Table 6 are not driven by a few banks that are classified as undercapitalized or worse, I re-estimate equation (4) by coding CAP equal to zero if a bank is well-capitalized and one otherwise. I find that the inferences drawn do not change if I re-define CAP as a dichotomous indicator variable. The untabulated results suggest that increase in bank contagion is
higher for banks that are not well-capitalized under a more fair value-based reporting regime.

In summary, in this section, I find that additional bank contagion associated with a more fair value based reporting regime is more likely to spread to banks whose balance sheets are more fair value-oriented, i.e., a higher proportion of their assets are reported at fair value. Further, poorly capitalized banks are more likely to be impacted by additional bank contagion associated with a more fair value-oriented reporting regime.

7. ADDITIONAL ANALYSIS AND ROBUSTNESS TESTS

In this section, I report the results of additional analysis and robustness tests.

7.1. Contagion from medium- and small-sized banks

As additional analysis, I run a test using an equally-weighted index comprising of seventeen random small- or medium-sized bank holding companies as a proxy for difficulties in the financial system (instead of an index of money center banks) to investigate whether contagion from small- and medium-sized banks is also enhanced in a more fair value-based reporting regime.

Money center banks are crucial for the stability of the banking system because the failure of money center banks can cause a systemic crisis. Thus, financial difficulties at money center banks are likely to adversely affect other banks in the economy. On the other hand, since small- or medium-sized banks are not as crucial as money center banks for the stability of the financial system, the failure of small- or medium-sized banks will not adversely affect the health of the other banks in the financial system to the same extent as the failure of a money center bank. Thus, it is not obvious whether contagion from small- and medium-sized banks will spread to other banks in the economy and if a
more fair value-based reporting system will exacerbate this contagion. To investigate this question, I re-examine the relationship between fair value accounting and bank contagion using the returns performance of an equally-weighted index of seventeen random small- or medium-sized banks as a proxy for difficulties in the banking industry. I use Nissim and Penman’s (2008) cutoff of total assets of $10 billion or less to identify small- and medium-sized bank holding companies.

I re-estimate equations (1) and (2) after substituting D_BANKRET with D_RDMRET. D_RDMRET is an indicator variable that equals one when the monthly return for an equally-weighted index of seventeen random small- or medium-sized banks is in the bottom quartile and D_BANKRET is not equal to one, and zero otherwise. The results are reported in Table 7. In both the models, the coefficient on D_RDMRET, $\beta_2$, is positive and statistically significant. This is evidence consistent with existence of contagion from small- and medium-sized banks. The coefficient on the interaction of D_RDMRET and FV_ALL, $\beta_4$, is negative and statistically insignificant. This suggests that a more fair value-oriented reporting regime is not associated with an increase in contagion from the small- and medium-sized banks. Further, when I classify the sample period into periods of market liquidity and illiquidity, I find no evidence of fair value accounting being associated with an increase in contagion from small- or medium-sized during periods of market illiquidity. In model 2, the coefficient on the interaction of D_RDMRET, D_ILLIQ, and FV_ALL, $\beta_6$, is negative and statistically insignificant. Thus, the results suggest that there exists contagion from small- and medium-sized banks but this contagion is not exacerbated by a more fair value based reporting system.

7.2. Excluding money center banks from the sample
The results presented in Table 3 and Table 4 are based on a sample that includes money center banks which also comprise the equally-weighted bank index. To address the concern that I am inducing a positive bias in my coefficients of interest ($\beta_4$ in Table 3 and $\beta_6$ in Table 4) by including the money center banks that comprise the equally-weighted bank index in the sample, I re-estimate my tests after excluding the money center banks from the sample. Untabulated results indicate that the inferences drawn do not change upon excluding the money center banks from the sample. I continue to find that the extent of fair value reporting is associated with an increase in contagion among banks. When I split my sample into periods of market liquidity and illiquidity, I find that the positive association between fair value accounting and bank contagion in enhanced during periods of market illiquidity.

8. CONCLUSION

In this paper, I study whether increased use of fair values in financial reporting is associated with additional contagion in the banking system. I find that increase in the use of fair values in financial reporting is associated with additional bank contagion. The increase in bank contagion is most severe during periods of market illiquidity. Further, the cross-sectional analyses indicate that additional bank contagion associated with fair value reporting is more likely to spread to banks: i) that are poorly capitalized, or ii) that have a relatively higher proportion of fair value assets.

Like any other archival empirical study, I do not claim to have found causal links between fair value reporting and additional bank contagion. And, though I only provide evidence of a positive association between fair value accounting and additional bank contagion, I do believe my findings can be of interest to policy-makers and regulators.
The Emergency Economic Stabilization Act of 2008 gave the SEC the power to suspend mark-to-market accounting because several parties have blamed fair value accounting for exacerbating the credit crunch that has followed the Subprime crisis. The findings of this paper should be useful to standard setters and regulators in weighing the costs and benefits of a fair value-based reporting regime for banks and deciding whether a) fair value accounting worsened the credit crunch that followed the Subprime crises, b) should fair value accounting rules be suspended or modified, and c) whether fair value is the appropriate measurement and reporting basis for financial instruments when markets are distressed or illiquid.

In this paper, my attempt is not to document the superiority of a historical cost-based reporting regime over one based on fair value. Rather my intentions are to document an alleged unintended externality of fair value accounting in the banking industry. The advantages of more timely and relevant information under a fair value-oriented reporting regime may overwhelm those of a historical cost-based regime if markets are liquid and competitive. Since the prices at which transactions occur in markets that are not deep and competitive can deviate significantly from fundamental prices in hypothetical frictionless competitive markets, the superiority of a fair value reporting regime is not obvious in this context. As pointed out by Plantin et al. (2008), when there is more than one imperfection in a competitive economy, removing just one of these imperfections may not be welfare improving. Instead, removal of one of the imperfections could magnify the negative effects of the other imperfections to the detriment of overall welfare. However, it is important to note that fair value accounting rules by themselves may not increase contagion among banks. It is only when fair values are used as inputs in regulatory ratios, internal control mechanisms or incentive contracts
for management that a more fair value-oriented reporting regime can interact with market conditions to increase bank contagion. Given that accounting numbers are used in multiple contexts, it might be more appropriate to adjust banking regulations and management incentive contracts rather than suspend and/or modify fair value accounting rules. For example, as suggested by Laux and Leuz (2009), it may be better to design prudential regulations that accept fair value accounting as a starting point but set explicit counter-cyclical capital requirements to address the issue of financial stability.
Appendix A: Money Center Banks Included in the Equally-Weighted Money Center Bank Index

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bank of America Corporation</td>
</tr>
<tr>
<td>2.</td>
<td>Canadian Imperial Bank of Commerce</td>
</tr>
<tr>
<td>3.</td>
<td>Citigroup Inc.</td>
</tr>
<tr>
<td>4.</td>
<td>JPMorgan Chase &amp; Co.</td>
</tr>
<tr>
<td>5.</td>
<td>KeyCorp</td>
</tr>
<tr>
<td>6.</td>
<td>Ohio Legacy Corp.</td>
</tr>
<tr>
<td>7.</td>
<td>Oriental Financial Group Inc.</td>
</tr>
<tr>
<td>8.</td>
<td>PNC Financial Services Group I</td>
</tr>
<tr>
<td>9.</td>
<td>Royal Bank of Canada</td>
</tr>
<tr>
<td>10.</td>
<td>SunTrust Banks Inc.</td>
</tr>
<tr>
<td>11.</td>
<td>TCF Financial Corporation</td>
</tr>
<tr>
<td>13.</td>
<td>The Bank Of Nova Scotia</td>
</tr>
<tr>
<td>14.</td>
<td>Toronto-Dominion Bank</td>
</tr>
<tr>
<td>15.</td>
<td>United Bancshares Inc.</td>
</tr>
<tr>
<td>16.</td>
<td>Wachovia Corporation</td>
</tr>
<tr>
<td>17.</td>
<td>Wells Fargo &amp; Company</td>
</tr>
</tbody>
</table>
REFERENCES


Wallison, P.J. May 1, 2008. “Judgment too important to be left to the accountants.”
http://www.aei.org/publications/filter.all.pubID.27917/pub_detail.asp

Notes to Figure 1:
FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held for investment by these banks
Figure 2: Number of Banks Experiencing Returns in the Lowest Decile of their Time-Series of Returns per Month

Notes to Figure 2:
The monthly distribution of the number of banks experiencing returns in the lowest decile of their time-series of returns over the sample period (i.e., January, 1988 to December, 2007).
Table 1: Summary Statistics

This table reports the summary statistics for the variables used in the study.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>25th Percentile</th>
<th>75th Percentile</th>
<th>Standard Deviation</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKTRET</td>
<td>0.0123</td>
<td>0.0160</td>
<td>-0.0185</td>
<td>0.0393</td>
<td>0.0495</td>
<td>240</td>
</tr>
<tr>
<td>TBILL (in %)</td>
<td>4.4357</td>
<td>4.8150</td>
<td>3.0650</td>
<td>5.4650</td>
<td>1.9033</td>
<td>240</td>
</tr>
<tr>
<td>BANKRET</td>
<td>0.0164</td>
<td>0.0162</td>
<td>-0.0147</td>
<td>0.0509</td>
<td>0.0582</td>
<td>240</td>
</tr>
<tr>
<td>ILLIQ</td>
<td>-5.50E-12</td>
<td>9.97E-11</td>
<td>-1.38E-9</td>
<td>1.36E-9</td>
<td>2.46E-9</td>
<td>240</td>
</tr>
<tr>
<td>FV_ALL</td>
<td>0.5984</td>
<td>0.5898</td>
<td>0.4440</td>
<td>0.7954</td>
<td>0.2184</td>
<td>80</td>
</tr>
<tr>
<td>LOANS_ALL</td>
<td>0.5722</td>
<td>0.5750</td>
<td>0.5295</td>
<td>0.5936</td>
<td>0.0405</td>
<td>80</td>
</tr>
<tr>
<td>LOANS_FS_ALL</td>
<td>0.0173</td>
<td>0.0168</td>
<td>0.0099</td>
<td>0.0260</td>
<td>0.0111</td>
<td>80</td>
</tr>
<tr>
<td>DERR_ALL</td>
<td>10.2491</td>
<td>10.7295</td>
<td>0.0000</td>
<td>17.1150</td>
<td>9.0164</td>
<td>80</td>
</tr>
<tr>
<td>FV_BANK</td>
<td>0.5454</td>
<td>0.3650</td>
<td>0.2469</td>
<td>0.5357</td>
<td>3.1559</td>
<td>28,882</td>
</tr>
<tr>
<td>LOANS</td>
<td>0.6399</td>
<td>0.6558</td>
<td>0.5805</td>
<td>0.7190</td>
<td>0.1236</td>
<td>28,882</td>
</tr>
<tr>
<td>LOANS_FS</td>
<td>0.0105</td>
<td>0.0006</td>
<td>0.0000</td>
<td>0.0066</td>
<td>0.03416</td>
<td>28,882</td>
</tr>
<tr>
<td>DERR</td>
<td>0.7336</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0119</td>
<td>9.0442</td>
<td>28,882</td>
</tr>
<tr>
<td>TIER1 RBC RATIO</td>
<td>13.79</td>
<td>12.73</td>
<td>11.60</td>
<td>14.45</td>
<td>12.05</td>
<td>11,173</td>
</tr>
<tr>
<td>TOTAL RBC RATIO</td>
<td>12.12</td>
<td>11.27</td>
<td>10.00</td>
<td>13.01</td>
<td>5.20</td>
<td>11,173</td>
</tr>
<tr>
<td>TIER1 LEVERAGE RATIO</td>
<td>9.06</td>
<td>8.60</td>
<td>7.70</td>
<td>9.72</td>
<td>7.99</td>
<td>11,173</td>
</tr>
</tbody>
</table>

Notes to Table 1:
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate
BANKRET – Monthly return for an equally-weighted index of money center banks
ILLIQ – Amihud’s (2002) proxy for market illiquidity as modified by Boyson et al. (2008). See section 3.2 for details about the estimation of ILLIQ
FV_ALL - Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks
LOANS_ALL - Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks
LOANS_FS_ALL - Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks
DERR_ALL - Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks
FV_BANK - Ratio of the sum of assets disclosed or recognized by a bank at fair value scaled by loans held-for-investment
LOANS – Loans and leases held-for-investment scaled by total assets
LOANS_FS – Loans held-for-sale scaled by total assets
DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment
TIER1 RBC RATIO – Tier 1 risk-based capital ratio estimated as tier 1 capital divided by risk-weighted assets
TOTAL RBC RATIO – Total risk-based capital ratio estimated as the sum of tier 1 and tier 2 capital divided by risk-weighted assets
TIER1 LEVERAGE RATIO – Tier 1 leverage ratio estimated as tier 1 capital divided by average total consolidated assets
Table 2: Univariate Analysis

This table reports the conditional mean of the variable EXTREMENEG for the indicator variables D_BANKRET, the interaction of D_BANKRET and D_FV_ALL, and the interaction of D_BANKRET, D_FV_ALL, and D_ILLIQ. EXTREMENEG equals one if a bank’s monthly return is less than the 10th percentile of its time-series of returns, and zero otherwise. The sample period is 1988 to 2007.

<table>
<thead>
<tr>
<th>Indicator Variable = D_BANKRET</th>
<th>Number of Observations</th>
<th>Mean of EXTREMENEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_BANKRET = 0</td>
<td>64,827</td>
<td>0.07</td>
</tr>
<tr>
<td>D_BANKRET = 1</td>
<td>21,410</td>
<td>0.22</td>
</tr>
<tr>
<td>Difference in EXTREMENEG Means</td>
<td></td>
<td>0.15***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator Variable = D_BANKRET and D_FV_ALL</th>
<th>Number of Observations</th>
<th>Mean of EXTREMENEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_BANKRET*D_FV_ALL = 0</td>
<td>75,061</td>
<td>0.08</td>
</tr>
<tr>
<td>D_BANKRET*D_FV_ALL = 1</td>
<td>11,176</td>
<td>0.23</td>
</tr>
<tr>
<td>Difference in EXTREMENEG Means</td>
<td></td>
<td>0.15***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator Variable = D_BANKRET and D_ILLIQ and D_FV_ALL</th>
<th>Number of Observations</th>
<th>Mean of EXTREMENEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_BANKRET<em>D_ILLIQ</em>D_FV_ALL = 0</td>
<td>82,178</td>
<td>0.09</td>
</tr>
<tr>
<td>D_BANKRET<em>D_ILLIQ</em>D_FV_ALL = 1</td>
<td>4,059</td>
<td>0.29</td>
</tr>
<tr>
<td>Difference in EXTREMENEG Means</td>
<td></td>
<td>0.20***</td>
</tr>
</tbody>
</table>

Notes to Table 2:
Differences in means with ***, **, and * are statistically significant at the 1%, 5%, and 10% levels, respectively.

Variable Definitions:
D_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise
D_FV_ALL – Equals one when the proxy for the extent to which the reporting regime is fair value-oriented, FV_ALL, is above the median, and zero otherwise
D_ILLIQ – Equals one when Amihud’s (2002) modified proxy for market illiquidity is in the top quartile, and zero otherwise
Table 3: Test of H1 - Fair Value Accounting and Bank Contagion

This table reports the results from a logit regression that examines whether fair value accounting is associated with an increase in bank contagion. The model estimated is as below:

\[ \text{EXTREMENEG}_{it} = \beta_1 + \beta_2 \text{D_BANKRET}_t + \beta_3 \text{FV_ALL}_t + \beta_4 \text{D_BANKRET}_t \times \text{FV_ALL}_t + \beta_5 \text{MKTRET}_t + \beta_6 \text{TBILL}_t + \beta_7 \text{LOANS}_{i,t} + \beta_8 \text{LOANS_FS}_{i,t} + \beta_9 \text{DERR}_{i,t} + \beta_{10} \text{LOANS_ALL}_{i,t} + \beta_{11} \text{LOANS_FS_ALL}_{i,t} + \beta_{12} \text{DERR_ALL}_{i,t} + \varepsilon_{i,t} \]

EXTREMENEG equals one if a bank’s monthly return is less than the 10th percentile of its time-series of returns, and zero otherwise. The logit regression is determining the likelihood of the dependent variable being equal to ‘1’. The sample period is 1988 to 2007. Model 1 excludes fixed-year effects and fixed-firm effects. Model 2 includes fixed-year effects only, and model 3 includes both fixed-year and fixed firm-effects.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Pred. Sign</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Estimate</td>
<td>P-Value</td>
<td>Estimate</td>
<td>P-Value</td>
<td>Estimate</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td></td>
<td>-11.093</td>
<td>&lt;.01***</td>
<td>-11.352</td>
<td>&lt;.01***</td>
<td>-11.472</td>
</tr>
<tr>
<td>D_BANKRET</td>
<td>+</td>
<td>1.082</td>
<td>&lt;.01***</td>
<td>0.627</td>
<td>&lt;.01***</td>
<td>0.627</td>
</tr>
<tr>
<td>FV_ALL</td>
<td>?</td>
<td>0.498</td>
<td>0.14</td>
<td>2.709</td>
<td>&lt;.01***</td>
<td>2.697</td>
</tr>
<tr>
<td>D_BANKRET*FV_ALL</td>
<td>+</td>
<td>0.090</td>
<td>0.22</td>
<td>0.394</td>
<td>&lt;.01***</td>
<td>0.399</td>
</tr>
<tr>
<td>MKTRET</td>
<td></td>
<td>-4.938</td>
<td>&lt;.01***</td>
<td>-4.672</td>
<td>&lt;.01***</td>
<td>-4.729</td>
</tr>
<tr>
<td>TBILL</td>
<td></td>
<td>0.033</td>
<td>0.03**</td>
<td>-0.030</td>
<td>0.31</td>
<td>-0.033</td>
</tr>
<tr>
<td>LOANS</td>
<td></td>
<td>0.138</td>
<td>0.17</td>
<td>0.133</td>
<td>0.19</td>
<td>0.485</td>
</tr>
<tr>
<td>LOANS_FS</td>
<td></td>
<td>0.684</td>
<td>0.03**</td>
<td>0.531</td>
<td>0.10*</td>
<td>1.124</td>
</tr>
<tr>
<td>DERR</td>
<td></td>
<td>0.000</td>
<td>0.97</td>
<td>0.000</td>
<td>0.92</td>
<td>0.000</td>
</tr>
<tr>
<td>LOANS_ALL</td>
<td></td>
<td>12.903</td>
<td>&lt;.01***</td>
<td>10.661</td>
<td>&lt;.01***</td>
<td>10.363</td>
</tr>
<tr>
<td>LOANS_FS_ALL</td>
<td></td>
<td>19.337</td>
<td>&lt;.01***</td>
<td>2.331</td>
<td>0.69</td>
<td>1.890</td>
</tr>
<tr>
<td>DERR_ALL</td>
<td></td>
<td>0.026</td>
<td>&lt;.01***</td>
<td>0.103</td>
<td>&lt;.01***</td>
<td>0.106</td>
</tr>
</tbody>
</table>

Fixed-Year Effects | NO | YES | YES |
Fixed-Firm Effects | NO | NO | YES |
N                  | 86,237 | 86,237 | 86,237 |
Adjusted R-square  | 0.05 | 0.07 | 0.07 |

Notes to Table 3:
*, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1 - (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise
FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate
LOANS – Loans and leases held-for-investment scaled by total assets
LOANS_FS – Loans held-for-sale scaled by total assets
DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment
LOANS_ALL – Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks
LOANS_FS_ALL – Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks
DERR_ALL – Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks
**Table 4: Test of H2 - Impact of Market Illiquidity on Fair Value Accounting and Bank Contagion**

This table reports the results from a logit regression that examines the impact of market illiquidity on the association between fair value accounting and bank contagion. The model estimated is as below:

\[
\text{EXTREMENEG}_{i,t} = \beta_1 + \beta_2 D_{\text{BANKRET}}_t + \beta_3 FV_{\text{ALL}}_t + \beta_4 D_{\text{BANKRET}}_t*FV_{\text{ALL}}_t + \beta_5 D_{\text{ILLIQ}}_t + \beta_6 D_{\text{BANKRET}}_t*D_{\text{ILLIQ}}_t*FV_{\text{ALL}}_t + \beta_7 \text{MKTRET}_t + \beta_8 \text{TBILL}_t + \beta_9 \text{LOANS}_{i,t} + \beta_{10} \text{LOANS}_{\text{FS}}_{i,t} + \beta_{11} \text{DERR}_{i,t} + \beta_{12} \text{LOANS}_{\text{ALL}}_t + \beta_{13} \text{LOANS}_{\text{FS,ALL}}_t + \beta_{14} \text{DERR}_{\text{ALL}}_t + \text{error}_{i,t}
\]

EXTREMENEG equals one if a bank’s monthly return is less than the 10th percentile of its time-series of returns, and zero otherwise. The logit regression is determining the likelihood of the dependent variable being equal to ‘1’. The sample period is 1988 to 2007. Model 1 excludes fixed-year effects and fixed-firm effects. Model 2 includes fixed-year effects only, and model 3 includes both fixed-year and fixed-firm effects.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Pred. Sign</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERCEPT</td>
<td></td>
<td>-10.683</td>
<td>&lt;.01***</td>
<td>-11.177</td>
</tr>
<tr>
<td>D_BANKRET</td>
<td>+</td>
<td>1.126</td>
<td>&lt;.01***</td>
<td>0.668</td>
</tr>
<tr>
<td>FV_ALL</td>
<td>?</td>
<td>0.176</td>
<td>0.60</td>
<td>2.474</td>
</tr>
<tr>
<td>D_BANKRET*FV_ALL</td>
<td>+</td>
<td>-0.186</td>
<td>0.94</td>
<td>0.172</td>
</tr>
<tr>
<td>D_ILLIQ</td>
<td>?</td>
<td>-0.102</td>
<td>0.01***</td>
<td>-0.065</td>
</tr>
<tr>
<td>D_BANKRET*D_ILLIQ</td>
<td>+</td>
<td>0.677</td>
<td>&lt;.01***</td>
<td>0.516</td>
</tr>
<tr>
<td>*FV_ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MKTRET</td>
<td>-4.406</td>
<td>&lt;.01***</td>
<td>-4.204</td>
<td>&lt;.01***</td>
</tr>
<tr>
<td>TBILL</td>
<td>0.047</td>
<td>&lt;.01***</td>
<td>-0.003</td>
<td>0.90</td>
</tr>
<tr>
<td>LOANS</td>
<td>0.132</td>
<td>0.19</td>
<td>0.131</td>
<td>0.20</td>
</tr>
<tr>
<td>LOANS_FS</td>
<td>0.697</td>
<td>0.03**</td>
<td>0.535</td>
<td>0.10*</td>
</tr>
<tr>
<td>DERR</td>
<td>0.000</td>
<td>0.99</td>
<td>0.000</td>
<td>0.94</td>
</tr>
<tr>
<td>LOANS_ALL</td>
<td>12.291</td>
<td>&lt;.01***</td>
<td>10.024</td>
<td>&lt;.01***</td>
</tr>
<tr>
<td>LOANS_FS_ALL</td>
<td>22.420</td>
<td>&lt;.01***</td>
<td>5.396</td>
<td>0.36</td>
</tr>
<tr>
<td>DERR_ALL</td>
<td>0.029</td>
<td>&lt;.01***</td>
<td>0.119</td>
<td>&lt;.01***</td>
</tr>
</tbody>
</table>

Fixed-Year Effects
Fixed-Firm Effects

<table>
<thead>
<tr>
<th>N</th>
<th>Adjusted R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>86,237</td>
<td>0.05</td>
</tr>
<tr>
<td>86,237</td>
<td>0.07</td>
</tr>
<tr>
<td>86,237</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Notes to Table 4:
* *, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1- (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise
FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks
D_ILLIQ – Equals one when Amihud’s (2002) modified proxy for market illiquidity is in the top quartile, and zero otherwise
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate
LOANS – Loans and leases held-for-investment scaled by total assets
LOANS_FS – Loans held-for-sale scaled by total assets
DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment
LOANS_ALL – Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks
LOANS_FS_ALL – Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks
DERR_ALL – Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks
Table 5: The Extent to which a Bank is Fair Value-Oriented and the Spread of Contagion

This table reports the results from a logit regression that investigates whether the positive association between a more fair value-oriented reporting regime and an increase in bank contagion is greater for banks that are more fair value-oriented. The model estimated is as below:

\[
 EXTREMENEG_{i,t} = \beta_1 + \beta_2 D_{BANKRET_{i,t}} + \beta_3 FV_{ALL_{i,t}} + \beta_4 D_{BANKRET_{i,t}} \cdot FV_{ALL_{i,t}} + \beta_5 FV_{BANK_{i,t}} + \beta_6 D_{BANKRET_{i,t}} \cdot FV_{BANK_{i,t}} \cdot FV_{ALL_{i,t}} + \beta_7 MKTRET_{t} + \beta_8 TBILL_{t} + \\
\beta_9 LOANS_{i,t} + \beta_{10} LOANS_{FS_{i,t}} + \beta_{11} DERR_{i,t} + \beta_{12} LOANS_{ALL_{t}} + \beta_{13} LOANS_{FS_{ALL_{t}}} + \beta_{14} DERR_{ALL_{t}} + error_{i,t}
\]

EXTREMENEG equals one if a bank’s monthly return is less than the 10\textsuperscript{th} percentile of its time-series of returns, and zero otherwise. The logit regression is determining the likelihood of the dependent variable being equal to ‘1’. The sample period is 1988 to 2007. Model 1 excludes fixed year-effects and fixed-firm effects. Model 2 includes fixed-year effects only, and model 3 includes both fixed-year and fixed-firm effects.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Pred. Sign</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Estimate</td>
<td>P-Value</td>
<td>Estimate</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td></td>
<td>-11.143</td>
<td>&lt;.01***</td>
<td>-11.146</td>
</tr>
<tr>
<td>D_BANKRET</td>
<td>+</td>
<td>1.084</td>
<td>&lt;.01***</td>
<td>0.629</td>
</tr>
<tr>
<td>FV_ALL</td>
<td>?</td>
<td>0.502</td>
<td>0.14</td>
<td>2.718</td>
</tr>
<tr>
<td>D_BANKRET*FV_ALL</td>
<td>+</td>
<td>0.067</td>
<td>0.28</td>
<td>0.370</td>
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Notes to Table 5:
* *, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1- (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise
FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks
FV_BANK – Ratio of the sum of assets disclosed or recognized by a bank at fair value scaled by loans held-for-investment
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate
LOANS – Loans and leases held-for-investment scaled by total assets
LOANS_FS – Loans held-for-sale scaled by total assets
DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment
LOANS_ALL – Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks
LOANS_FS_ALL – Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks
DERR_ALL – Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks
Table 6: Bank Capital and Spread of Contagion

This table reports the results from a logit regression that investigates whether the positive association between a more fair value-oriented reporting regime and increased bank contagion is greater for banks that are poorly capitalized. The model estimated is as below:

$$\text{ EXTREMENEG}_{i,t} = \beta_1 + \beta_2 D_{\text{BANKRET}} + \beta_3 FV_{\text{ALL}} + \beta_4 D_{\text{BANKRET}} \times FV_{\text{ALL}} + \beta_5 \text{CAP}_{i,t} + \beta_6 D_{\text{BANKRET}} \times \text{CAP} \times FV_{\text{ALL}} + \beta_7 \text{MKTRET} + \beta_8 \text{TBILL} + \beta_9 \text{LOANS}_{i,t} + \beta_{10} \text{LOANS}_{FS} + \beta_{11} \text{DERR}_{i,t} + \beta_{12} \text{LOANS}_{ALL} + \beta_{13} \text{LOANS}_{FS} + \beta_{14} \text{DERR}_{ALL} + \text{error}_{i,t}$$

EXTREMENEG equals one if a bank’s monthly return is less than the 10th percentile of its time-series of returns, and zero otherwise. The logit regression is determining the likelihood of the dependent variable being equal to ‘1’. The sample period is 2001 to 2007. Model 1 excludes fixed-year effects and fixed-firm effects. Model 2 includes fixed-year only, and model 3 includes both fixed-year and fixed-firm effects.

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Notes to Table 6:

*, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1- (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is below the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise

FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks

CAP – Equals one if a bank is classified as well-capitalized, two if a bank is adequately capitalized, three if a bank is undercapitalized, and four if a bank is significantly or critically undercapitalized

MKTRET – Monthly CRSP equally-weighted market return

TBILL – Monthly 3-month Treasury bill rate

LOANS – Loans and leases held-for-investment scaled by total assets

LOANS_FS – Loans held-for-sale scaled by total assets

DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment

LOANS_ALL – Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks

LOANS_FS_ALL – Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks

DERR_ALL – Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks
This table reports the results from logit regressions that examine whether fair value accounting is associated with an increase in contagion from small- and medium-sized bank holding companies. The following two models are estimated:

\[ \text{EXTREMENEG}_{i,t} = \beta_1 + \beta_2 \text{D}_{\text{RDMRET}} + \beta_3 \text{FV}_{\text{ALL}} + \beta_4 \text{D}_{\text{RDMRET}} \times \text{FV}_{\text{ALL}} + \beta_5 \text{MKTRET} + \beta_6 \text{TBILL} + \text{error}_{i,t} \]

\[ \text{EXTREMENEG}_{i,t} = \beta_1 + \beta_2 \text{D}_{\text{RDMRET}} + \beta_3 \text{FV}_{\text{ALL}} + \beta_4 \text{D}_{\text{RDMRET}} \times \text{FV}_{\text{ALL}} + \beta_5 \text{D}_{\text{ILLIQ}} + \beta_6 \text{D}_{\text{RDMRET}} \times \text{D}_{\text{ILLIQ}} \times \text{FV}_{\text{ALL}} + \beta_7 \text{MKTRET} + \beta_8 \text{TBILL} + \text{error}_{i,t} \]

EXTREMENEG equals one if a bank’s monthly return is in the bottom decile of its time-series of returns, and zero otherwise. The logit regression is determining the likelihood of the dependent variable being equal to ‘1’. The sample period is 1988 to 2007.

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<th>Model 2</th>
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Notes to Table 7:
* *, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1- (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_RDMRET – Equals one when the monthly return for an equally-weighted index of seventeen random small- and medium-sized banks is in the bottom quartile and D_BANKRET is not equal to one, zero otherwise.

Notes to Table 7:
* *, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1- (p/2)) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:
D_RDMRET – Equals one when the monthly return for an equally-weighted index of seventeen random small- and medium-sized banks is in the bottom quartile and D_BANKRET is not equal to one, zero otherwise.
FV_ALL – Sum of assets disclosed or recognized at fair value by the banks in the sample scaled by the sum of loans held-for-investment by these banks
D_ILLIQ – Equals one when Amihud’s (2002) modified proxy for market illiquidity is in the top quartile, and zero otherwise
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate
LOANS – Loans and leases held-for-investment scaled by total assets
LOANS_FS – Loans held-for-sale scaled by total assets
DERR – Sum of notional value of derivative contracts held by a bank scaled by loans held-for-investment
LOANS_ALL – Sum of loans and leases held-for-investment by the banks in the sample scaled by the sum of total assets of these banks
LOANS_FS_ALL – Sum of loans held-for-sale by the banks in the sample scaled by the sum of total assets of these banks
DERR_ALL – Sum of the notional value of derivative contracts held by the banks in the sample scaled by the sum of loans held-for-investment by these banks