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"Does fair value accounting

contribute to Systemic Risk in the Banking Industry?"

Urooj Khan

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

Urooj Khan
Columbia Business School
609 Uris Hall
3022 Broadway
New York, NY 10027
uk2117@columbia.edu

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 has 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 and liabilities.

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, argue that fair value accounting has created a vicious circle of falling prices and led to a financial meltdown (Hughes and Tett 2008; Johnson 2008; and Rummell 2008). Speaking at a SEC panel on mark-to-market accounting and the market turmoil following the subprime crisis, William Isaac, Federal Deposit Insurance Corporation (FDIC) chairman from 1978 to 1985, blamed mark-to-market accounting for causing the financial meltdown that followed the subprime crisis (Katz, 2008).[1] 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 the systemic risk in the banking industry.[2]

In this paper, I 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 an increase in 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 and liabilities are more likely to be affected by the increase in systemic risk associated with fair value accounting.

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[1] In this paper, I use the terms mark-to-market accounting and fair value accounting interchangeably.
[2] 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).

Fair value accounting uses market prices and other market inputs to value assets and liabilities. Under a fair value-oriented accounting regime, concerns about compliance with externally imposed solvency ratios (e.g., minimum regulatory capital requirements for banks) can force a firm to sell its assets following an event that reduces the market value of its assets.[3] If the market's ability to absorb excess supply shocks is less than perfect, which is likely to be the case for markets during periods of financial distress, such forced disposals will result in a short-run decrease in market prices. Under a fair value-oriented accounting regime when assets are marked down to the new lower price, a firm may be forced to sell even more assets to avoid violating regulatory solvency constraints. Additional disposals of assets can further depress prices, creating a feedback loop of falling prices and increasing the threat of systemic failure of the financial system (Cifuentes et al. 2005). Accordingly, I first investigate whether fair value accounting is associated with an increase in systemic risk in the banking industry as a whole.

Sales of assets have a greater impact on price in the short-term when markets are illiquid. Thus, concerns about compliance with solvency ratios which can lead to procyclical trades and an increase in systemic risk are heightened during periods of market illiquidity. Therefore, I next examine whether the association between a more fair value-oriented accounting 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-oriented accounting regime is more likely to affect

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[3] A 'fair value-oriented accounting regime' refers to a financial reporting regime in which FASB requires financial institutions to account for their assets and liabilities using fair value. The extent to which the accounting regime is fair value-oriented varies over time. The variation is jointly due to changes in FASB rules regarding accounting for assets and liabilities using fair value, and changes in financial institutions' holdings of assets and liabilities that need to be accounted for using fair value.

banks with: (i) a larger proportion of assets and liabilities reported at fair value and, (ii) lower levels of regulatory capital.

First, a bank that reports a relatively larger proportion of its assets and liabilities 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 fire-sale. Therefore, I predict that the increase in systemic risk associated with fair value accounting is more likely to affect banks that are poorly capitalized.

At the heart of the concept of systemic risk in banking is the notion of contagion among banks. 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. 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 bank holding companies; I estimate logit regressions to test whether a more fair value-oriented accounting regime is associated with increase in contagion among banks. 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-oriented accounting regime. To proxy for the extent to which the accounting regime is fair value-oriented at a certain point in time, I estimate the ratio of the sum of assets and liabilities recognized or

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disclosed using fair value by all the banks in my sample to the sum of total assets for these banks. The higher this ratio, the more fair value-oriented is the accounting regime.

The results indicate that a more fair value-oriented accounting 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 under a more fair value-oriented accounting regime. Further, fair value accounting is associated with an increase in bank contagion only during periods of market illiquidity. The results of the cross-sectional tests indicate that the increased bank contagion associated with fair value accounting is more likely to spread to banks that have lower capital adequacy ratios or are more fair value-oriented.

An alternate explanation for my findings is that increased bank contagion associated with a more fair value-oriented accounting regime is due to fair value accounting providing more value relevant information during crises. Many would agree that fair value estimates are more relevant for valuation purposes; however there is lack of consensus in the literature about whether fair value estimates are sufficiently reliable to be valuation-relevant, especially during times when the markets are in turmoil and market prices or market inputs are used to estimate fair value.[4] To rule out the alternative explanation for my findings, I examine whether fair value accounting is associated with upside contagion during booms or good times. If the additional bank contagion associated with fair value accounting is because fair value accounting provides more value relevant information during crises, I should find that a more fair value-oriented accounting regime

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[4] Consistent with the idea that fair value accounting does not increase transparency or provide more value relevant information during crises, Evans, Hodder and Hopkins (2010) find that bank's fair value information is less value-relevant during periods of heightened market-wide credit risk.

is associated with increased bank contagion during good times as well because there is no reason to expect that fair value accounting provide information that is incrementally value relevant only during crises but not during booms or good times. On the other hand, if the additional downside bank contagion associated with a more fair value-oriented accounting regime is due to fair value accounting exacerbating price declines and inducing procyclical trades following a shock, I should not find any evidence of an association between fair value accounting and increased contagion during good times. The reason being, during good times fair value accounting is unlikely to interact with solvency regulatory constraints and result in a price feedback effect that can increase contagion among banks. The results indicate that during booms, fair value accounting is not associated with an increase in bank contagion suggesting that the increased bank contagion during crises associated with a more fair value-oriented reporting regime is not because fair value accounting provides more value-relevant information during crises.

I believe this is the first paper to provide empirical evidence of the impact of fair value accounting on systemic risk in the banking industry. It documents that banks experience increased co-movement of extreme negative stock returns as the use of fair value in financial reporting has increased. Further, the increased co-movement of extreme negative returns among banks associated with the increasing use of fair value accounting is more pronounced during periods of illiquidity, and among banks that are more fair value oriented or closer to violating minimum capital adequacy ratios.

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. In related research, Bhat, Frankel and Martin (2010) document price-decline related selling of mortgage-backed securities by banks close to the minimum

regulatory capital requirements providing empirical evidence of feedback effects related to fair value accounting. Badertscher, Burks and Easton (2010) examine the effects of fair value losses on bank regulatory capital and sale of securities during the credit 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. Also, Bowen, Khan and Rajgopal (2010) 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. They also find some evidence suggesting that banks that benefitted the most from the relaxation of fair value accounting rules were the most susceptible to contagion.

Unlike this study, none of the above mentioned papers examine the implications of fair value accounting on the probability of the breakdown of the banking system as a whole. Also, this is the first paper 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 U.S. bank holding companies with available date over a 20-year period. The 20-year sample period includes several banking crises and significant variation in the use of fair values in financial reporting by banks.

The results of this study can 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 have blamed fair value accounting for exacerbating the credit crunch that has followed the Subprime crisis. The evidence presented in this paper can help the SEC and the standard setters analyze the impact of fair value

accounting on systemic risk in banks and thereby help them in determining the costs and benefits of a fair value-based accounting regime for banks.

The rest of the paper is organized as follows. I develop my hypotheses 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. RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

2.1. Fair value accounting and systemic risk

In the wake of the Subprime crisis, critics have argued that a cost associated with a fair value-oriented accounting regime is that it can create contagion, a vicious circle of falling prices, and increase the risk of failure of the financial system as a whole. In an analytical framework, Cifuentes, Ferrucci, and Shin (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 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.[5]

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

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[5] The findings of Cifuentes at al. (2005) hold even in the absence of externally imposed solvency requirements if banks have internal risk-control mechanisms in place that cause them to sell assets whose prices have fallen. Using data from U.S. Flow of Funds account, Adrian and Shin (2007) find that commercial banks in the U.S. seem to target a fixed leverage ratio. This implies that when assets of banks are marked to market, a shock that reduces the market price of assets can lead to sale of assets by a bank adjusting its leverage back to the target ratio.

such scenarios, a fair value-oriented accounting 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 accounting regime, banks can continue and meet all their future liabilities.

Plantin, Sapra, and Shin (2008) assume that a bank manager seeks to maximize accounting earnings and show that under a fair value-oriented accounting 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-oriented accounting 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 being the first to sell assets that have declined in value) under a mark-to-market 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-oriented accounting regime is associated with a greater increase in systemic risk in the banking system during periods of market illiquidity.

3.   RESEARCH DESIGN AND VARIABLE MEASUREMENT

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

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. 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 oriented. 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, allows for conditioning on additional risk factors and does not parameterize tail dependencies.[6] A similar approach is adopted in Eichengreen, Rose, and Wyplosz (1996), Bae, Karolyi, and Stulz (2003) and Boyson, Stahel, and Stulz (2008) to examine contagion.

Accordingly, I estimate the following logit model:

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t}$ *(1)*

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[6] 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.

The dependent variable, $EXTREMENEG_{i,t}$, is set to one if bank i's return for month t is below the 10th percentile (i.e., in the bottom decile) of the entire time-series of monthly returns of bank i, and zero otherwise.[7]

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.[8] Appendix A lists the seventeen money center banks included in the equally-weighted index.

FV_ALL measures the extent to which the accounting regime is fair value oriented. FV_ALL is the ratio of the sum of assets and liabilities (held-to-maturity securities, available-for-sale securities, trading assets, mortgage servicing rights, other financial assets, derivative contracts, trading liabilities, other financial liabilities and servicing liabilities) recognized or disclosed at fair value by the banks in my sample to the sum of total assets of these banks.[9]

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[7] Following Boyson, Stahel, and Stulz (2008), I use a lower 10% cutoff of the entire time-series distribution of returns to identify firm-specific "extreme" negative returns.

[8] 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.

[9] 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.

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 capital. I include disclosed fair value amounts along with recognized fair value amounts in the estimation of FV_ALL for two reasons. First, banks use fair value of assets and liabilities that are only disclosed, and not necessarily recognized, under financial 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. Second, 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 U.S. GAAP 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-oriented accounting 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, when the markets are doing well, the ratio of assets and liabilities marked-to-market to total assets (i.e., FV_ALL) is higher by the virtue of its construction. Therefore, I include MKTRET in the regression to

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control for the influence of changes in market conditions on the relationship between bank contagion and the extent to which the reporting regime is fair value-oriented.

De Bandt and Hartman (2000) find that over time banks have become more involved in financial trading activities as opposed to traditional lending. To control for changes in bank contagion due to operational and structural changes in the banking sector over time I include fixed-year effects. Further, 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, β_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, β_4, would be evidence of a positive association between a more fair value-oriented accounting regime and increase in bank contagion. 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:

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t * FV\_ALL_t + \beta_5 D\_ILLIQ_t + \beta_6 D\_BANKRET_t * D\_ILLIQ_t * FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t + Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t}$ *(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. (2008) 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 the caveat that like any other proxy, D_ILLIQ is not a perfect proxy and contains some amount of measurement error.

A positive and significant coefficient on the interaction of D_BANKRET, D_ILLIQ, and FV_ALL, β_6, would be evidence consistent with the hypothesis that a more fair value-oriented accounting regime is associated with a greater increase in bank contagion during periods of market illiquidity. H2 predicts a positive and significant β_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 793 unique bank holding companies.

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 oriented, is 0.37. In other words, as a proportion of total assets of the banks in the sample, 37 percent of assets and liabilities are either recognized or disclosed using fair value on average

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 0.16.

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

Consistent with FASB's long-term objective of using fair value to account for financial instruments, the financial reporting rules for U.S. banks have become more fair value-oriented over time. The proxy for the extent to which the accounting regime is fair value-oriented, FV_ALL, is plotted over time in Figure 1. The time trend in Figure 1 is consistent with a significant increase in the use of fair value in financial reporting by banks in recent years.

Prior to December 31, 1993, the sum of all assets and liabilities recognized or disclosed using fair value is less than five percent of the total assets of the banks in my sample. 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. Subsequent to SFAS No. 115 becoming effective, FV_ALL sharply increased from 5 percent to 24 percent.

The next big increase in FV_ALL is around December 31, 1994. This increase can be attributed to SFAS No. 119, *Disclosures about derivative financial instruments and fair value of financial instruments*, becoming effective for fiscal years ending after December 31, 1994. 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.

From December, 1994 to March, 2002 the total of assets and liabilities accounted

for using fair value as a proportion of total assets of the sample banks hovered between

35 percent and 51 percent. 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.[10] 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 48 percent on March 31,

2002 to 66 percent on September 30, 2002 primarily due to the reporting of fair value of

credit derivatives.

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.,

January, 1988 to December, 2007). The maximum number of banks experiencing returns

in their lowest decile in any given month is 388 at the time of the Long Term Capital

Management crisis (August, 1998).

5.2. Univariate analysis

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[10] 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.

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_BANRKET with D_FV_ALL and D_ILLIQ, and perform t-tests for differences in means. For the purpose of the unvariate 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 21% monthly-bank returns are in the bottom decile of the time-series of monthly-bank returns compared to only 6% 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, 24% of the banks in the sample have monthly returns in the bottom decile of their time-series of returns whereas, only 9% 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 accounting regime is relatively

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more fair value oriented. This is evidence consistent with H1, suggesting that a more fair value-oriented accounting 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 accounting regime and bank contagion, I interact D_BANKRET, D_FV_ALL, and D_ILLIQ and estimate the means of the variable EXTREMENEG. The EXTREMENEG variable has a mean of 0.31 in the joint presence of money center banks performing poorly (D_BANKRET equals one), the accounting regime being more fair value oriented (the FV_ALL variable has a value greater or equal to its median), and markets being illiquid (D_ILLIQ 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 accounting regime is greater.

5.3. Multivariate analysis

5.3.1. Fair value accounting and bank contagion

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, the inferences drawn from the three models do not differ, for the purpose of brevity, I only discuss the results of the model that includes both fixed-year and fixed-firm effects.

In model 3, the coefficient on D_BANKRET, β_2, is positive and statistically significant, indicating that a bank is more likely to experience extremely poor performance (i.e., returns below the 10th 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_BANKRET and FV_ALL, β_4, is positive and statistically significant. This suggests that a more fair value-

oriented accounting 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.[11]

The coefficient on MKTRET, β_5, is negative and significant. This is consistent with banks being more likely to have extreme negative returns when the equity market is doing poorly. The coefficient on TBILL, β_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.

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 of model 3 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, β_2, remains positive and significant. The coefficient on the interaction of D_BANKRET and FV_ALL, β_4, is no longer statistically significant. This suggests that during periods of market liquidity, a more fair value-oriented accounting 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, β_6, is positive and significant.[12] Thus, during periods of market illiquidity fair value accounting is

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[11] 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_BANKRET and FV_ALL, β_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 β_4 are not incorrect.

[12] 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

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 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.[13]

5.3.3. Historical cost-based reporting regime and increase in bank contagion

Under a historical cost-based reporting regime, assets deemed other-than-temporarily impaired are written down to fair value. Thus, it can be argued that during crises, a historical cost-based accounting regime is similar to a fair value-oriented accounting regime and can lead to increased bank contagion. However, it is unlikely that a historical cost-based accounting regime will contribute to bank contagion.

For assets whose changes in fair value are not recognized in earnings on a regular basis, the asset is deemed to be impaired if its fair value is less than its amortized cost basis at the reporting date. The impairment is considered other-than-temporary only if the firm does not expect to recover the entire amortized cost basis of the asset before the maturity of the asset or before the intended sale of the asset. To the extent a firm expects

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. Untabulated results indicate that the inferences drawn based on adjusted standard errors remain unchanged.

[13] The results are robust to using the 5th percentile of time-series of returns as a cutoff for coding EXTREMENEG. Therefore, reported the results are not sensitive to using the 10th percentile of time-series of returns as cutoff for classifying whether a bank is experiencing extremely poor returns in a given month.

that the assets' amortized cost basis will be recovered before maturity or sale of the asset, the impairment is considered temporary and no impairment loss or charge is required to be recorded under a historical cost reporting regime. Whereas, under a fair value accounting reporting regime even temporary or short-term market dislocations that result in decreases in asset prices and cause asset prices to deviate from fundamental value, i.e., temporary impairments, will result in an impairment loss being recorded on the income statement. The fact that temporary price declines are required to be recognized on the financial statements under a fair value reporting regime, can result in banks de-leveraging or in fire-sales of assets to avoid regulatory or internal risk management constraints which can contribute to bank contagion.

Further, unlike under a fair value oriented reporting regime, managers have considerable discretion and judgment in ascertaining whether impairment is other than temporary under a historical cost accounting regime. Prior research has shown that managers use this discretion opportunistically to delay recording impairments. Ramanna and Watts (2008) find that 71% of their sample firms delay recording goodwill impairments and the discretion in recording impairments is used opportunistically to manage financial statements. Also, the Savings and Loans (S&L) crisis is a case in point that highlights that under a historical cost accounting regime firms do not take timely impairments and thus it is unlikely that increased contagion will be observed under a reporting regime based on historical cost. The crisis partly stemmed from the fact that the variable interest rate on deposit liabilities rose above the fixed interest rates earned on the mortgage assets. The total liabilities of the savings and loans institutions exceeded their total assets by USD 118bn on a fair value basis, effectively leaving most institutions insolvent. However, this deficit did not appear on the savings and loans institutions'

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balance sheets which were based on historical cost accounting because the institutions did not record other-than-temporary impairments on a timely basis thereby contributing to the length and the severity of the S&L crisis. Ironically, after the S&L crisis the standard setters and regulators advocated a move towards a reporting regime based of fair value accounting to avoid delays in recording impairments and as a remedy for such a prolonged credit crises. Under a fair value accounting reporting regime, firms do not have the option to avoid reporting assets at a temporarily depressed price on the balance sheet. Therefore, strategic concerns that can lead to procyclical trades and increase bank contagion are unlikely to arise under a historical cost-based accounting regime.

6. CROSS-SECTIONAL TESTS

In this section, I investigate whether the additional bank contagion associated with a more fair value-oriented accounting 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 oriented because the amount of assets and liabilities held by each bank that are required to be accounted for using fair value varies. So, even though the accounting regime for banks has become more fair value oriented over time (see Figure 1), the pressure from strategic concerns faced by banks that can lead to procyclical trades under fair value accounting would vary based on the proportion of assets and liabilities of each bank that are marked-to-market. In the extreme, a bank that does not hold any assets

or liabilities that are accounted for using fair value (i.e., its entire balance sheet consists of assets and liabilities that are accounted for using historical 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 and liabilities on its balance sheet. On the other hand, a bank whose entire balance sheet is composed of assets and liabilities that are accounted for using fair value would be most sensitive to the feedback effect of fair value accounting. I investigate whether the spread of bank contagion under a fair value oriented-accounting 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:

$$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t * FV\_ALL_t$$
$$+ \beta_5 FV\_BANK_{i,t} + \beta_6 D\_BANKRET_t * FV\_BANK_{i,t} * FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t +$$
$$Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t} \qquad (3)$$

FV_BANK measures the extent to which a bank's balance sheet is fair value oriented. FV_BANK is the ratio of the sum of assets and liabilities (held-to-maturity securities, available-for-sale securities, trading assets, mortgage servicing rights, other financial assets, derivative contracts, trading liabilities, other financial liabilities and servicing liabilities) recognized or disclosed at fair value by the bank scaled by its total assets. A positive and statistically significant coefficient on the interaction of D_BANKRET, FV_BANK, and FV_ALL, β_6, would be evidence consistent with the notion that under a more fair value-oriented accounting 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_BANKRET, β_2, is positive and significant. This is evidence of

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contagion among banks. The coefficient on the interaction of D_BANKRET and

FV_ALL, β_4, is no longer significantly different from zero. The coefficient on the

interaction of D_BANKRET, FV_BANK, and FV_ALL, β_6, is positive and statistically

significant in all three models. This suggests that in a more fair value-oriented accounting

regime, the increased bank contagion 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

accounting regime is more likely to spread to banks that are poorly capitalized, I estimate

the following logit model:

EXTREMENEG$_{i,t}$ = β_1 + β_2D_BANKRET$_t$ + β_3FV_ALL$_t$ + β_4 D_BANKRET$_t$*FV_ALL$_t$
+ β_5CAP$_{i,t}$ + β_6D_BANKRET$_t$*CAP$_{i,t}$*FV_ALL$_t$ + β_7MKTRET$_t$ + β_8TBILL$_t$ + Fixed-Year
Effects + Fixed-Firm Effects + error$_{i,t}$ (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 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 accounting 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, β_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 33,124 bank-month observations.

The results of estimating equation (4) are reported in Table 6. The coefficient on D_BANKRET, β_2, is no longer statistically significant. The coefficient on the interaction of D_BANKRET and FV_ALL, β_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-oriented accounting regime. As predicted, β_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-oriented accounting 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-oriented accounting regime.

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

7.   ROBUSTNESS TESTS AND ADDITIONAL ANALYSES

In this section, I report the results from robustness tests to rule out alternative explanations to my findings.

7.1. Fair value accounting and upside-contagion during good times

An alternative explanation for the association between fair value accounting and increased bank contagion on the downside could be that fair value accounting provides more value relevant information to bank investors during crises relative to historical cost accounting. Value-relevance of an accounting amount is a joint function of the relevance and reliability of the reported amount. If the increased contagion amongst banks returns is due to fair value accounting providing more value relevant information during security market downturns, it has to be the case that a reported amount on a fair value basis is

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more relevant to investors' valuation decisions and is measured with more reliability compared to the same amount being reported on an amortized cost or historical cost basis.

Many would agree that fair value estimates are more relevant for valuation purposes; however there is a lack of consensus in the literature about whether fair value estimates are sufficiently reliable to be valuation-relevant. Especially, during crises when markets are in turmoil, credit risk is high and market prices or market inputs are used to estimate fair value. Consistent with this idea, Evans et al. (2010) find that bank's fair value information is less value-relevant during periods of heightened market-wide credit risk.

To rule out the above alternative explanation for my results, I examine whether fair value accounting is associated with additional bank contagion during booms or good times. If the additional downside contagion observed during security market downturns under more fair value-oriented regimes is due to fair value accounting providing value-relevant information in such times, then it should be the case that fair value accounting provides greater transparency and more value-relevant information during good times as well and I should find that fair value accounting is associated with upside contagion during booms/good times. On the other hand, if the additional downside contagion associated with a more fair value-oriented regime is due to fair value accounting exacerbating price declines and inducing procyclical trades following a shock, then I should not find any evidence of an association between fair value accounting and upside contagion. Accordingly, I estimate the following logit regressions –

$EXTREMEPOS_{i,t} = \beta_1 + \beta_2 GD\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 GD\_BANKRET_t * FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t}$ (5)

In equation (5), $EXTREMEPOS_{i,t}$, is set to one if bank i's return for month t is greater than the 90th percentile of the entire time-series of its monthly returns, and zero otherwise. GD_BANKRET is a proxy for good times/boom in the banking industry. It is an indicator variable that equals one when the monthly return on the equally-weighted index of money center banks is greater than the 75th percentile of its time-series of returns, and zero otherwise.

The results of estimating equation (1) are reported in Table 7 of the paper. The coefficient on the interaction of GD_BANKRET and FV_ALL (β_4) is negative and statistically insignificant. This implies that during booms, fair value accounting is not associated with an increase in bank contagion. Hence, this evidence is inconsistent with the alternative explanation that the increased downside contagion associated with a more fair value-oriented reporting regime is because of fair value accounting providing value relevant information during security market downturns.

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 (β_4 in Table 3 and β_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. As a result the sample size reduces to 95,621 bank-month observations and 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 exists only during periods of market illiquidity.

7.3. Excluding fair value amounts that are not recognized on the financial statements under US GAAP in measuring FV_ALL

In calculating the extent to which the reporting regime is fair value oriented, FV_ALL, I include the fair value of assets and liabilities that are recognized as well as disclosed under US GAAP. Bank regulations require that unrealized fair value gains and losses are excluded in the estimation of regulatory capital requirements. In general, only those amounts that are recognized in net income and retained earnings in accordance with US GAAP are included in the estimation of regulatory capital ratios. Therefore, it can be argued that the contagion argument in the paper is weakened because I am including amounts in FV_ALL that the bank regulations exclude in the estimation of regulatory ratios. Since unrealized fair value gains and losses on held-to-maturity securities and available-for-sale securities are excluded in calculating regulatory capital ratios, to address this concern I re-calculate FV_ALL after excluding the fair value of held-to-maturity and available-for-sale securities and re-test the hypotheses. Untabulated results indicate that the inferences drawn do not change.

7.4. Alternate capital-raising and capital-preserving options during crises

Instead of selling fair value assets that have declined in value in crises, arguably, a bank may issue additional equity, reduce planned repurchases of stock or payment of planned dividends to avoid violating binding capital constraints. If such is the case, then it is less likely that banks will be forced into procyclical trades and therefore fair value accounting should not contribute to bank contagion. Banks could also use these other equity-raising or equity-preserving strategies in conjunction with selling fair value assets

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that have declined in value. However, it is unlikely that banks will issue additional equity during a crisis, a time-period characterized by depressed equity prices and high information asymmetry. Nonetheless, I investigate this possibility and perform two additional tests.

First, I examine whether banks in my sample are issuing additional equity or reducing share repurchases to avoid violating binding constraints during crises. To do so, I perform a t-test for a difference in means to investigate whether banks issue more equity (net of share repurchases) during months classified as crisis months versus the non-crisis months in the sample period. Untabulated results indicate that the difference in the mean of net equity issued during crisis and non-crisis months is not statistically different from zero.

Second, I investigate whether banks declare lower dividends during crisis months to avoid violating binding capital constraints. I compare dividends declared on common stocks and preferred stocks in the crisis months to non-crisis and perform a t-test for a difference in their means. The untabulated results show that the means of the dividends declared on common stocks and preferred stocks during crisis and non-crisis months are not statistically different. In summary, the evidence indicates that banks are not pursuing other capital-raising or capital-preserving options to avoid potentially binding capital constraints.

7.5. Fair value accounting contagion in industries other than banking

In general, all industries seem to have inter-firm stock correlations that increase during a crisis but the impact of accounting standards requiring the use of fair values in financial reporting has differed from industry to industry. In this section, I examine whether fair value accounting contributes to downside contagion in industries other than

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banking and whether the fair value contagion observed in the banking industry is out of line with what we see in other industries with similar large negative value shocks.[14] The three industries I examine are food stores (2-digit SIC code 54), manufacturing (2-digit SIC code 20 to 39) and retail trade (2-digit SIC code 52 to 59, excluding 54). I choose these three industries because these industries have been minimally impacted by the new fair value rules enacted over the years. Therefore, they provide good placebo samples to examine whether inter-firm stock correlations that are anti-cyclical have increased as the use of fair value reporting has varied in financial reporting. I estimate the following logit regression for each of the above mentioned industries –

$$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_TOP10RET_t + \beta_3 FV\_ALL_t + \beta_4 D\_TOP10RET_t * FV\_ALL_t +$$
$$\beta_5 MKTRET_t + \beta_6 TBILL_t + \textit{Fixed-Year Effects} + \textit{Fixed-Firm Effects} + error_{i,t} \qquad (6)$$

In the above equation, D_TOP10RET is an indicator variable that equals 1 when the returns for an equally-weighted index of the ten largest firms in the industry is below the 25th percentile of its time-series of returns, and zero otherwise. To construct the equally-weighted index of the ten largest firms, I select the ten firms in each industry with the largest market value of equity at the beginning of each month. Thus, D_TOP10RET is a proxy for crises in an industry and a substitute for D_BANKRET that I use in my tests of H1 and H2. EXTREMENEG equals one if a firm in the industry experiences monthly returns that are below the 10th percentile of its time-series of returns, and zero otherwise. All other variables are as defined earlier in the paper.

The results of estimating equation 6 are reported in Table 8. The results indicate that that each industry has evidence of contagion, i.e., the coefficient on D_TOP10RET is positive and statistically significant. However, I fail to find any evidence of increase in

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[14] I would like to thank Matthew Spiegel for suggesting this robustness test.

contagion associated with a more fair value accounting oriented reporting regime. The coefficient on the interaction of D_TOP10RET and FV_ALL is positive for the retail trade and food stores regression, but it is not statistically significant. Thus, a firm is more likely to have extreme negative stock returns when other firms are experiencing poor performance, however unlike in the banking industry, I do not find that contagion has increased as the extent of fair value accounting used in financial reporting has increased.

7.6. Influence of omitted correlated variables

During the 20-year sample period, many things have changed in the banking industry, e.g., the composition of bank asset portfolios has changed, there have been mergers and acquisitions in the industry, etc. Some of these factors that have varied over the sample period can be correlated with the extent to which the reporting regime is fair value oriented and thus present an omitted correlated variable problem if the specific factor is not explicitly controlled for. While it is impossible to completely rule out that the documented results of any empirical study are not an artifact of a correlated omitted variable because the list of correlated variables can be endless, I make several attempts by using a robust research design to ensure that my reported results are not driven by an omitted variable that is correlated with the extent to which the reporting regime is fair value oriented. Below I list the different research design choices that I make to rule out the effects of correlated omitted variables –

1. I include fixed-year effects in my model to control for operational and structural changes taking place in the banking sector over time. The impact on contagion of the change in the business model of banks over time should be captured by these fixed-year effects to a large extent.

2. I include fixed-firm effects in my model to control for omitted bank-specific characteristics that may be correlated with the extent to which the reporting regime is fair value oriented (FV_ALL) and the likelihood of the monthly return being in the lowest decile of returns (EXTREMENEG). Fixed-firm effects do not control for factors that may have varied with FV_ALL over time, but they help to rule out that the documented results are due to an innate firm characteristic that has not been included in the regression.

3. I control for contagion that exists in the banking industry due to trade and financial linkages in the banking sector, unrelated to fair value accounting, by including D_BANKRET in the model. My variable of interest in the tests of H1 and H2, i.e., the interactions of FV_ALL and D_BANKRET for H1 and the interaction of FV_ALL, D_BANKRET and D_ILLIQ for H2, capture contagion above and beyond contagion that exists due to other factors. Therefore, a potential increase in contagion due to mergers and acquisitions, increase in risky loans and the use of derivatives, or changes in business model should be captured by D_BANKRET.

I also perform an additional test where I include risk-weighted leverage in the regression to examine whether I find evidence of increase in contagion related to fair value accounting after controlling for a shift in the business model of banks where they are investing in more risky assets. To ensure that my results are not driven by this shift in the business model, I include risk-weighted leverage (LEV) in equation 7 below to proxy for increase in the holding of riskier assets. LEV is calculated as the inverse of the Tier 1 leverage ratio. I use risk-weighted leverage in the equation below rather than the more traditional measure of leverage (i.e., the ratio of total assets to equity) because the risk-weighted measure takes risk into consideration by risk-weighting assets and including capital for market risk. Further, it is also consistent with the measure used by regulators

to assess the capital solvency of banks. The rest of the variables in the equation below are estimated as described earlier in the paper.

Accordingly, I estimate the following logit model:

$EXTREMENEG_{i,t}$ = β_1 + $\beta_2 D\_BANKRET_t$ + $\beta_3 FV\_ALL_t$ + $\beta_4 D\_BANKRET_t*FV\_ALL_t$ + $\beta_5 LEV_{i,t}$ + $\beta_6 D\_BANKRET_t*LEV_{i,t}*FV\_ALL_t$ + $\beta_7 MKTRET_t$ + $\beta_8 TBILL_t$ + *Fixed-Year Effects* + *Fixed-Firm Effects* + *error$_{i,t}$* (7)

The results of estimating equation 7 are reported in Table 9. The Bank Holding Companies Database has data for the Tier 1 leverage ratio beginning March 31, 2001. So, the sample period is restricted to the years 2001 to 2007 for the purpose of this test. In all three versions of equation 7, the coefficient on the interaction of D_BANKRET and FV_ALL, β_4, is positive and statistically significant. Therefore, even after controlling for a change in the business model of banks and variation in risk taking, I continue to find that a more fair value oriented reporting regime is associated with an increase in bank contagion. Not surprisingly, the coefficient on the interaction of D_BANKRET, LEV and FV_ALL is also positive and statistically significant. Thus, banks that are more levered are more likely to be affected by the increased contagion under a more fair value oriented reporting regime.

8. CONCLUSION

In this paper, I study whether increased use of fair value accounting is associated with additional contagion in the banking system. I proxy for the extent to which fair value accounting is used by estimating the ratio of the sum of all assets and liabilities recognized or disclosed using fair value by the banks in my sample to the sum of total assets of these banks. I find that increase in the use of fair value accounting 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 accounting is more likely to spread to banks: i) that are poorly capitalized, or ii) that have relatively higher proportion of fair value assets and liabilities.

To rule out the alternative explanation that increased downside contagion among banks associated with a more fair value-oriented accounting regime is due to fair value providing greater value relevant information during crises, I investigate whether a more fair value-oriented accounting regime is associated with increased bank contagion during good times or booms. I do not find any evidence of an association between additional bank contagion and the increased use of fair value in financial reporting during good times. This suggests that the increased bank contagion associated with a more fair value-oriented accounting regime is not an artifact of increased transparency or more value relevant information provided by fair value accounting during crises.

Like any other archival empirical study, I do not claim to have found causal links between fair value accounting and additional bank contagion. 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 the SEC in weighing the costs and benefits of a fair value-oriented accounting regime for banks and deciding whether a) fair value accounting has worsened the credit crunch that has 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.

To address the concern that the current application of fair value accounting rules has led to fire-sale asset pricing and contributed to the credit crunch that has followed the Subprime crisis, FASB issued additional guidance on the estimation of fair value of an asset or liability that is traded in a market that is not active on April 9, 2009 (FASB Staff Position (FSP) No. FAS 157-4, *Determining fair value when the volume and level of activity for the asset or liability have significantly decreased and identifying transactions that are not orderly*). In FSP No. FAS 157-4, FASB noted that a significant decrease in the volume and activity in a market for an asset or liability may be indicative of markets that are not orderly and a significant adjustment to the transactions or quoted prices may be necessary to estimate fair value for such assets and liabilities. The guidance provided by FASB is consistent with the findings in this paper that marking assets and liabilities to market during periods of market illiquidity can increase bank contagion, therefore fair values estimates should not be based on quoted prices or transaction prices when markets are disorderly or transactions are distressed.

In this paper, my attempt is not to document the superiority of a historical cost-based accounting 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 accounting 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.

Appendix A: Money Center Banks Included in the Equally-Weighted Money Center

Bank Index

| Serial No.	Name
1.	Bank of America Corporation
2.	Canadian Imperial Bank of Commerce
3.	Citigroup Inc.
4.	JPMorgan Chase & Co.
5.	KeyCorp
6.	Ohio Legacy Corp.
7.	Oriental Financial Group Inc.
8.	PNC Financial Services Group I
9.	Royal Bank of Canada
10.	SunTrust Banks Inc.
11.	TCF Financial Corporation
12.	The Bank of New York Mellon Co.
13.	The Bank Of Nova Scotia
14.	Toronto-Dominion Bank
15.	United Bancshares Inc.
16.	Wachovia Corporation
17.	Wells Fargo & Company

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Figure 1: Trends in the Extent to which the Accounting Regime is Fair Value-Oriented over Time
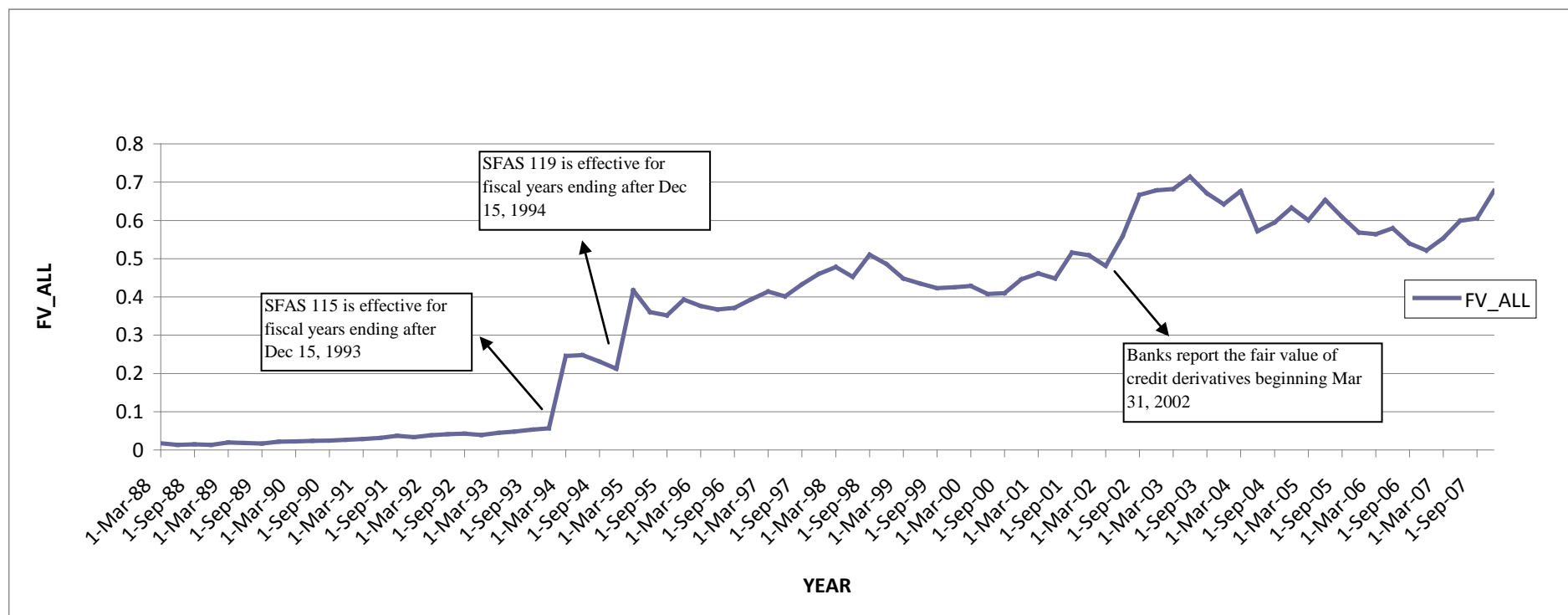
Notes to Figure 1:
FV_ALL – Sum of assets and liabilities (held-to-maturity securities, available-for-sale securities, trading assets, mortgage servicing rights, other financial assets, derivative contracts, trading liabilities, other financial liabilities and servicing liabilities) disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of these banks

Figure 2: Number of Banks Experiencing Returns in the Lowest Decile of their Time-Series of Returns per Month
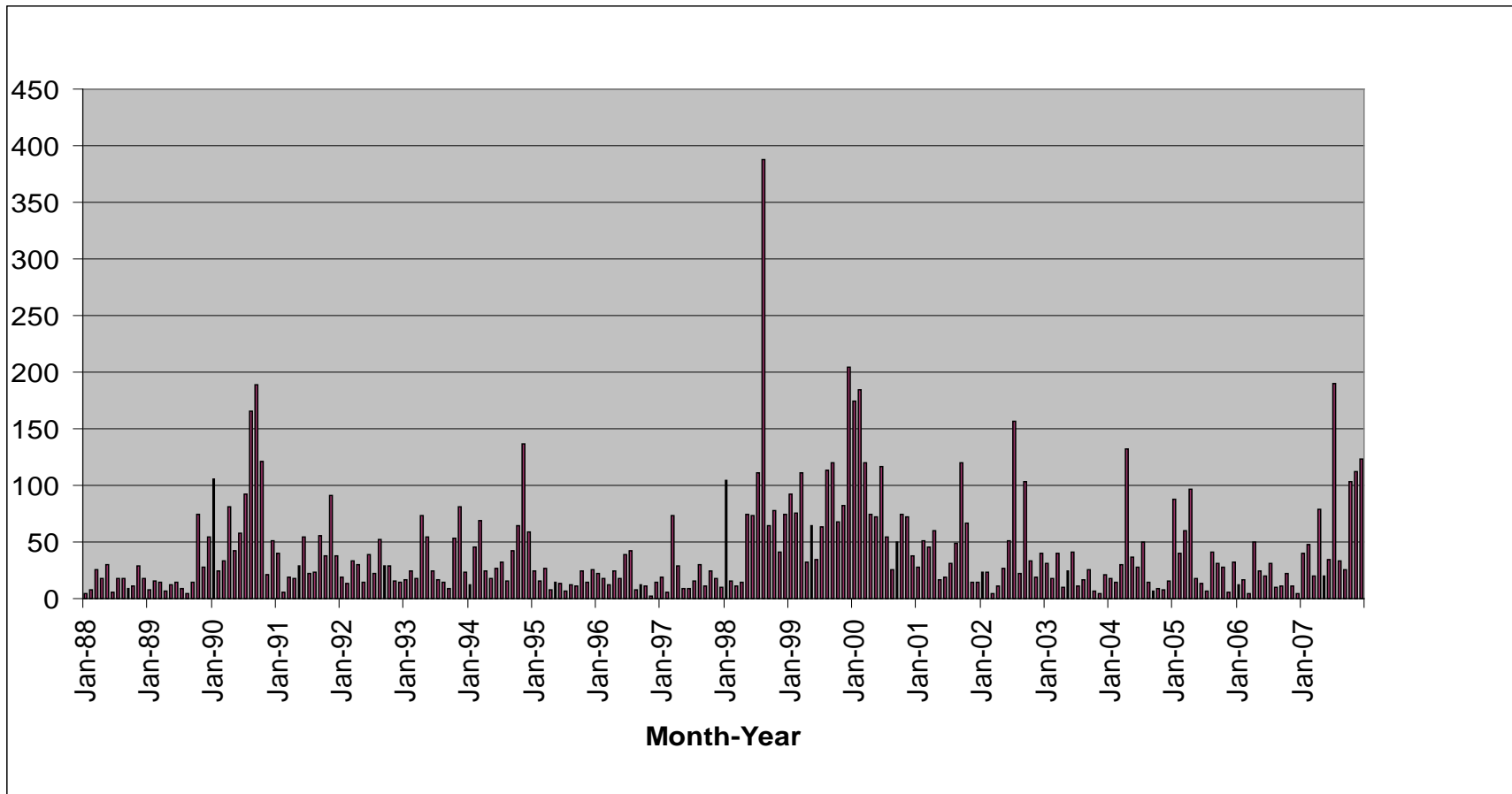
Notes to Figure 2:

   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.

Variables	Mean	Median	25th Percentile	75th Percentile	Standard Deviation	Number of Observations
MKTRET	0.0124	0.0161	-0.0208	0.0416	0.0504	98,162
TBILL (in %)	4.2926	4.7199	3.0199	5.2799	1.8429	98,162
FV_ALL	0.3787	0.4285	0.2120	0.5584	0.2240	98,162
BANKRET	0.0162	0.0162	-0.0141	0.0510	0.0576	98,162
ILLIQ	-1.26E-11	1.32E-10	-1.36E-9	1.35E-9	2.44E-9	98,162
FV_BANK	0.1643	0.1506	0.0306	0.2425	0.2444	86,314
TIER1 RBC RATIO	13.80	12.74	11.61	14.46	12.107	33,124
TOTAL RBC RATIO	12.13	11.27	10.01	13.01	5.2066	33,124
TIER1 LEVERAGE RATIO	9.06	8.60	7.70	9.72	8.0287	33,124

Notes to Table 1:

MKTRET – Monthly CRSP equally-weighted market return

TBILL – Monthly 3-month Treasury bill rate

FV_ALL – Sum of assets and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of these banks

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 4.2 for details about the estimation of ILLIQ

FV_BANK - Ratio of the sum of assets and liabilities disclosed or recognized by a bank at fair value scaled by its total assets

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.

	Number of Observations	Mean of EXTREMENEG
Indicator Variable = D_BANKRET		
D_BANKRET = 0	73,639	0.06
D_BANKRET = 1	24,523	0.21
Difference in EXTREMENEG Means		0.15***
Indicator Variable = D_BANKRET and D_FV_ALL		
D_BANKRET*D_FV_ALL = 0	87,199	0.09
D_BANKRET*D_FV_ALL = 1	10,963	0.24
Difference in EXTREMENEG Means		0.15***
Indicator Variable = D_BANKRET and D_ILLIQ and D_FV_ALL		
D_BANKRET*D_ILLIQ*D_FV_ALL = 0	93,709	0.09
D_BANKRET*D_ILLIQ*D_FV_ALL = 1	4,453	0.31
Difference in EXTREMENEG Means		0.22***

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 accounting 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:

$$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + error_{i,t}$$

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.

Independent Variables	Pred. Sign	Model 1		Model 2		Model 3	
		Estimate	P-Value	Estimate	P-Value	Estimate	P-Value
INTERCEPT		-3.1168	<.01***	-3.4836	<.01***	-3.4445	<.01***
D_BANKRET	+	1.0172	<.01***	0.7204	<.01***	0.7201	<.01***
FV_ALL	?	0.4135	<.01***	3.1556	<.01***	3.1587	<.01***
D_BANKRET*FV_ALL	+	**0.2074**	**0.02*****	**0.2879**	**<.01*****	**0.2907**	**<.01*****
MKTRET		-4.9483	<.01***	-4.9628	<.01***	-5.0062	<.01***
TBILL		0.0952	<.01***	-0.0440	0.09*	-0.0464	0.07*
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		98,162		98,162		98,162	
Adjusted R-square		0.05		0.06		0.06	

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) 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 and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of these banks
MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate

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:

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 D\_ILLIQ_t + \beta_6 D\_BANKRET_t*D\_ILLIQ_t*FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t + error_{i,t}$

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.

Independent Variables	Pred. Sign	Model 1 Estimate	Model 1 P-Value	Model 2 Estimate	Model 2 P-Value	Model 3 Estimate	Model 3 P-Value
INTERCEPT		-3.1785	<.01***	-3.5768	<.01***	-3.5379	<.01***
D_BANKRET	+	1.0520	<.01***	0.7463	<.01***	0.7458	<.01***
FV_ALL	?	0.4566	<.01***	3.1669	<.01***	3.1704	<.01***
D_BANKRET*FV_ALL	+	-0.1080	0.84	0.0507	0.34	0.0551	0.32
D_ILLIQ	?	-0.0502	0.11	-0.0132	0.69	-0.0130	0.69
D_BANKRET*D_ILLIQ ***FV_ALL**	+	**0.7497**	**<.01*****	**0.5406**	**<.01*****	**0.5375**	**<.01*****
MKTRET		-4.4872	<.01***	-4.5805	<.01***	-4.6249	<.01***
TBILL		0.1062	<.01***	-0.0245	0.34	-0.0270	0.30
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		98,162		98,162		98,162	
Adjusted R-square		0.05		0.06		0.07	

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) 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 and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of 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

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 accounting regime and an increase in bank contagion is greater for banks that are more fair value oriented. The model estimated is as below:

$$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 FV\_BANK_{i,t} + \beta_6 D\_BANKRET_t*FV\_BANK_{i,t}*FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t + error_{i,t}$$

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.

Independent Variables	Pred. Sign	Model 1 Estimate	Model 1 P-Value	Model 2 Estimate	Model 2 P-Value	Model 3 Estimate	Model 3 P-Value
INTERCEPT		-3.1734	<.01***	-3.5075	<.01***	-3.5446	<.01***
D_BANKRET	+	1.1121	<.01***	0.7949	<.01***	0.7954	<.01***
FV_ALL	?	0.6821	<.01***	3.1977	<.01***	3.2057	<.01***
D_BANKRET*FV_ALL	+	-0.2742	0.98	-0.1269	0.81	-0.1292	0.81
FV_BANK	?	-0.5109	<.01***	-0.3119	0.02**	-0.2890	0.10*
D_BANKRET*FV_BANK ***FV_ALL**	+	**1.6177**	**<.01*****	**1.4509**	**<.01*****	**1.4866**	**<.01*****
MKTRET		-4.6482	<.01***	-4.7318	<.01***	-4.7914	<.01***
TBILL		0.0999	<.01***	-0.0368	0.18	-0.0394	0.15
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		86,314		86,314		86,314	
Adjusted R-square		0.05		0.07		0.07	

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) 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 and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of all the banks in the sample
FV_BANK – Ratio of the sum of assets and liabilities disclosed or recognized by a bank at fair value scaled by total assets

MKTRET – Monthly CRSP equally-weighted market return
TBILL – Monthly 3-month Treasury bill rate

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 accounting regime and increased bank contagion is greater for banks that are poorly capitalized. The model estimated is as below:

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 CAP_{i,t} + \beta_6 D\_BANKRET_t*CAP_{i,t}*FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t + error_{i,t}$

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 effects only, and model 3 includes both fixed-year and fixed-firm effects.

	Pred.	Model 1		Model 2		Model 3	
Independent Variables	**Sign**	**Estimate**	**P-Value**	**Estimate**	**P-Value**	**Estimate**	**P-Value**
INTERCEPT		-3.9995	<.01***	-3.2131	<.01***	-3.3127	<.01***
D_BANKRET	+	0.1165	0.36	-0.3507	0.83	-0.3584	0.84
FV_ALL	?	2.0599	<.01***	1.7697	<.01***	1.7655	<.01***
D_BANKRET*FV_ALL	+	1.0562	0.03**	1.6717	<.01***	1.6740	<.01***
CAP	?	0.0562	0.21	0.0319	0.48	0.1473	0.01
D_BANKRET*CAP							
*FV_ALL	+	**0.2068**	**0.03****	**0.1939**	**0.04****	**0.2007**	**0.04****
MKTRET		-6.0914	<.01***	-5.9936	<.01***	-6.0324	<.01***
TBILL		0.1056	<.01***	-0.0990	0.01***	-0.1017	<.01***
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		33,124		33,124		33,124	
Adjusted R-square		0.05		0.06		0.06	

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) 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 and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of all the banks in the sample
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

Table 7: Fair Value Accounting and Upside-Contagion during Good Times

This table reports results from a logit regression that examines whether a more fair value accounting is associated with an increase in upside-contagion during good times. The model estimated is as below:

$EXTREMEPOS_{i,t} = \beta_1 + \beta_2 GD\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 GD\_BANKRET_t*FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t}$

EXTREMEPOS equals one if a bank's monthly return is greater than the 90th 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.

Independent Variables	Pred. Sign	Model 1 Estimate	Model 1 P-Value	Model 2 Estimate	Model 2 P-Value	Model 3 Estimate	Model 3 P-Value
INTERCEPT		-2.277	<0.01***	-2.672	<0.01***	-2.635	<0.01***
GD_BANKRET	+	0.780	<0.01***	0.742	<0.01***	0.742	<0.01***
FV_ALL	?	-0.155	0.03**	-0.509	0.19	-0.542	0.16
GD_BANKRET*FV_ALL	+	**-0.140**	**0.42**	**-0.508**	**0.49**	**-0.507**	**0.49**
MKTRET		5.711	<0.01***	5.201	<0.01***	5.211	<0.01***
TBILL		-0.042	<0.01***	0.073	<0.01***	0.075	<0.01***
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		98,088		98,088		98,088	
Adjusted R-square		0.02		0.03		0.03	

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) values for coefficients that assume a sign opposite to the one predicted.

Variable definitions:

GD_BANKRET – Equals one when the monthly return of the equally-weighted index of money center banks is greater than the 75th percentile of the entire time-series of monthly returns for this index, and zero otherwise

FV_ALL – Sum of assets and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of all the banks in the sample

MKTRET – Monthly CRSP equally-weighted market return

TBILL – Monthly 3-month Treasury bill rate

Table 8: Test of Fair Value Accounting Contagion in Industries Other Than Banking

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

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_TOP10RET_t + \beta_3 FV\_ALL_t + \beta_4 D\_TOP10RET_t*FV\_ALL_t + \beta_5 MKTRET_t + \beta_6 TBILL_t + \text{Fixed-Year Effects} + \text{Fixed-Firm Effects} + error_{i,t}$

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 effects only, and model 3 includes both fixed-year and fixed-firm effects.

Independent Variables	Pred. Sign	Manufacturing		Retail Trade		Food Stores	
		Estimate	P-Value	Estimate	P-Value	Estimate	P-Value
INTERCEPT		-3.020	<0.01***	-3.580	0.71	-2.405	0.63
D_TOP10RET	+	0.196	<0.01***	0.354	<0.01***	0.650	<0.01***
FV_ALL	?	2.773	<0.01***	5.091	<0.01***	-0.384	0.80
D_TOP10RET*FV_ALL	+	**-0.242**	**0.49**	**0.043**	**0.35**	**0.335**	**0.19**
MKTRET		-11.815	<0.01***	-9.768	<0.01***	-7.279	<0.01***
TBILL		-0.041	<0.01***	-0.083	<0.01***	0.040	0.66
Fixed-Year Effects		YES		YES		YES	
Fixed-Firm Effects		YES		YES		YES	
N		619,656		95,378		8,463	
Adjusted R-square		0.05		0.05		0.05	

Notes to Table 8:

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

Variable definitions:

D_TOP10RET – Equals one when the monthly return of the equally-weighted index of the biggest 10 firms (determined by market value of equity at the beginning of the month) in the industry is less than the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise

FV_ALL – Sum of assets and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of all the banks in the sample

MKTRET – Monthly CRSP equally-weighted market return

TBILL – Monthly 3-month Treasury bill rate

Table 9: Test of Fair Value Accounting Contagion after Controlling for Risk-Weighted Leverage

This table reports results from a logit regression that examines whether a more fair value accounting is associated with an increase in bank contagion after controlling for risk-weighted leverage. The model estimated is as below:

$EXTREMENEG_{i,t} = \beta_1 + \beta_2 D\_BANKRET_t + \beta_3 FV\_ALL_t + \beta_4 D\_BANKRET_t*FV\_ALL_t + \beta_5 LEV_{i,t} + \beta_6 D\_BANKRET_t*LEV_{i,t}*FV\_ALL_t + \beta_7 MKTRET_t + \beta_8 TBILL_t + Fixed\text{-}Year\ Effects + Fixed\text{-}Firm\ Effects + error_{i,t}$

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 effects only, and model 3 includes both fixed-year and fixed-firm effects.

Independent Variables	Pred. Sign	Model 1 Estimate	Model 1 P-Value	Model 2 Estimate	Model 2 P-Value	Model 3 Estimate	Model 3 P-Value
INTERCEPT		-3.954	<0.01***	-3.131	<0.01***	-3.160	<0.01***
D_BANKRET	+	0.123	0.35	-0.360	0.83	-0.376	0.84
FV_ALL	?	2.112	<0.01***	1.789	<0.01***	1.798	<0.01***
D_BANKRET*FV_ALL	+	**0.797**	**0.08***	**1.353**	**0.02****	**1.348**	**0.02****
LEV		-0.129	0.88	-0.472	0.59	0.126	0.89
D_BANKRET*LEV*							
FV_ALL	+	4.431	0.02**	5.023	<0.01***	5.255	<0.01***
MKTRET		-6.108	<0.01***	-6.003	<0.01***	-6.061	<0.01***
TBILL		0.109	<0.01***	-0.098	0.01**	-0.100	<0.01***
Fixed-Year Effects		NO		YES		YES	
Fixed-Firm Effects		NO		NO		YES	
N		33,102		33,102		33,102	
Adjusted R-square		0.05		0.06		0.06	

Notes to Table 9:

*, **, and ***: Significant at 10%, 5%, and 1% p-values. P-values are one-sided for variables with directional predictions. I report (1-p) 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 less than the 25th percentile of the entire time-series of monthly returns for this index, and zero otherwise

FV_ALL – Sum of assets and liabilities disclosed or recognized at fair value by the banks in the sample scaled by the sum of total assets of all the banks in the sample

LEV – Inverse of the Tier 1 leverage ratio

MKTRET – Monthly CRSP equally-weighted market return

TBILL – Monthly 3-month Treasury bill rate