A Convenient Scapegoat: Fair Value Accounting by Commercial Banks during the Financial Crisis

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Abstract: Critics argue that the "fair value" provisions in U.S. accounting rules exacerbated the recent financial crisis by depleting banks' regulatory capital, which curtailed lending and triggered asset sales, leading to further economic turmoil. Defenders counter-argue that the role of fair value in U.S. accounting rules is insufficient to lead to the pro-cyclical effects alleged by the critics; they point out that most bank assets are not fair valued, and the assets that are fair valued likely have little effect on regulatory capital, especially when banks do not intend to sell the assets at low prices. Our empirical evidence indicates that fair value provisions in U.S. accounting rules did not affect the commercial banking industry in the ways commonly alleged by critics. We show that fair value accounting losses had minimal effect on regulatory capital, and there is no evidence of increased selling of securities during the crisis.

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I. Introduction

U.S. accounting rules, which are the basis of bank regulatory capital requirements, have been blamed for exacerbating the recent financial crisis. Critics allege that the rules required financial institutions to write down their assets to abnormally low market prices even when the institutions did not intend to sell at those prices; they argue that these write-downs decreased banks' regulatory capital, forcing them to take actions that lead to further rounds of price declines and capital depletions. Defenders of U.S. accounting and bank regulatory systems counter-argue that the fair value accounting provisions are limited and are unlikely to have lead to the pro-cyclical effects alleged by the critics. Defenders point out that most bank assets are not fair valued, and the assets that are fair valued likely have little effect on regulatory capital, especially when banks do not intend to sell the assets at low prices.

Our empirical evidence indicates that fair value accounting did not affect the commercial banking industry in the ways commonly alleged by critics. There are two primary aspects of our analyses. First, we quantify the effects of fair value losses on regulatory capital. Typically the largest asset on bank balance sheets subject to fair value accounting is the portfolio of debt securities that are classified as available-for-sale (AFS) or held-to-maturity (HTM). Fair value losses on these securities do not affect regulatory capital unless management deems them "other than temporary," meaning that the bank cannot demonstrate intent and ability to hold the securities until the price recovers. During the crisis, the banking industry claimed that demonstrating such intent and ability was too onerous, causing "performing assets that have no credit losses [to be] written down as impaired," thus needlessly reducing regulatory capital and restricting the ability to lend (American Bankers Association 2008). Based on these claims, Congress pressured the Financial Accounting Standards Board (FASB), to make swift changes that softened the rules governing other-than-temporary-impairments (OTTIs). In light of the link

between OTTI charges and regulatory capital, the banking industry's complaints about OTTIs, and the subsequent rule changes, we examine the size, timing, and pro-cyclical effects of the OTTI charges taken by a sample of bank holding companies since 2004.

Our second set of empirical analyses focus on the common allegation that banks boost their regulatory capital ratios by selling assets, which shrinks the ratio's denominator (risk-weighted assets). Selling assets in response to fair value losses such as OTTI charges would further decrease market prices, resulting in more rounds of write-downs, capital depletion, and asset selling. In this way, fair value accounting would make initial exogenous shocks to asset prices worse than is justified by fundamentals. Several analytical models rely on asset sales to generate the pro-cyclical effects of fair value accounting (Cifuentes et al. 2005; Allen and Carletti 2008; Plantin et al. 2008). These models typically assume a *pure* fair value accounting regime in which all asset price declines reduce accounting earnings and regulatory capital.

Academic studies, popular press accounts, and trade groups allege that U.S. accounting rules and, by extension, regulatory capital rules were sufficiently reliant on fair value to prompt pro-cyclical selling behavior, which worsened the recent crisis. These arguments were cited in Securities and Exchange Commission (SEC) deliberations and in Congressional hearings that pressured the FASB to change U.S. accounting rules. However, as Laux and Leuz (hereafter LL) 2010) point out, there is no systematic evidence concerning whether banks do, in fact, sell assets in response to write-downs or low capital ratios. We examine banks' selling behavior during the crisis, consistent with calls by Laux and Leuz for research to be "specific about the links through which write-downs under fair value can create problems," and "more explicit about the mechanism of contagion" (Laux and Leuz 2009, 833).

Our sample consists of 150 bank holding companies with large portfolios of non-Treasury AFS and HTM securities. We conduct industry- and firm-level analyses. On the

industry level, we find no support for claims that the fair value provisions of U.S. accounting rules significantly depleted regulatory capital or caused pro-cyclical selling of securities. OTTI charges reached levels during the crisis that were likely unprecedented, but these charges had only a small impact on regulatory capital, especially compared to the impact of bad debt expense which is a not a fair valued item. Furthermore, most of the OTTI charges were not recognized until late in the crisis, well after the financial markets deteriorated and capital ratios began to fall. We do not observe an increase in industry-level sales of AFS and HTM securities as alleged by some critics of fair value accounting; sales of AFS and HTM securities during the crisis were in line with the levels seen before the crisis. Also, we find no evidence that banks more commonly sold securities at a loss during the crisis, providing no support for claims that fair value losses caused "fire-sales" of assets.

We find mixed evidence of pro-cyclical activity at the firm level. We seek evidence as to whether bank stress factors such as low capital ratios or low earnings cause banks to sell securities. Our results suggest that, consistent with the notion of pro-cyclicality, sales of securities are correlated with the magnitude of OTTI charges and with decreases in capital ratios. On the other hand, inconsistent with the notion of pro-cyclicality, sales of securities are not significantly related to other components of earnings. Furthermore, we find some evidence that firms with low capital ratios actually engage in less selling than do firms with high capital ratios. We also seek evidence regarding whether bank stress factors lead banks to sell assets at fire-sale prices. Again there is inconsistent evidence of pro-cyclical behavior; net losses realized on sales of securities are statistically significantly correlated with the capital ratio in some specifications but the correlations between net losses realized on sales and all other stress factors are not statistically significant in the predicted directions.

Further evidence against pro-cyclicality is that there is less interrelated selling activity among banks during the crisis. Specifically, before the crisis, industry-level security sales are a significant determinant of sales by individual banks, but, during the crisis, industry-level sales cease to be a significant determinant. Also, the coefficient of variation in securities sales across banks significantly increases during the crisis. This higher variation in selling across banks is counter to the notion that U.S. accounting rules are pro-cyclical inasmuch as they force banks to uniformly respond to a single set of market conditions.

In the next section, we explain the concerns about fair value accounting and pro-cyclical asset sales, and recent rule changes. Section 3 describes the sample. Section 4 describes our research design and findings. Section 5 concludes.

II. Background

Arguments regarding fair value accounting and cyclicality

There are two arguments that support the notion that fair value provisions in U.S. accounting rules worsened the recent financial crisis. One argument is based on the premise that, during the crisis, market prices were poor indicators of the long run value of certain assets (principally mortgage-backed securities). Even though the securities were fundamentally sound and banks had no intention of selling them at low prices, they were forced to write them down, leading to decreases in regulatory capital that did not reflect fundamentals. Thus, fundamentally healthy banks were forced to curtail their lending activities because of misleadingly low regulatory capital, extending what began as a weakness in subprime mortgage-backed securities to the broader economy. In lobbying to reform the OTTI rules (which eventually proved successful), the American Bankers Association describes the problem as follows:

> "One key factor that is recognized as having exacerbated these problems is fair value accounting, which influences the recognition of OTTI. In today's illiquid market the results can be severe: (1) capital is artificially eroded despite solid fundamental credit performance, (2) the lending capability of a bank is reduced as much as $13 for every $1

> of needless OTTI, and (3) the accounting formula is driving economic outcomes – including reduced availability of consumer and small business credit, with a negative impact on the health of individual institutions – and does not reflect economic reality." (American Bankers Association 2008)

To assess the role of OTTI charges in the financial crisis, we examine their size and timing relative to other non-fair value charges that were taken by banks.

A key assumption of this first argument regarding the effects of fair value accounting is that the fundamental values of the assets were sound and that banks would shield themselves from market price declines by holding the securities and collecting the underlying cash flows in the long run. If this assumption does not hold (i.e., if the securities were not fundamentally sound and banks would not be able to recover the losses), fair value accounting cannot be blamed for causing an unjustified decline in lending. To the contrary, fair value accounting improves economic efficiency by speeding recognition that capital reserves are inadequate to support further lending.

Another argument regarding the pro-cyclical effects of fair value accounting holds even if the initial fair value losses reflect fundamentals. This argument holds that after the fair value losses are taken to reflect exogenous fundamental shocks to asset prices, banks sell assets in an attempt to boost the capital ratio. This selling pressure reduces market prices below fundamentals. The fair value accounting rules then force banks to write assets down to below-fundamental values, resulting in unwarranted capital depletion and even further rounds of selling and price decreases.

The essence of this second argument is found in the theoretical models in the academic literature. These models usually assume a pure fair value accounting regime and less than perfectly liquid markets. In Cifuentes et al. (2005), banks, in response to fair value losses that reduce regulatory capital, sell assets to reduce the denominator of their capital ratios (risk-weighted assets); this reduces prices even further because of less than perfect liquidity. In Allen

and Carletti (2008), fair value losses cause banks to be declared insolvent by regulators, resulting in forced liquidations that reduce market prices even further because of less than perfect liquidity. Both of these models suggest that, in response to fair value losses, selling of all types of risky assets increases. In contrast, Plantin et al. (2008) predict that banks increase selling of the very assets that have declined in value. Their model does not rely on capital shortages to produce pro-cyclical asset sales. Instead, the model assumes that managers are concerned with the effects of fair value losses on reported earnings. In response to an exogenous negative shock to an asset price, managers race to be among the first to sell the asset early in the asset's price decline, flooding the market with supply and causing prices to fall below fundamental values.

Even though U.S. accounting and bank regulatory rules are not as fair value oriented as the regimes assumed in these models, critics have made similar claims about how U.S. rules promoted pro-cyclical sales of assets during the recent crisis. Academic papers making this claim include Hellwig (2009, 176) and Bignon et al. (2009, 4). Bignon et al. (2009) go so far as to claim that "a consensus exists on the role of fair-value measurements in spreading the crisis throughout the whole of the financial system: some entities urgently sold their assets to obtain the liquidities required to respond to their accounting write downs, creating the mechanism by which the crisis was amplified." Numerous popular press accounts also make this claim, including Hall (2008), Kewelramani (2008), The Economist (2008), and Wesbury and Stein (2009). The Economist describes the problem as follows:

> "Regulators and bankers fear that this 'mark-to-market' approach is helping to turn a liquidity crisis into a solvency one. As holders of mortgage-backed securities and the like revalue their assets at fire-sale prices, they are running short of capital—which can lead to further sales and more write-downs. Are the beancounters ensuring a crash?" (The Economist 2008,13).

The claim that U.S. rules promoted pro-cyclical sales of assets during the crisis was also part of the lobbying and policy deliberations surrounding fair value accounting reforms. A

significant portion of the Mortgage Bankers Association's comment letter to the SEC describes how fair value losses related to Statement of Financial Accounting Standards (SFAS) No. 157 can result in pro-cyclical asset sales (Mortgage Bankers Association 2008). The SEC received other comments of a similar nature, as evidenced by the SEC's synopsis of its October 29, 2008 public roundtable meeting on fair value accounting:

> "[Some panelists] assert that when asset prices decline and liquidity is reduced, banks are forced to sell their investments or raise capital (due to the interaction of regulatory capital requirements that are based on the fair value of their assets). If bank portfolios are marked-to-market, their capital position deteriorates, which, in turn, causes more asset sales and further depresses asset prices" (SEC 2008, 149).

In March 2009 Congressional hearings conducted by the House of Representatives, Representative Scott Garrett of New Jersey stated in his prepared opening statement:

> "When the price of assets in a bank's balance sheet are written down, the bank has to raise additional capital by selling additional assets or stock. These sales put more downward pressure on prices and so it is this negative feedback loop that is exacerbated by the combination of accounting practices and capital requirements" (Garrett 2009).

During these hearings several members of Congress pressed the FASB for swift changes to SFAS No. 157 as well as to the rules governing OTTI.[1] It is rare for government policymakers to overtly pressure the FASB, which is a private entity that strives to keep its standard setting processes independent of political interference.[2] The standing policy of the SEC is that FASB accounting standards have "authoritative" status, although the SEC does have the ultimate (but rarely used) authority to revoke this status (SEC 2003). In the Emergency Economic Stabilization Act of 2008, Congress emphasized the SEC's power to revoke FASB

[1] The *Wall Street Journal* recounts an exchange between Rep. Paul Kanjorski and FASB Chairman Robert Herz: "'We want you to act,' Rep. Kanjorski told Robert Herz, FASB's chief. Mr. Herz waffled about how quickly the standards board could act. Rep. Kanjorski leaned over the dais. 'You do understand the message that we're sending?' he said. 'Yes,' Mr. Herz replied. 'I absolutely do, sir.'" (Pulliam and McGinty 2009).

[2] Responding to Congressional interference regarding accounting for stock option compensation in 2004, the FASB governing board stated: "While we respect the right of Congress to set accounting rules if it chooses, we believe that doing so would dangerously compromise the independence of the FASB and, by politicizing standard setting, would compromise the credibility of the resulting accounting standards" (Financial Accounting Foundation (FAF) 2005, 3). More recently, the FASB opposed Congressional efforts to create a federal systemic risk council that has power to change accounting rules (FAF 2010, 14).

rules, especially rules pertaining to fair value. Subsequently, Congress debated various forms of legislation that would create a systemic risk regulator that has the power to change accounting rules when they are deemed to threaten financial stability (Lamoreaux 2009). Responding to the Congressional pressure, the FASB made changes to fair value accounting standards in April 2009.

Changes to accounting standards

The FASB issued two new staff positions that made major changes to fair value accounting rules. Staff Position No. 157-4 gives preparers more freedom to depart from observable market prices and assign more optimistic fair values. The original standard (SFAS No. 157) had created a three-level hierarchy that specifies the information preparers should use to estimate fair values. The hierarchy gives highest priority to quoted prices in active markets for identical assets (level 1). The controversial part of the standard is how to value an asset when an active market does not exist. The original standard required heavy reliance on prices from inactive markets, directing preparers to use "quoted prices for identical or similar assets or liabilities in markets that are not active, that is, markets in which there are few transactions for the asset or liability, the prices are not current, [etc.]" (SFAS No. 157, paragraph 28). These level-2 inputs have priority over level-3 "unobservable inputs" such as the preparer's internal cash flow projections. Auditors reportedly enforced the standard strictly. The Center for Audit Quality, an industry group formed by the Big-Four accounting firms, issued a white paper emphasizing that prices from inactive markets took precedence over internal projections (Center for Audit Quality 2007). This appears to have emboldened auditors to force preparers to anchor their fair value estimates on low prices from inactive markets rather than on more optimistic internal projections (Reilly 2007).

The new staff position issued after the Congressional hearings emphasizes that prices from inactive markets can, in fact, be significantly adjusted:

> "If the reporting entity concludes there has been a significant decrease in the volume and level of activity for the asset or liability in relation to normal market activity for the asset or liability (or similar assets or liabilities), transactions or quoted prices may not be determinative of fair value (for example, there may be increased instances of transactions that are not orderly). Further analysis of the transactions or quoted prices is needed, and a significant adjustment to the transactions or quoted prices may be necessary to estimate fair value in accordance with Statement 157" (paragraph 13).

This was widely seen as backtracking from the original standard in response to outside pressure (Pulliam and McGinty 2009).

The FASB issued another staff position (FSP FAS 115-2 and 124-2) that makes it easier to avoid OTTI charges and reduces the impact on regulatory capital when OTTI charges still need to be taken. The rules in place during the crisis required an OTTI charge unless the firm could demonstrate ability and intent to hold the asset until the fair value recovered (FSP FAS 115-1 and 124-1, paragraphs A2-A4). In other words, the old standard presumed impairment unless the firm could prove otherwise. The new standard switches the presumption to no impairment. It states that an OTTI charge is not necessary unless the firm anticipates that it will have to sell the debt securities before the price recovers (FSP FAS 115-2 and 124-2, paragraph 7), thus enabling firms to avoid OTTI charges more often.

The FASB staff position's second OTTI rule change reduces the impact on regulatory capital even when OTTI charges are necessary. Under the old rule, the size of the OTTI loss was the difference between the security's fair value and amortized cost, and the entire loss was recognized in net income and flowed to retained earnings where it affected regulatory capital. Under the new rule, only the "credit" portion of the loss (i.e. that related to expected non-recoverable cash flows) is recognized in net income and retained earnings (FSP FAS 115-2 and 124-2, paragraphs 8-9). The non-credit portion of the loss, which reflects illiquidity discounts

that the bank will avoid if it holds on to the asset, is recognized in "accumulated other comprehensive income." Many items in this account, including the non-credit portion of OTTI charges, are excluded from regulatory capital (Board of Governors of the Federal Reserve System 2010, p. HC-R-2). In summary, changes to the accounting standards allow firms to make more optimistic fair value estimates, and avoid or reduce charges to earnings and regulatory capital even when the optimistic estimates indicate losses.

Prior empirical studies on the role of fair value accounting in the crisis

Despite the controversy surrounding fair value accounting, there are relatively few studies that empirically examine its role in the crisis. Khan (2009) analyzes how the extreme negative stock returns of individual banks co-vary with those of money-center banks. He finds that the negative returns co-vary more strongly during times when more items are measured at fair value, suggesting that fair value accounting contributes to contagion. Bowen et al. (2010) find that the stock market reacted positively (negatively) to key events signaling that policymakers would (would not) relax fair value accounting rules.

Rather than making inferences from stock returns, which reflect the *perceived* effects of fair value accounting, other studies examine the direct impact of fair value accounting on banks' financial condition. As part of the Emergency Economic Stabilization Act of 2008, Congress required the SEC to examine the role of fair value accounting in the crisis. The SEC examined a sample of fifty financial institutions that failed during the crisis and concluded that fair value accounting did not play a meaningful role in the failures (SEC 2008). The primary basis for this conclusion is that the failed banks had a minority of assets whose fair value losses affected regulatory capital, and even for the banks that did report sizeable fair value losses, the failures appeared to stem from credit losses related to poor lending decisions rather than from marking assets to market.

Short of causing bank failures, fair value accounting could have contributed to the crisis by causing pro-cyclical activity, such as sales of assets. LL (2010) discuss this possibility but conclude otherwise. Similar to the SEC study, LL point out that loans and leases held for investment, which constitute roughly half of the assets in the banking sector, are not fair valued; rather, the loans and leases are valued at their amortized cost less a provision for future uncollectible amounts projected by management. The next largest asset is the portfolio of HTM and AFS securities, which constitutes between 15 and 20 percent of total assets. HTM securities are not fair valued, except for OTTI adjustments. Even though AFS securities are fair valued, LL argue that they could not have played a role because the fair values typically do not affect regulatory capital. Most AFS securities are debt securities, and regulatory capital rules exclude fair value gains and losses on debt securities unless they are deemed other than temporary.[3] LL argue that securities classified as "trading," which constitute about 12 percent of the assets of large banks, are the only fair valued assets that could have significantly affected regulatory capital. However, LL point out that even the American Bankers Association believes that trading securities should be fair valued because they are intended to be sold at market prices within short horizons.

Our study more closely examines the fair value effects of the AFS and HTM securities portfolio because declines in the portfolio's fair value can affect regulatory capital if deemed other than temporary. These OTTI charges merit further study because of allegations that the charges were excessive and pro-cyclical, leading the FASB to change the OTTI rules. Shaffer (2010) also examines OTTI charges and pro-cyclical actions taken by a small sample (fourteen) of large bank holding companies in 2008. He finds that the impact of the OTTI charges on

[3] Fair value gains and losses on AFS equity securities do affect regulatory capital, but mean (median) holdings of AFS equity securities in our sample is only 0.4 (0.1) percent of assets. Thus, fair value losses on AFS equity securities could not have meaningfully affected regulatory capital.

regulatory capital was negligible for most of the banks, and finds little evidence of distressed sales and other pro-cyclical behavior.

Our study examines more banks over a longer time period, allowing us to compare activity during the crisis to that under more normal circumstances. It also allows us to determine whether pro-cyclical behavior was occurring in 2007 as the crisis built momentum (Ryan 2008). To measure sales of securities, Shaffer (2010) uses "AFS and HTM net portfolio inflows/outflows," which closely mirrors the change in the AFS and HTM portfolio's amortized cost. This measure, however, hides pro-cyclical selling activity in cases where banks sell risky securities and use the proceeds to purchase riskless securities like Treasuries. Instead, we collect a more direct measure of securities sales from the statement of cash flows found in the SEC forms 10Q and 10K; this measure is not affected by purchases.

III. Sample Selection

Our sample consists of 150 bank holding companies that are among the largest holders of non-Treasury AFS and HTM securities as of June 30, 2006. We form the sample just before the first public signs of distress in the banking industry, which Ryan (2008) traces to February 2007 when two subprime mortgage originators announced major increases in loss reserves. We identify the banks using Federal Reserve Y-9C reports filed by bank holding companies with total consolidated assets of at least $500 million. To form the sample we first rank all report filers by the amortized cost of their portfolio of non-Treasury AFS and HTM securities. We use the portfolio's amortized cost instead of fair value because amortized cost reflects the notional amount of risky securities that are subject to OTTI charges and available to sell. We require banks to regularly file forms 10-Q and 10-K with the SEC because we use the filings to hand-collect OTTI charges and sales of securities. We further require that the bank file both the Y-9C and 10-Q for at least the first quarter of 2007 to ensure valid comparisons across the pre-crisis

(2004 to 2006) and crisis (2007 to 2008) periods. To obtain 150 usable banks, we expand the rankings to the top 208 banks because 46 banks are private or foreign, and thus they do not file with the SEC, and an additional 12 banks did not file the Y-9C and 10-Q for the first quarter of 2007. The combined non-Treasury AFS and HTM amortized holdings of the 150 banks in our sample exceeds $1.5 trillion, which represents over 82 percent of the holdings reported by all of the 998 banks filing a Y-9C report.

IV. Research design and results

Other-than-temporary-impairments

Since the Y-9C report combines OTTI charges with realized gains and losses on securities sales, we hand-collect quarterly OTTI charges on AFS and HTM securities from 10-Qs and 10-Ks from 2004 to 2008. Panel A of Figure 1 plots the industry-level OTTI charges taken on AFS and HTM securities each quarter.[4] The sample size varies by quarter because we choose the sample banks at a single point in time. We standardize the sample size each quarter by including only the top 100 banks ranked by beginning holdings of non-Treasury HTM and AFS securities. Panel A of Figure 1 shows that the OTTI charges taken in 2008 far surpass those taken in the four prior years. The 2008 OTTI charges total approximately $18 billion, with the last two quarters accounting for $14 billion. In contrast, OTTI charges from 2004 to 2006 are well below $1 billion annually. In 2007, OTTI charges are small for the first three quarters, but reach nearly $1 billion in the fourth quarter.

[PLACE FIGURE 1 HERE]

Although OTTI charges reach unprecedented levels during 2008, Panel B of Figure 1 shows that they represent only a small portion of banks' normal earnings. Furthermore, the bulk

[4] The change to OTTI rules allowing firms to split the charge into credit and non-credit portions (FSP FAS 115-2 and 124-2) was not effective until 2009. Therefore, all OTTI charges during the sample period decrease earnings and regulatory capital.

of OTTI charges are taken well after bank earnings begin to decline (September 2007) and after indices tracking BBB- and AAA-rated subprime mortgage-backed securities begin to decline (July and October 2007, respectively) (Ryan 2008). Thus, fair value accounting charges were not an early factor in the subprime market collapse or the credit crisis. The figure shows that bank earnings fell in late 2007 and 2008 primarily because of increasing bad debt expense, which is not a fair valued item; rather, bad debt expense is determined by management's own projections of future uncollectible loans. Quarterly bad debt expense averaged $6.7 billion from 2004 to 2006. From September 2007 to December 2008, quarterly bad debt expense averaged $35.7 billion for a total of $214.2 billion, compared to a total of only $19 billion of OTTI charges over the same time period.

Next we assess the effect of bad debt expense and OTTI charges on regulatory capital ratios. Panel A of Figure 2 plots the inter-quartile range, mean, and median of Tier 1 capital ratios by quarter. The Federal Deposit Insurance Corporation (FDIC) considers a bank "well capitalized" at a Tier 1 capital ratio of six percent or above.[5] Panel A shows that even the bank at the 25th percentile was well above the "well capitalized" level throughout the sample period, including the crisis years. Capital ratios fell during the sample period, but rose sharply in December 2008 when the federal government infused capital through the Troubled Asset Relief Program (TARP).

[PLACE FIGURE 2 HERE]

We assess how bad debt expense and OTTI charges affect Tier 1 capital ratios for the quarter ended September 2008. We choose September 2008 because banks had recognized significant bad debt expense and OTTI charges by this point but had not yet received capital

[5] A bank is considered "adequately capitalized" at 4 percent. The minimum Tier 1 capital ratio is 3 percent for "strong" bank holding companies and 4 percent for all others. See capital adequacy guidelines at http://www.fdic.gov/regulations/laws/rules/2000-5000.html and http://www.fdic.gov/regulations/laws/rules/6000-2200.html.

through TARP. Panel B of Figure 2 compares the distribution of September 2008 Tier 1 capital ratios to two "as if" distributions of Tier 1 capital ratios, one purged of the effects of OTTI charges, and the other purged of abnormal bad debt expense. To compute each bank's normal bad debt expense, we average the bank's quarterly bad debt expense as a percentage of gross loans and leases from 2004 to 2006, and apply this percentage to the gross loans and leases reported each quarter from September 2007 to September 2008. We then compute abnormal bad debt expense by subtracting normal bad debt expense from reported bad debt expense. To adjust the September 2008 Tier 1 capital ratio for abnormal bad debt expense, we sum the quarterly abnormal bad debt expense from September 2007 to September 2008 and add this sum to the numerator. We compute a similar "as if" Tier 1 capital ratio adjusted for OTTI charges by summing the quarterly OTTI charges from September 2007 to September 2008 and adding this sum to the numerator.

Adjusting the Tier 1 capital ratio for OTTI increases the median slightly, from 9.9 to 10.0 percent. The increase in the mean is larger, from 10.5 to 10.8, suggesting that the effect of OTTI is concentrated in a small number of banks. On the other hand, the effect of abnormal bad debt expense on capital ratios is considerably larger. Abnormal bad debt expense moves the median capital ratio from 9.9 to 10.7 and the mean from 10.5 to 11.4. The similar magnitude of the shifts in the median and mean capital ratio indicate that the capital depletion caused by abnormal bad debt expense is relatively uniform across banks. To the extent that a credit crisis was caused by accounting-based reductions of regulatory capital, the "as if" adjustments to capital ratios indicate that the crisis was caused primarily by an accounting item that is not fair valued.[6]

[6] For simplicity, the "as if" computations only adjust the numerator of the capital ratio. OTTI and bad debt expense can also affect the denominator (risk-weighted assets), but we find that including denominator adjustments has almost no effect on the "as if" capital ratios. OTTI affects denominators because it reduces the amortized cost of the AFS and HTM securities in the denominator. Adjusting the denominator for OTTI is not as simple as adding back the OTTI amount because the OTTI may have applied to securities that were risk-weighted at more or less than 100 percent. When we add back OTTI to both the numerator and the denominator assuming that the applicable

Selling of AFS and HTM securities

Patterns of selling before and during the crisis

To determine whether banks engage in pro-cyclical selling of assets, we focus on the portfolio of AFS and HTM securities because this portfolio is typically the second largest asset on banks' balance sheets and consists of relatively liquid securities (LL 2010). We do not examine held-for-investment loans, the largest asset class on bank balance sheets, because they are not liquid.[7] Banks' most liquid risky assets are trading securities, but we do not examine these because they are intended to be sold in the short run; U.S. accounting rules would cause pro-cyclical sales of assets only if they cause banks to sell assets that would not otherwise have been sold.

Figure 3 includes a plot of the quarterly cash proceeds from sales of AFS and HTM securities; these data were obtained from the investing activities section of the statement of cash flows.[8] We use data from the Y-9C report, adding back realized losses and subtracting realized gains on sales of AFS and HTM securities, to calculate the notional value of the amount of securities that were sold.[9] Similar to Figure 1, Figure 3 includes a plot of total selling of securities by the top 100 banks ranked by beginning-of-quarter holdings of non-Treasury AFS and HTM securities (labeled "constant sample size"). Additionally, we plot total selling for a

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securities had a 100 percent weighting, the mean (median) "as if" capital ratio stays at 10.8 (10.0) as reported above. Large bad debt expenses can affect the denominator because banks are allowed to reduce the denominator by the amount of the allowance for loan loss that exceeds 1.25 percent of gross risk-weighted assets. To adjust for this denominator effect, we add back the lesser of abnormal bad debt expense and excess allowance for loan loss (item bhckA222 of the Y-9C report). After adjusting both the denominator and numerator for abnormal bad debt expense, the mean (median) "as if" capital ratio is 11.3 (10.7), compared to 11.4 (10.7) when only the numerator is adjusted.

[7] Consistent with banks being unable to sell held-for-investment loans, during the sample period we observe few transfers of loans and leases from the held-for-investment to held-for-sale categories. During 2007 and 2008 only 13 of the 150 banks make such transfers. The total amount transferred during these years is $14.5 billion, representing only 0.3 percent of sample banks' total loans and leases held for investment at the beginning of 2007.

[8] Compustat contains a version of this variable but it is often aggregated with cash from maturities of investments even though the two are presented separately on the bank's published statement of cash flows. We aggregate maturities with sales of securities only when they are aggregated on the published cash flow statement (12 banks).

[9] The realized gains/losses from the Y-9C report include OTTI charges even though these losses are unrealized. Using our hand-collected OTTI information, we add back the OTTI charges to the realized gains/losses to compute the gain/loss realized on actual sales.

sample that consists of the same firms each quarter (labeled "constant sample firms"). In order to increase the number of firms that can be used, we start this graph in 2005. Also, we plot total selling across all observations each quarter. Because the sample size for this last plot varies by quarter, we scale by average liabilities (labeled "scaled by average liabilities"). Liabilities are used instead of assets because fewer liabilities are measured at fair value, meaning that they are a more stable scalar in times of changing market prices. The scaling is done on a value-weighted basis across firms i=1 to N in each quarter q:

$$SALES\_I_q = \frac{\sum_{i=1}^{N} Sales_{i,q}}{\sum_{i=1}^{N} Ave.Liabilties_{i,q}} \qquad (1)$$

Throughout the paper we use the suffix "_I" to denote industry-level variables that are scaled on a value-weighted basis as shown above.

[PLACE FIGURE 3 HERE]

All three graphs in Figure 3 show a similar pattern. The level of quarterly selling during the crisis period of 2007 and 2008 averages $126.9 billion for the constant sample of 100 and 1.3 percent of average liabilities for the full sample, and appears in line with the levels of selling seen from 2004 to 2006. Over the entire sample period, the quarter with the least amount of selling ends in June 2008 ($78.9 billion for the constant sample of 100 firms and 0.8 percent of average liabilities for the full sample). In other words, the crisis period was not characterized by abnormally high levels of sales of securities.

One limitation of the analyses in Figure 3 is that the measure of sales of securities combines risky and riskless securities (banks seldom disclose what types of securities are sold). Thus, it is possible that during the crisis banks started selling more risky securities and fewer riskless securities compared to the past, masking an inter-temporal increase in sales of risky securities. To investigate this possibility, we examine holdings of Treasury securities, non-agency mortgage-backed securities (MBS), and all other AFS and HTM securities over time.

Holdings are measured using amortized cost, so they are unaffected by all fair value adjustments except those for OTTI. Figure 4 plots industry-level holdings scaled by industry-level average liabilities for each security type from 2004 to 2008. Un-scaled plots using the constant firm and constant size samples are not included because the patterns are very similar. Holdings of Treasury securities steadily decline from 2004 to 2007 and rise during 2008. A decline in holdings does not necessarily indicate sales because holdings are also affected by purchases and maturities. However, if declines in Treasury holdings reflect selling over 2004 to 2007, the lack of Treasury selling in 2008 could hide an increase in sales of risky securities that year. Later we use OLS regression to assess the level of securities selling during the crisis period while controlling for changes in the holdings of Treasury securities.

Figure 4 shows that holdings of non-agency MBS generally increase from 2004 to 2006, increase sharply in 2007, and level off in 2008.[10] Holdings of all other securities steadily decline from 2004 to 2007 and increase slightly during 2008. In other words, there is no sign of a decline in holdings of risky securities that is unique to the crisis period, which suggests that banks did not engage in widespread selling of these securities during the crisis, consistent with the evidence regarding sales of HTM and AFS securities shown in Figure 3.

[PLACE FIGURE 4 HERE]

Multiple regression analyses of sales before and during the crisis

In this sub-section we, first, use multiple regression analysis to determine whether *industry-level* securities sales (SALES_I) are higher during the crisis period of 2007 and 2008 conditional on the change in Treasury securities each quarter (CH_TREASURY_I) and the beginning level of non-Treasury HTM and AFS security holdings each quarter (PORTFOLIO_SIZE_I):

[10] To compute the amortized cost of non-agency MBS holdings, we sum items bhck1709, bhck1711, bhck1733, and bhck1735 from Schedule HC-B of the Y-9C report.

$$SALES\_I_q = a + b_1 2007\ indicator + b_2 2008\ indicator + b_3 CH\_TREASURY\_I_q + b_4 PORTFOLIO\_SIZE\_I_q + e_q \quad (2)$$

SALES_I, CH_TREASURY_I, and PORTFOLIO_SIZE_I are scaled on a value-weighted basis by average liabilities as shown in equation (1). CH_TREASURY_I is expected to be negatively related to securities sales because Treasury holdings decline when Treasury securities are sold. PORTFOLIO_SIZE_I is expected to be positively related to securities sales because large portfolios imply that there are more securities that may be potentially sold. Coefficient estimates are shown in Table 1. The estimated coefficients on the year indicator variables suggest that the level of selling is not significantly different during 2007 and 2008 compared to the prior years. The estimated coefficient on CH_TREASURY_I is not significantly different from zero, possibly because purchases and maturities of Treasuries introduce noise into this variable making the change in Treasury holdings a poor proxy for sales of Treasuries. The estimated coefficient on PORTFOLIO_SIZE_I is also not significantly different from zero.

[PLACE TABLE 1 HERE]

The industry-level quarterly analyses conducted thus far give more weight to large sellers or holders of HTM and AFS securities, which seems appropriate because the activity of the largest players would affect market prices most. However, we now re-run regression (2) using *firm-level* quarterly observations in order to determine whether the non-cyclical behavior of the largest banks is masking pro-cyclical behavior among smaller banks. We scale firm-quarter securities sales, changes in Treasury holdings, and portfolio size by firm i's average liabilities in quarter q and winsorize at one percent (these variables are denoted SALES, CH_TREASURY, and PORTFOLIO_SIZE, respectively). Descriptive statistics for these and other firm-quarter variables used later are found in Table 2. As in the industry-level quarterly regression, the 2007 and 2008 year indicator variables are not statistically significantly different from zero (see second column of Table 1). The estimates of the coefficients on the CH_TREASURY and

PORTFOLIO_SIZE controls are statistically significantly different from zero in the expected directions.

Cross-sectional determinants of selling of HTM and AFS securities

We next examine the cross-sectional determinants of securities selling. In particular, we are interested in whether bank stress factors such as low capital ratios lead the banks to sell securities. The capital ratio plays a crucial role in theoretical models of pro-cyclicality; faced with negative shocks to the numerator of the ratio (the balance of regulatory capital) banks sell assets to shrink the denominator (risk-weighted assets). Therefore, we predict an inverse relation between securities sales and the beginning Tier 1 capital ratio (CAPITAL_RATIO). Similarly, we predict an inverse relation between securities sales and the prior quarter's change in capital ratio (ΔCAPITAL_RATIO) because recent capital ratio declines may prompt banks to sell securities. We use the change in capital ratio during the prior quarter because securities sales endogenously boost capital ratios during the current quarter. We include the bank's quarterly pre-tax net income scaled by average liabilities (EARNINGS) in order to capture exogenous shocks to the capital ratio within the quarter, which would prompt sales of assets. EARNINGS is the summary measure of performance that would cause the capital ratio to change during the quarter absent sales of assets. Given the potentially important role of OTTI charges and bad debt expenses in pro-cyclical selling, we exclude them from EARNINGS and include separate variables (denoted OTTI and BDE).[11] We also include as controls CH_TREASURY, PORTFOLIO_SIZE, and the natural log of average liabilities (FIRM_SIZE). The regression model is as follows:

[11] To compute EARNINGS, we take pre-tax earnings before extraordinary items, remove OTTI and BDE, and then add extraordinary items, even though extraordinary items is an after-tax amount. Since OTTI and BDE are pre-tax amounts and are of most interest, we consider it best to base the computation on a pre-tax earnings number.

$$SALES_{i,q} = a + b_1 CAPITAL\_RATIO_{i,q} + b_2 \Delta CAPITAL\_RATIO_{i,q-1} + b_3 EARNINGS_{i,q} + b_4 OTTI_{i,q} + b_5 BDE_{i,q} + b_6 CH\_TREASURY_{i,q} + b_7 PORTFOLIO\_SIZE_{i,q} + b_8 FIRM\_SIZE_{i,q} + e_{i,q} \quad (3)$$

We focus on the effects of bank stress factors during the crisis in particular, by separately estimating regression (3) in the pre-crisis period (2004 to 2006) and in the crisis period. We estimate two crisis-period regressions; one including only 2008, the other pooling 2007 and 2008. We estimate a 2008-only model because Figure 1 shows that in 2007 bank earnings were still high and OTTI charges were small.

Determinants of selling: descriptive statistics

Table 2 presents descriptive statistics for the full sample and the sample partitioned by pre-crisis and crisis years. All variables are winsorized at one percent except for CAPITAL_RATIO and OTTI. Since CAPITAL_RATIO has no extreme outliers in the left tail, we simply cap the right tail at 30 percent. We do not winsorize OTTI because it is zero for nearly 90 percent of observations. Instead, in robustness tests we replace continuous OTTI with a ranked version and with an indicator variable that captures whether an OTTI charge is taken at all.

[PLACE TABLE 2 HERE]

For the full sample, which is described in Panel A, the mean (median) quarterly SALES are 1.4 (0.2) percent of average liabilities. Almost 23 percent of the observations have SALES of zero.[12] The mean (median) change in the Tier1 capital ratio (ΔCAPITAL_RATIO) is -0.06 (-0.02) percentage points consistent with Figure 2 which showed a general decline in Tier1 capital ratios during the sample period. The mean OTTI is extremely low (0.011 percent of liabilities) because of the predominance of zero observations. Although OTTI is predominantly zero, over 50 percent of firms record an OTTI charge in the quarter ended September 2008. The mean

[12] Exclusion of these observations does not affect the inferences from our tests.

(median) bad debt expense (BDE) is 0.100 (0.043) percent of average liabilities. Similar to LL (2010), we find that the mean (median) non-Treasury HTM and AFS portfolio (PORTFOLIO_SIZE) is 26.0 (23.5) percent of average liabilities, representing a significant portion of bank balance sheets. Sample firms vary widely in size, ranging from total liabilities of $815 million to $2.2 trillion, with a mean (median) of $61.2 ($6.1) billion.

The means and medians for almost all variables differ statistically across the pre-crisis and crisis periods (see Panel B of Table 2). Inconsistent with pro-cyclical sales of securities, mean and median SALES are lower during the crisis, although this difference does not remain significant in the multiple regression results reported in Table 1. As expected, during the crisis CAPITAL_RATIO and EARNINGS are lower, and BDE and OTTI are higher. When compared to the pre-crisis period, the crisis-period mean BDE increases by a factor of 4 and mean OTTI increases by a factor of 20.

Panel C of Table 2 presents Pearson and Spearman correlations among the variables of interest. SALES is significantly correlated in the expected direction with OTTI, CH_TREASURY, and PORTFOLIO_SIZE, and is significantly correlated in the unexpected direction with BDE and EARNINGS. SALES also has a strong unexpectedly positive Pearson correlation with CAPITAL_RATIO (0.299), suggesting that firms with high capital ratios actually do more selling of securities. Outliers may be driving this Pearson correlation, as the Spearman correlation is not statistically significantly different from zero.[13] Another potential explanation for the unexpected sign of the Pearson correlation is that firms with high CAPITAL_RATIO tend to have large PORTFOLIO_SIZE (Pearson correlation of 0.627), and in turn firms with large PORTFOLIO_SIZE tend to have high SALES (Pearson correlation of

[13] In robustness tests we use rank regressions to assess the influence of outliers.

0.204); hence, we use multiple regression to examine the relation between securities sales and capital ratios after controlling for portfolio size.

Determinants of selling: regression results

Table 3 presents coefficient estimates for regression (3). Consistent with banks engaging in pro-cyclical sales of securities, the coefficient on OTTI is positive and significant in both the 2008-only and in the 2007-2008 pooled regression. The estimate of the coefficient on OTTI is insignificant in the pre-crisis regression, but the statistical power is low because few firms recognize OTTI charges in the pre-crisis period.

[PLACE TABLE 3 HERE]

OTTI is just one of many accounting charges that deplete regulatory capital. The remaining capital-depleting charges are captured by EARNINGS and BDE. The estimated coefficient on EARNINGS is not statistically significant in the pre-crisis or crisis period, and the estimated coefficient on BDE is statistically significant only in the 2008 regression. If the significant relation between SALES and OTTI is caused by banks selling securities in response to capital-depleting accounting charges, EARNINGS and BDE also should be significantly related to SALES. Thus, there is inconsistent evidence that accounting charges lead to pro-cyclical sales of assets. There is also inconsistent evidence concerning the relation between capital ratios and sales. As expected, the relation between ΔCAPITAL_RATIO and SALES is significantly negative during the crisis. However, the relation between CAPITAL_RATIO level and SALES is unexpectedly positive and statistically significant in both the pre-crisis and crisis periods, contrary to claims that low capital ratios cause firms to sell assets.

Determinants of selling: robustness tests

We consider several alternative specifications in order to check the robustness of our results. In order to determine whether the positive relation between SALES and OTTI is driven

by the mere incidence of an OTTI charge rather than by the magnitude of the OTTI charge, we replace OTTI with an indicator variable capturing whether the firm takes an OTTI charge or not. The results for analyses based on the OTTI indicator variable are weaker than those based on a continuous OTTI variable: the estimate of the coefficient on the OTTI indicator variable is not significantly different from zero in the pre-crisis regression, only marginally significantly positive in the 2008-only regression (p-value = 0.078), and not statistically different from zero in the 2007-2008 pooled regression. Thus, the relation between continuous OTTI and SALES is driven primarily by the magnitude of the OTTI charges.

To determine whether outliers drive the unexpectedly positive relation between SALES and CAPITAL_RATIO, we re-estimate regression (3) using ranks of all variables. Ranked FIRM_SIZE is highly collinear with the other ranked explanatory variables, so we remove it from the regression. The estimate of the coefficient on ranked CAPITAL_RATIO is not statistically different from zero in the pre-crisis or crisis-period regressions. The coefficient on ranked OTTI continues to be insignificant in the pre-crisis period and positive and significant (p-value = 0.001) in the crisis period.

Finally, we re-estimate regression (3) with two subsets of the sample. First, we restrict the sample to observations with a non-zero level of SALES; inferences remain unchanged. Second, we examine the sample of observations with non-zero levels of SALES and capital ratios below the median capital ratio; this sample is potentially interesting because bank stress factors such as earnings, bad debt expense, and OTTI may be relevant only when firms are less capitalized. For this sub-sample (contrary to the results for the full sample), no bank stress factor (CAPTIAL_RATIO, ΔCAPITAL_RATIO, EARNINGS, OTTI, and BDE) is statistically significant in the pre-crisis period or in the crisis period.

Realized gains and losses on sales of securities

In this sub-section, we examine the realized gains and losses on sales of AFS and HTM securities during the financial crisis. We do this for two reasons. First, even though we find that securities sales did not increase during the crisis, the fair value provisions of U.S. accounting rules could have spread the crisis across the financial sector as follows: a relatively modest level of selling, at low prices, could have established the marks that other banks used when marking their securities to market (LL 2010). These markdowns then would have decreased regulatory capital if considered other than temporary. If this alternative scenario occurred, then realized net profit from sales of securities likely would decline during the crisis.

The second reason for examining realized gains and losses during the crisis is that analytical models of pro-cyclicality differ in their predictions about what assets banks sell in response to market price shocks. Plantin et al. (2008) predict that banks sell the very assets that are marked down, while other models predict that banks sell any liquid risky asset, not necessarily the assets that are marked down (Cifuentes et al. 2005; Allen and Carletti 2008). If the Plantin et al. model is descriptive of the recent crisis, we would expect to see a decline in realized net profit from sales of securities during the crisis.

Figure 5 plots realized gains and losses on sales of AFS and HTM securities netted across banks for each quarter from 2004 to 2008.[14] Despite the falling prices for mortgaged-backed and other securities during 2007 and 2008, each quarter of 2007 and 2008 has a positive net gain across banks. The net gains in 2007 and 2008 appear in line with those realized in 2004 and early 2005, and are actually higher than those realized in late 2005 and 2006. Consistent with these observations, un-tabulated analysis indicates that the 2007 and 2008 net gains/losses are

[14] The realized gains and losses are taken from items bhck3521 and bhck3196 on the Y-9C report. We add back OTTI charges because they are included in the items but are not actually realized.

statistically significantly higher than those in the pre-crisis quarters. Thus, industry-level net gains on sale provide no evidence of increased loss selling during the crisis.

[PLACE FIGURE 5 HERE]

We also investigate the cross-sectional determinants of realized gains and losses (REALIZED_GL) to determine if bank stress factors such as low capital ratios prompt firms to engage in loss selling. The model is as follows:

$$\begin{aligned} REALIZED\_GL_{i,q} = a + b_1 CAPITAL\_RATIO_{i,q} + b_2 \Delta CAPITAL\_RATIO_{i,q-1} + \\ b_3 EARNINGS\_GL_{i,q} + b_4 OTTI_{i,q} + b_5 BDE_{i,q} + b_6 PORTFOLIO\_SIZE_{i,q} + \\ b_7 FIRM\_SIZE_{i,q} + b_8 APPRECIATION_{i,q} + e_{i,q} \end{aligned} \quad (4)$$

Since REALIZED_GL is a proxy for pro-cyclical activity, most of the explanatory variables are the same as in the SALES regression model (model 3); the estimates of the coefficients are, however, expected to have the opposite signs. Also, since REALIZED_GL is a component of EARNINGS, we remove it from EARNINGS to create an explanatory variable called EARNINGS_GL. Further, we add a control variable called APPRECIATION, which is the beginning difference between the fair value and amortized cost of the AFS and HTM securities portfolio, scaled by average liabilities. If a bank is forced to sell particular securities at abnormally low prices, it may try to offset the negative impact on earnings and regulatory capital by selling other securities that have appreciated in value. We expect APPRECIATION to be positively related to REALIZED_GL because it captures the unrealized gains available to offset the effects of loss selling.

[PLACE TABLE 4 HERE]

Table 4 presents coefficient estimates from regression (4). As expected, the estimated coefficient on the control for portfolio APPRECIATION is statistically significantly positive in both the pre-crisis and crisis period. No bank stress factors are statistically significantly related to REALIZED_GL in the predicted direction, except for CAPITAL_RATIO. However,

CAPITAL_RATIO has a weak level of significance in the crisis period (the estimated coefficient is statistically significant at the 10 percent level in the 2007-2008 pooled regression and is not statistically significant in the 2008-only regression). As a robustness check, we re-estimate regression (4) after replacing the continuous OTTI variable with the OTTI indicator variable. The explanatory power of the OTTI variable remains statistically insignificant. We also estimate the regression using just the observations with below-median CAPITAL_RATIO and all inferences are the same. The inconsistency and lack of significance in the relations between REALIZED_GL and the bank stress factors suggest that loss selling is not a common response to distress.[15]

Interrelation of securities sales across firms; contagion effects

The last aspect of pro-cyclicality we examine is the cross-bank relations in selling behavior. Theoretical models predict that fair value accounting causes banks to respond to price shocks in uniform ways, creating volatile economic conditions (Plantin et al. 2008). If banks' selling behavior in non-crisis periods is based on idiosyncratic liquidity needs or noise trading, we would expect to observe less cross-sectional variation in selling during crisis periods, as fair value losses force more and more banks to sell assets. Similarly, in crisis periods the industry level of selling should become a primary determinant of each individual bank's selling activity.

We compute the coefficient of variation (i.e., standard error/mean) for SALES in each quarter and plot this in Figure 6. Contrary to expectations, variation in selling in 2007 and 2008 appears in line with 2006 and actually higher than in 2004 and 2005. Un-tabulated analysis

[15] We speculate that accounting rules may have actually *discouraged* fire sales because the realized losses on sale would have reduced the capital ratio numerator, and thus in many cases would have reduced the overall capital ratio. Auditing practices may have also discouraged fire selling. Based on our conversations with auditors, sales of securities at a loss would be cause for questioning the bank's intent and ability to hold securities until prices recover, increasing the probability that the auditor would require OTTI charges on securities remaining in the portfolio. The basis for this auditing practice appears to be Auditing Standard AU 332, paragraph 57, which states that auditors should consider whether management's activities, such as securities selling, corroborate or conflict with stated intent. These incentives not to sell securities in times of falling prices would mean that accounting rules actually promote *counter*-cyclical behavior.

confirms that the coefficient of variation is statistically significantly higher in 2007 and 2008 than in the pre-crisis quarters.

[PLACE FIGURE 6 HERE]

The second way we examine the cross-bank relations in selling behavior is by adding industry-level quarterly sales (SALES_I) to the model of firm-level SALES (regression model 3). The presence of cross-bank inter-relations would suggest that SALES_I will be positively related to SALES, and we would expect the estimate of the coefficient on SALES_I to become significantly more positive during the crisis period. Table 5 shows that the estimate of the coefficient on SALES_I is significantly positive in the pre-crisis period. However, the estimate of the coefficient becomes insignificant in the crisis period, and is actually smaller in magnitude than the pre-crisis coefficient.[16] Inferences regarding SALES_I are robust to replacing a continuous OTTI variable with an OTTI indicator variable. Inferences also remain the same when restricting the sample to observations with below-median capital ratios and when requiring all observations to have non-zero sales. In summary, the evidence indicates that securities selling actually becomes less inter-related across banks during the crisis.

[PLACE TABLE 5 HERE]

V. Conclusion

Fair value provisions of U.S. accounting rules have been blamed for exacerbating the recent financial crisis, leading critics to call for substantial rule changes. Banking industry lobbyists and members of Congress pressed the FASB and SEC to change or suspend fair value accounting, and the FASB swiftly responded with changes. Defenders of U.S. rules argued that that the role of fair value accounting in U.S. bank regulation is not sufficient to lead to the pro-

[16] Un-tabulated results indicate that the difference in SALES_I coefficients between the pre-crisis and crisis period is not statistically significant.

cyclical effects alleged by the critics, and are concerned about government interference in standard setting, normally a non-governmental activity.

We contribute to the debate over the role of fair value accounting in the recent crisis by examining the size and timing of OTTI charges relative to other non-fair value charges taken by banks. We focus on OTTI charges because they are the only fair value write-downs of debt securities that affect regulatory capital. We find that, although OTTI charges reached unprecedented levels during the financial crisis, the impact on regulatory capital was minimal. Moreover, the majority of the OTTI charges were not recognized until the later part of 2008, well after the financial crisis was underway. Although we do find a relation between sales of securities and OTTI, suggesting a possible link between fair value accounting and pro-cyclical behavior, the preponderance of our evidence is inconsistent with pro-cyclical behavior.

Critics of fair value accounting also contend that it prompted banks to sell securities in order to maintain their regulatory capital ratios. Our results suggest that industry-level sales of AFS and HTM securities were similar to levels seen before the crisis. We also find no evidence that banks increasingly sold securities at losses during the crisis, providing no support for claims that fair value accounting caused "fire-sales" of assets. Based on our findings, it is unlikely that fair value accounting affected the banking industry in the ways commonly alleged by critics. Rather, our evidence suggests that, if accounting-based depletions of regulatory capital played a role in the crisis, the main culprit was bad debt expense which is not a fair valued item.

It is important to understand the role that accounting rules played in the recent crisis because many critics, including a former FDIC chairman, pointed to the economic turmoil as evidence that the FASB needs more government oversight and checks on its standard setting power (Lamoreaux 2009; Isaac 2010). This study's findings counter many of the claims about accounting's role in the crisis, which in turn suggests that Congress was rash in demanding rule

changes from the FASB. This should give pause to advocates of even more government involvement in accounting standard setting. An alternative way for the government to limit the FASB's influence over the financial sector is to delink regulatory capital rules from accounting rules. Even before the crisis, bank regulators shielded regulatory capital from several items affecting accounting book equity (e.g. unrealized gains/losses on AFS debt securities), and more exclusions could be made if systemic risk is a concern.

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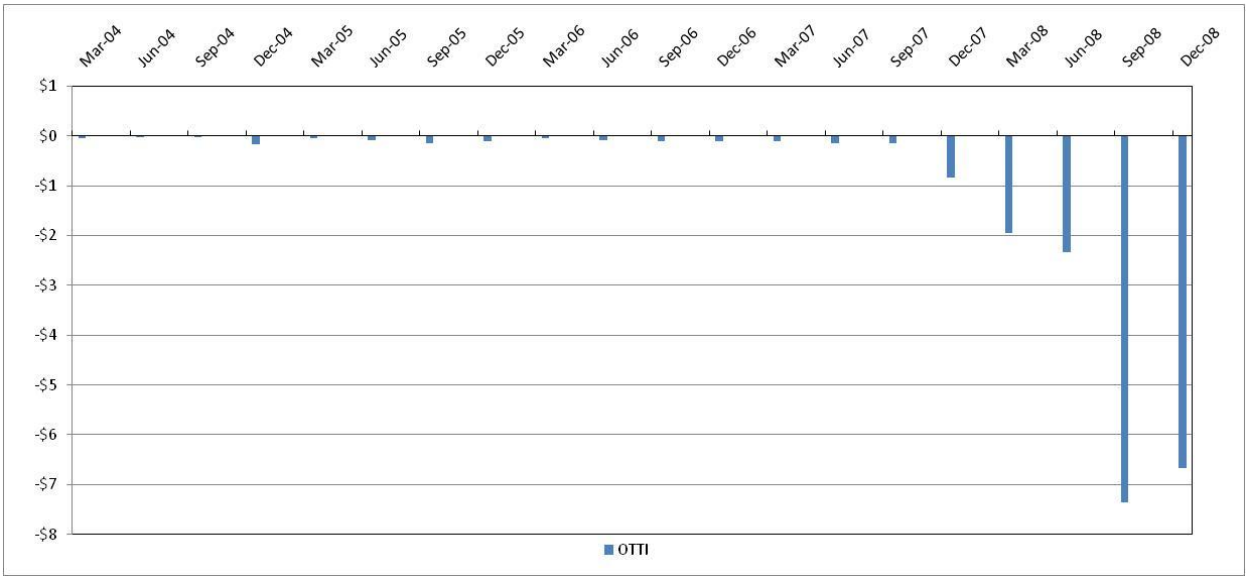
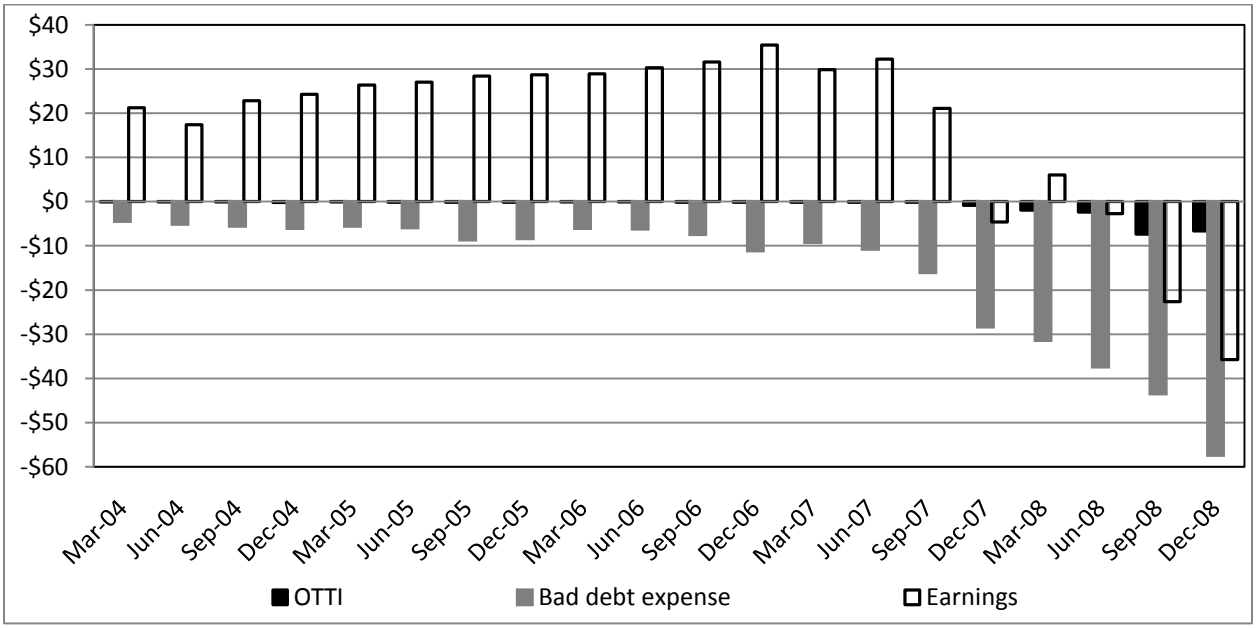
Figure 1. Other than Temporary Impairments, Bad Debt Expense, and Earnings by Quarter

Panel A: OTTI



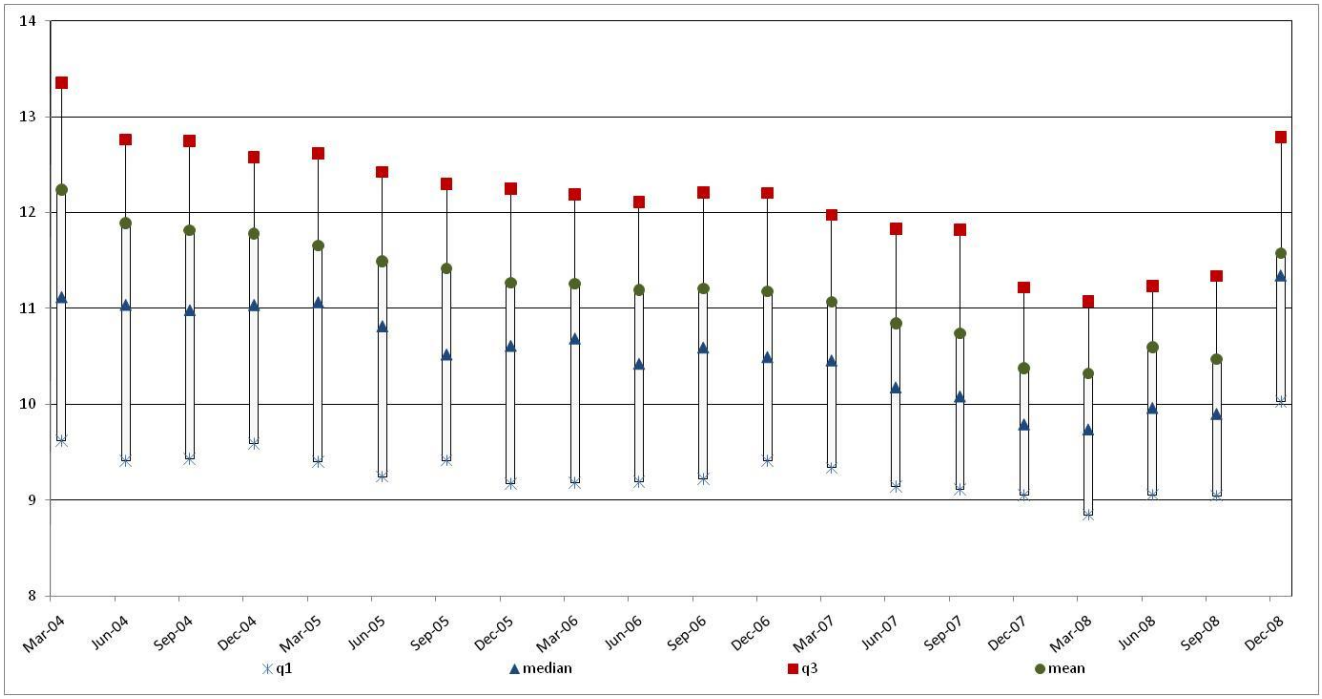
Panel B: OTTI, bad debt expense, and earnings



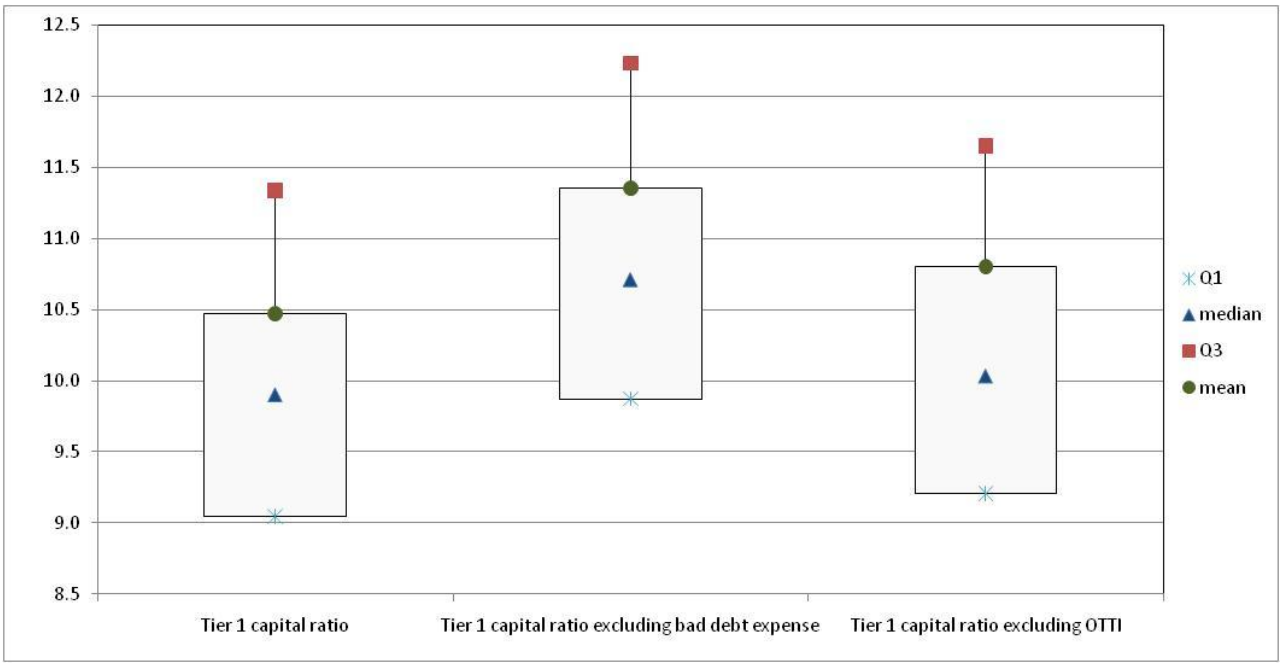
OTTI is the amount of other-than-temporary impairments of available-for-sale and held-to-maturity securities. Bad debt expense is a charge related to management's expectations about future uncollectible loan amounts (bhck4230). Earnings is the amount of net income (loss) (bhck4340). The sample is based on the top 100 banks ranked by beginning of quarter holdings of non-Treasury held-to-maturity and available-for-sale securities. All amounts are in billions.

Figure 2. Tier 1 Capital Ratios

Panel A: Box-Plot of the Tier 1 Capital Ratio by Quarter

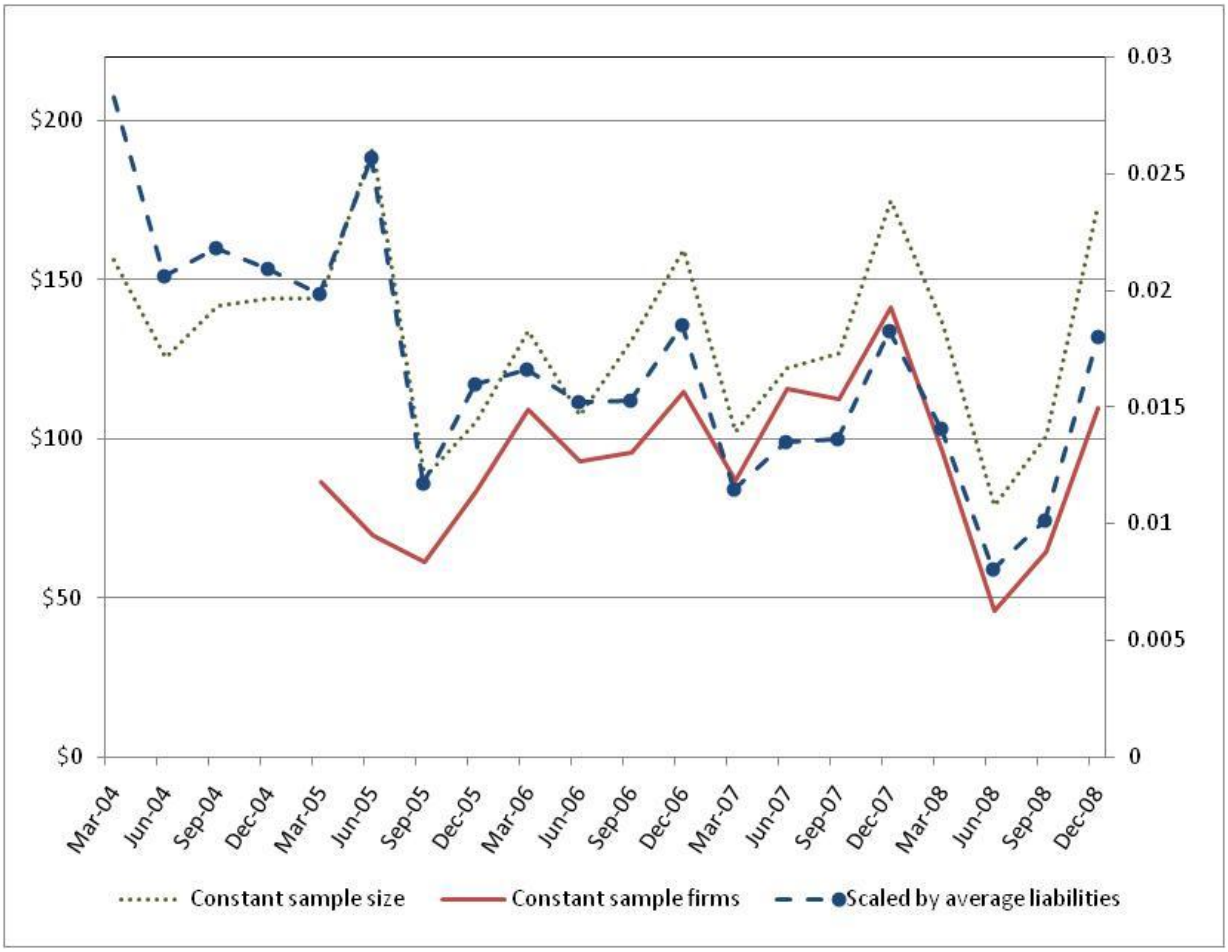


Panel B: Tier 1 Capital Ratio for Quarter ended September 2008



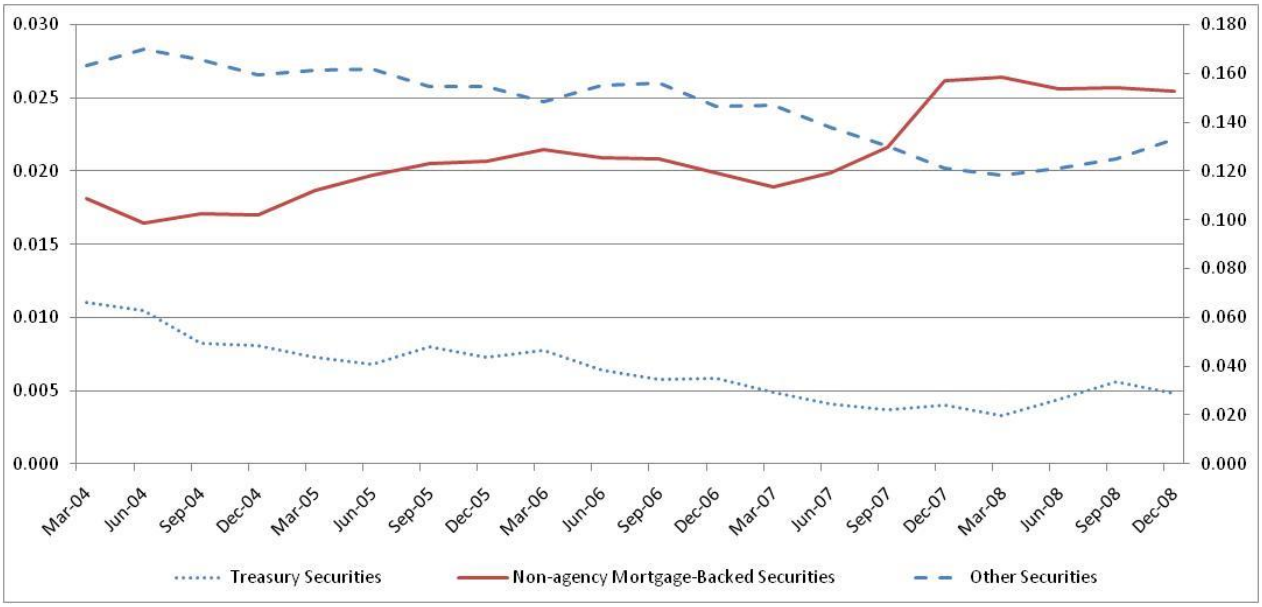
Tier1 capital ratio is item bhck7206 from the Federal Reserve FR Y-9C report. Bad debt expense is a charge related to management's expectations about future uncollectible loan amounts (bhck4230). OTTI is the amount of other-than-temporary impairments of available-for-sale and held-to-maturity securities. The sample is based on 2,846 firm-quarters with the total number of firms in each quarter ranging from 128 in December 2008 to 150 in June of 2006. The quarter ended September 2008 has 131 firms.

Figure 3. Sales of AFS and HTM Securities by Quarter



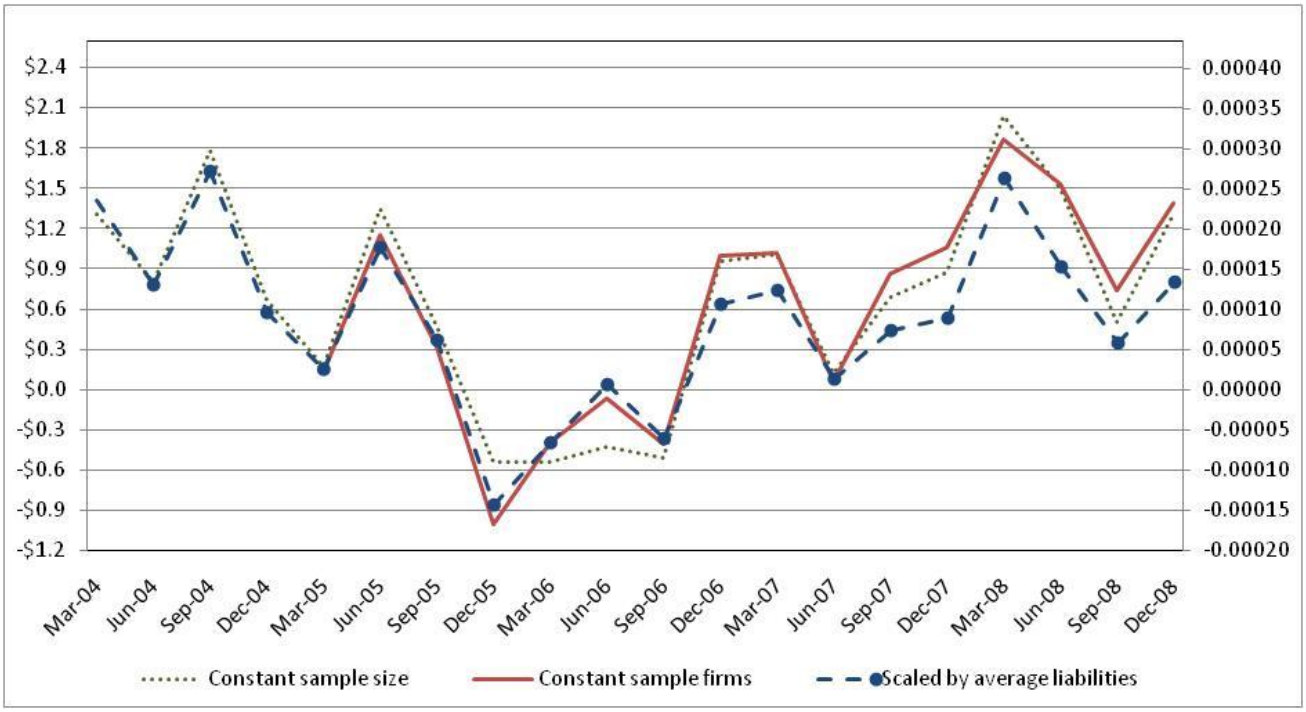
Sales of available-for-sale and held-to-maturity securities are obtained from the statement of cash flows. The 'constant sample size' plot is based on the top 100 banks ranked by beginning of quarter holdings of non-Treasury held-to-maturity and available-for-sale securities. The 'constant sample firms' plot is based on the same 69 firms each quarter. To increase the number of firms that can be used, this plot does not start until 2005. The 'scaled by average liabilities' plot is based on 2,685 firm-quarters and is the total amount of held-to-maturity and available-for-sale securities sales, scaled by average liabilities. The left axis, in billions, applies to the 'constant sample size' and 'constant sample firms' plots while the right axis applies to 'scaled by average liabilities' plot.

Figure 4. Holdings of Treasury Securities, Non-agency Mortgage-Backed Securities, and all other AFS and HTM Securities by Quarter



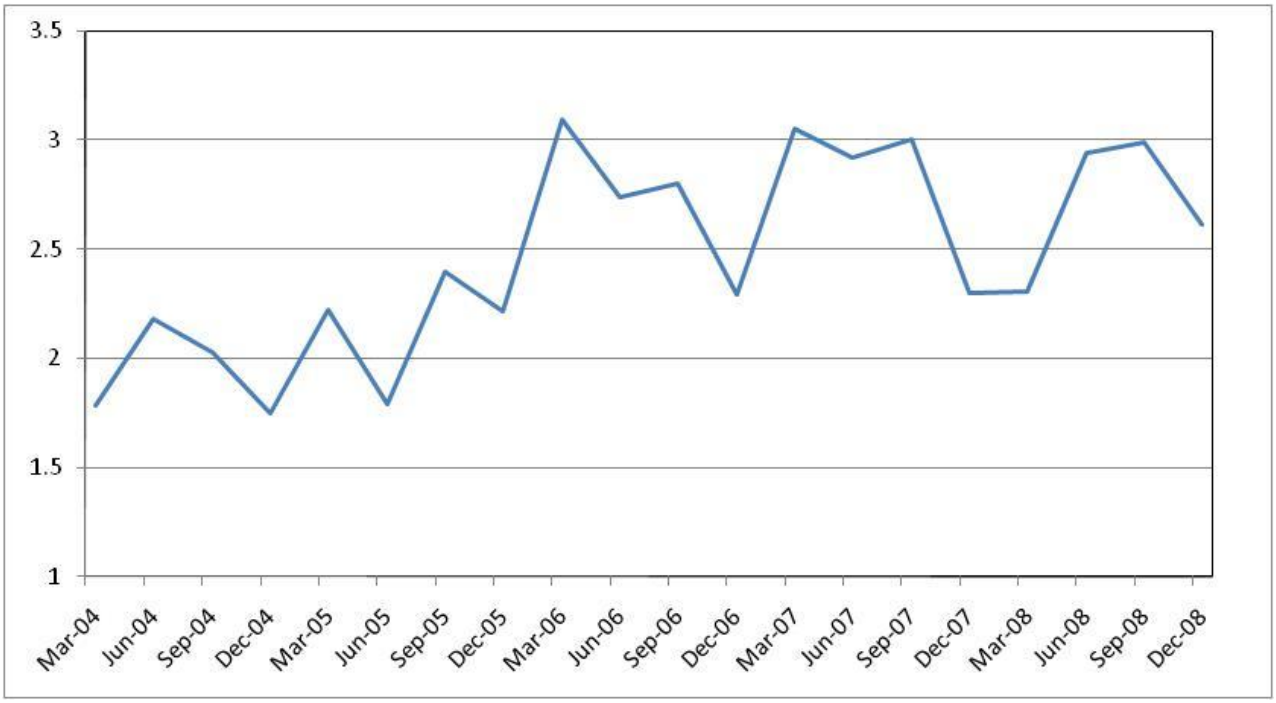
All securities included in this figure are either available-for-sale or held-to-maturity securities. All amounts are industry-level holdings scaled by industry-level average liabilities. The sample is based on 2,846 firm-quarters. The left axis applies to 'Treasury Securities' and 'Non-agency Mortgage-Backed Securities' while the right axis applies to 'Other Securities'.

Figure 5. Net Realized Gains and Losses on Sales of AFS and HTM Securities by Quarter



Net realized gains and losses from the sale of held-to-maturity and available-for-sale securities are obtained from Federal Reserve Y-9C items bhck3521 and bhck3196. We add back OTTI charges to these items to compute the gains/losses realized from actual sales. The 'constant sample size' plot is based on the top 100 banks ranked by beginning of quarter holdings of non-Treasury held-to-maturity and available-for-sale securities. The 'constant sample firms' plot is based on the same 121 firms each quarter. To increase the number of firms that can be used, this plot does not start until 2005. The 'scaled by average liabilities' plot is based on 2,838 firm-quarters and is scaled by average liabilities. The left scale, in billions, applies to the 'constant sample size' and 'constant sample firms' plots while the right scale applies to 'scaled by average liabilities' plot.

Figure 6. Coefficient of Variation in Sales of AFS and HTM Securities by Quarter



The coefficient of variation is the standard error of SALES divided by the mean of SALES each quarter. The sample is based on 2,685 firm-quarter observations. SALES equals the total amount of held-to-maturity and available-for-sale securities sales, scaled by average liabilities.

Table 1
Level of Selling during the Crisis Period

	Predicted	Quarterly Regression	Firm-quarter Regression	
Intercept	?	-0.0131	0.0004	
		(0.0319)	(0.0080)	
2007_INDICATOR	+	-0.0013	-0.0014	
		(0.0046)	(0.0022)	
2008_INDICATOR	+	-0.0015	-0.0006	
		(0.0052)	(0.0030)	
CH_TREASURY_I	-	-0.8937		
		(1.2839)		
PORTFOLIO_SIZE_I	+	0.1830		
		(0.1815)		
CH_TREASURY	-		-1.0903	***
			(0.3658)	
PORTFOLIO_SIZE	+		0.0534	**
			(0.0309)	
Adjusted R-square		25.1%	5.3%	
n		20	2,671	

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (one-tailed if sign is in the predicted direction, two-tailed otherwise). The model is estimated using ordinary least squares. Standard errors are presented in parentheses below coefficient estimates. The quarterly regression uses heteroscedasticity-consistent standard errors (White 1980). The firm-quarter regression uses robust standard errors clustered by firm. The dependent variable in the quarterly (firm-quarter) regression is SALES_I (SALES): industry-level (firm-level) held-to-maturity and available-for-sale securities sales in quarter q, scaled by industry-level (firm-level) average liabilities in quarter q. 2007_INDICATOR equals one if the quarter is in 2007 and zero otherwise. 2008_INDICATOR equals one if the quarter is in 2008 and zero otherwise. CH_TREASURY_I (CH_TREASURY) equals the industry-level (firm-level) change in the amortized cost of held-to-maturity (bhck0211) and available-for-sale Treasury securities (bhck1286), scaled by industry-level (firm-level) average liabilities in quarter q (bhck2948). PORTFOLIO_SIZE_I (PORTFOLIO_SIZE) equals the industry-level (firm-level) amortized cost of non-Treasury held-to-maturity and available-for-sale securities (bhck1754 + bhck1772 – bhck0211 – bhck1286), scaled by industry-level (firm-level) average liabilities in quarter q (bhck2948). All items beginning with "bhck" come from Federal Reserve Y-9C reports.

Table 2

Descriptive Statistics and Correlations for Firm Quarters

Panel A: Descriptive Statistics for the Full Sample

Full Sample (n=2,671)	Mean	Std Err	Min	Q1	Median	Q3	Max
SALES	0.0142	0.0341	0.0000	0.0000	0.0028	0.0135	0.2518
CAPITAL_RATIO	11.2271	3.3876	0.1200	9.2000	10.4100	12.2600	30.0000
ΔCAPITAL_RATIO	-0.0585	0.7439	-3.4100	-0.2800	-0.0200	0.2000	2.9700
EARNINGS	0.0091	0.0099	-0.0382	0.00444	0.0087	0.0142	0.0381
OTTI	0.0001	0.0007	0.0000	0.0000	0.0000	0.0000	0.0173
BDE	0.0010	0.0018	-0.0004	0.0002	0.0004	0.0009	0.0104
CH_TREASURY	-0.0003	0.0034	-0.0203	-0.0000	0.0000	0.0000	0.0155
PORTFOLIO_SIZE	0.2597	0.1267	0.0605	0.1713	0.2348	0.3256	0.7097
FIRM_SIZE	9.1297	1.5703	6.9895	7.9298	8.7106	9.6927	14.1172
REALIZED_GL	0.0044	0.0354	-0.1621	0.0000	0.0003	0.0072	0.2033
APPRECIATION	-0.0014	0.0048	-0.0167	-0.0039	-0.0014	0.0007	0.0158
LIABILITIES ($ millions)	61,179	220,855	815	2,779	6,067	16,199	2,156,448

Panel B: Descriptive Statistics for the Pre-Crisis Sample and Crisis Sample

Pre-Crisis (n=1,665)	Mean	Std Err	Min	Q1	Median	Q3	Max
SALES	0.0158***	0.0354	0.0000	0.0000	0.0031***	0.0159	0.2518
CAPITAL_RATIO	11.5867***	3.6372	6.0000	9.3600	10.8100***	12.5200	30.0000
ΔCAPITAL_RATIO	-0.0503	0.7566	-3.4100	-0.2800	-0.0200	0.2100	2.9700
EARNINGS	0.0117***	0.0076	-0.0382	0.0059	0.0105***	0.0162	0.0381
OTTI	0.0000***	0.0001	0.0000	0.0000	0.0000***	0.0000	0.0020
BDE	0.0005***	0.0008	-0.0004	0.0001	0.0003***	0.0006	0.0091
CH_TREASURY	-0.0004	0.0037	-0.0203	-0.0000	0.0000	0.0000	0.0154
PORTFOLIO_SIZE	0.2803***	0.1298	0.0605	0.1930	0.2585***	0.3464	0.7097
FIRM_SIZE	9.0701**	1.5512	6.9895	7.9035	8.6551***	9.7057	14.1172
REALIZED_GL	0.0033	0.0340	-0.1621	0.0000	0.0002	0.0075	0.2033
APPRECIATION	-0.0012***	0.0051	-0.0167	-0.0040	-0.0012***	0.0013	0.0158
LIABILITIES ($ millions)	52,062***	180,741	815	2,707	5,739***	16,411	1,694,445

Crisis (n=1,006)	Mean	Std Err	Min	Q1	Median	Q3	Max
SALES	0.0115	0.0318	0.0000	0.0000	0.0011	0.0095	0.2518
CAPITAL_RATIO	10.6319	2.8310	0.1200	9.0600	10.0000	11.6900	30.0000
ΔCAPITAL_RATIO	-0.0721	0.7220	-3.4100	-0.2800	-0.0400	0.1800	2.9700
EARNINGS	0.0048	0.0115	-0.0382	0.0021	0.0057	0.0107	0.0381
OTTI	0.0003	0.0012	0.0000	0.0000	0.0000	0.0000	0.0173
BDE	0.0019	0.0024	-0.0004	0.0003	0.0009	0.0024	0.0104
CH_TREASURY	-0.0001	0.0027	-0.0203	-0.0000	0.0000	0.0000	0.0155
PORTFOLIO_SIZE	0.2256	0.1134	0.0605	0.1518	0.1967	0.2796	0.7097
FIRM_SIZE	9.2284	1.5974	6.9895	8.0226	8.8498	9.6793	14.1172
REALIZED_GL	0.0061	0.0375	-0.1621	0.0000	0.0004	0.0066	0.2032
APPRECIATION	-0.0019	0.0043	-0.0167	-0.0037	-0.0017	0.0005	0.0158
LIABILITIES ($ millions)	76,266	274,104	853	3,049	6,973	15,984	2,156,448

Panel C: Pearson (above the diagonal) and Spearman (below the diagonal) Correlations

	Pearson (above the diagonal) and Spearman (below the diagonal) Correlations											
Full Sample (n=2,671)	1	2	3	4	5	6	7	8	9	10	11	12
SALES (1)		0.30***	-0.02	0.11***	0.06***	-0.06***	-0.11***	0.20***	-0.03	0.12***	0.07***	0.02
CAPITAL_RATIO (2)	-0.03		0.05***	0.19***	0.02	-0.16***	-0.11***	0.63***	-0.39***	0.12***	0.14***	0.03
ΔCAPITAL_RATIO (3)	0.02	0.05**		0.08***	-0.03	-0.00	0.08**	-0.01	0.04**	0.00	-0.03	0.06**
EARNINGS (4)	0.09***	0.08***	0.05**		-0.16***	-0.57***	-0.03	0.14***	0.03	0.13***	0.04**	0.08***
OTTI (5)	0.06**	-0.16***	0.02	-0.14***		0.17***	0.02	-0.00	-0.01	-0.09**	0.02	-0.15***
BDE (6)	-0.02	-0.31***	-0.02	-0.32***	0.21***		0.04	-0.27***	0.16**	-0.20***	0.04**	-0.03
CH_TREASURY (7)	-0.07***	-0.03	0.01	-0.03	0.05**	0.03		-0.02	0.04	-0.07***	-0.04	0.00
PORTFOLIO_SIZE (8)	0.08***	0.60***	-0.02	0.08***	-0.09***	-0.38***	0.01		-0.36***	0.17***	0.10**	-0.05**
FIRM_SIZE (9)	0.13***	-0.51***	0.04**	0.09***	0.19***	0.13***	-0.04**	-0.43***		-0.06**	-0.01	0.06***
SALES_I (10)	0.19***	0.13***	0.01	0.19***	-0.15***	-0.21***	-0.08	0.19***	-0.07***		0.06**	0.17***
REALIZED_GL (11)	0.22***	-0.03	0.00	-0.02	0.07**	0.06***	0.01	0.04**	0.03	0.10***		0.16***
APPRECIATION (12)	0.08***	-0.05***	0.05**	-0.02	-0.07**	0.04**	-0.01	-0.12***	0.02	0.17***	0.12***	

In Panel B ***, ** denote that the value in the pre-crisis partition significantly differs from the corresponding value in the crisis partition at the 1 and 5 percent levels, respectively (two-tailed). In Panel C ***, ** denote significantly different from zero at the 1 and 5 percent levels, respectively (two-tailed). SALES equals the total amount of held-to-maturity and available-for-sale securities sales (from cash flow statement), scaled by average liabilities (bhck2948). CAPITAL_RATIO equals the beginning Tier1 Capital Ratio (bhck7206). ΔCAPITAL_RATIO equals the change in the Tier1 Capital Ratio (bhck7206) during quarter q-1. EARNINGS equals pretax earnings (bhck4301) plus extraordinary items (bhck4320) minus other-than-temporary-impairments (*OTTI*) minus bad debt expense (bhck4230), scaled by average liabilities (bhck2948). OTTI equals other-than-temporary impairments of available-for-sale and held-to-maturity securities, scaled by average liabilities (bhck2948). BDE equals the charge related to management's expectations about future uncollectible loan and lease amounts (bhck4230), scaled by average liabilities (bhck2948). CH_TREASURY equals the quarterly change in the amortized cost of held-to-maturity (bhck0211) and available-for-sale Treasury securities (bhck1286), scaled by average liabilities (bhck2948). PORTFOLIO_SIZE equals the beginning amortized cost of non-Treasury held-to-maturity and available-for-sale securities (bhck1754 + bhck1772 – bhck0211 – bhck1286), scaled by average liabilities (bhck2948). FIRM_SIZE equals the natural log of the average of total liabilities (bhck2948). SALES_I equals industry-wide sales of held-to-maturity and available-for-sale securities, scaled by industry-wide average liabilities (bhck2948). REALIZED_GL equals net realized gains and losses from the sale of held-to-maturity and available-for-sale securities (bhck3521 + bhck3196), scaled by average liabilities (bhck2948). We add back OTTI charges to exclude them from these items. APPRECIATION equals the beginning difference between the fair value of held-to-maturity (bhck1771)and available-for-sale securities (bhck1773) and the amortized cost of held-to-maturity (bhck1754) and available-for-sale securities (bhck1772), scaled by average liabilities (bhck2948). LIABILITIES Equals average total liabilities (bhck2948). All continuous variables are winsorized at one percent except for CAPITAL_RATIO, OTTI and LIABILITIES. CAPITAL_RATIO is instead capped at 30 percent. All items beginning with "bhck" come from Federal Reserve Y-9C reports.

Table 3
Cross-sectional Determinants of Selling

	Predicted	Pre-Crisis	2008 Only	2007 and 2008
Intercept	?	-0.039 *	-0.074 **	-0.060 ***
		(0.020)	(0.033)	(0.019)
CAPITAL_RATIO	-	0.002 **	0.004 **	0.004 ***
		(0.001)	(0.002)	(0.001)
ΔCAPITAL_RATIO	-	0.001	-0.008 ***	-0.006 **
		(0.002)	(0.003)	(0.003)
EARNINGS	-	0.112	0.441	0.324
		(0.217)	(0.273)	(0.297)
OTTI	+	-1.932	2.331 ***	2.378 **
		(5.128)	(0.711)	(1.274)
BDE	+	-2.873	1.982 **	1.274
		(1.750)	(0.924)	(0.940)
CH_TREASURY	-	-0.873 ***	-0.995 *	-0.619
		(0.323)	(0.656)	(0.452)
PORTFOLIO_SIZE	+	0.007	0.034	0.017
		(0.019)	(0.030)	(0.025)
FIRM_SIZE	?	0.002 *	0.003 **	0.002 **
		(0.001)	(0.001)	(0.001)
Adjusted R-square		8.8%	29.0%	17.5%
n		1,665	472	1,006

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (one-tailed if sign is in the predicted direction, two-tailed otherwise). The model is estimated using ordinary least squares where the dependent variable is SALES. Robust standard errors clustered by firm are presented in parentheses below coefficient estimates. SALES equals the total amount of held-to-maturity and available-for-sale securities sales (from cash flow statement), scaled by average liabilities (bhck2948). CAPITAL_RATIO equals the beginning Tier1 Capital Ratio (bhck7206). ΔCAPITAL_RATIO equals the change in the Tier1 Capital Ratio (bhck7206) during quarter q-1. EARNINGS equals pretax earnings (bhck4301) plus extraordinary items (bhck4320) minus other-than-temporary-impairments (*OTTI*) minus bad debt expense (bhck4230), scaled by average liabilities (bhck2948). OTTI equals other-than-temporary impairments of available-for-sale and held-to-maturity securities, scaled by average liabilities (bhck2948). BDE equals the charge related to management's expectations about future uncollectible loan and lease amounts (bhck4230), scaled by average liabilities (bhck2948). CH_TREASURY equals the quarterly change in the amortized cost of held-to-maturity (bhck0211) and available-for-sale Treasury securities (bhck1286), scaled by average liabilities (bhck2948). PORTFOLIO_SIZE equals the beginning amortized cost of non-Treasury held-to-maturity and available-for-sale securities (bhck1754 + bhck1772 – bhck0211 – bhck1286), scaled by average liabilities (bhck2948). FIRM_SIZE equals the natural log of the average of total liabilities (bhck2948). All items beginning with "bhck" come from Federal Reserve Y-9C reports.

Table 4
Cross-sectional Determinants of Realized Gains and Losses

	Predicted	Pre-Crisis	2008 Only	2007 and 2008
Intercept	?	-0.0160	-0.0451 **	-0.0404 **
		(0.0136)	(0.0192)	(0.0186)
CAPITAL_RATIO	+	0.0012 ***	0.0006	0.0016 *
		(0.0005)	(0.0010)	(0.0011)
ΔCAPITAL_RATIO	+	-0.0007	-0.0047	-0.0033 *
		(0.0013)	(0.0029)	(0.0015)
EARNINGS_GL	+	-0.1626	0.1962	0.2313
		(0.2006)	(0.3374)	(0.2334)
OTTI	-	1.0289	0.8103	1.7708
		(6.6265)	(3.0135)	(2.6345)
BDE	-	0.9672	1.0837	1.9246
		(1.3267)	(1.4534)	(1.0961)
PORTFOLIO_SIZE	?	0.0065	0.0627	0.0419 *
		(0.0115)	(0.0399)	(0.0244)
FIRM_SIZE	?	0.0006	0.0037 **	0.0020 *
		(0.0010)	(0.0017)	(0.0011)
APPRECIATION	+	0.8194 ***	1.7129 *	2.1923 ***
		(0.2284)	(0.8789)	(0.5853)
Adjusted R-square		2.9%	5.7%	11.1%
N		1,665	472	1,006

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (one-tailed if sign is in the predicted direction, two-tailed otherwise). The model is estimated using ordinary least squares where the dependent variable is REALIZED_GL. Robust standard errors clustered by firm are presented in parentheses below coefficient estimates. REALIZED_GL equals net realized gains and losses from the sale of held-to-maturity and available-for-sale securities (bhck3521 + bhck3196), scaled by average liabilities (bhck2948). We add back OTTI charges to exclude them from these items. CAPITAL_RATIO equals the beginning Tier1 Capital Ratio (bhck7206). ΔCAPITAL_RATIO equals the change in the Tier1 Capital Ratio (bhck7206) during quarter q-1. EARNINGS_GL equals pretax earnings (bhck4301), minus net realized gain/loss from the sale of held-to-maturity and available-for-sale securities (bhck3521 + bhck3196), plus extraordinary items (bhck4320) minus other-than-temporary-impairments (*OTTI*) minus bad debt expense (bhck4230), scaled by average liabilities (bhck2948). OTTI equals other-than-temporary impairments of available-for-sale and held-to-maturity securities, scaled by average liabilities (bhck2948). BDE equals the charge related to management's expectations about future uncollectible loan and lease amounts (bhck4230), scaled by average liabilities (bhck2948). PORTFOLIO_SIZE equals the beginning amortized cost of non-Treasury held-to-maturity and available-for-sale securities (bhck1754 + bhck1772 – bhck0211 – bhck1286), scaled by average liabilities (bhck2948). FIRM_SIZE equals the natural log of the average of total liabilities (bhck2948). SALES_I equals industry-level sales of held-to-maturity and available-for-sale securities, scaled by industry-level average liabilities. APPRECIATION equals the beginning difference between the fair value of held-to-maturity (bhck1771)and available-for-sale securities (bhck1773) and the amortized cost of held-to-maturity (bhck1754) and available-for-sale securities (bhck1772), scaled by average liabilities (bhck2948). All items beginning with "bhck" come from Federal Reserve Y-9C reports.

Table 5
Inter-relation of Selling across Banks

	Predicted	Pre-Crisis	2008 Only	2007 and 2008
Intercept	?	-0.0558 ***	-0.0778 **	-0.0633 ***
		(0.0198)	(0.0306)	(0.0197)
SALES_I	+	0.8988 ***	0.3730	0.2671
		(0.2229)	(0.3538)	(0.3602)
CAPITAL_RATIO	-	0.0026 **	0.0043 **	0.0039 ***
		(0.0013)	(0.0022)	(0.0013)
ΔCAPITAL_RATIO	-	0.0005	-0.0078 ***	-0.0058 **
		(0.0016)	(0.0027)	(0.0033)
EARNINGS	-	0.2343	0.4338	0.2953
		(0.2311)	(0.2737)	(0.3271)
OTTI	+	-0.9927	2.3172 ***	2.3636 **
		(5.3690)	(0.7134)	(1.2967)
BDE	+	-2.6640	1.8446 **	1.1399
		(1.7725)	(0.9732)	(1.0787)
CH_TREASURY	-	-0.8024 ***	-0.9812 *	-0.6063 *
		(0.3163)	(0.6519)	(0.4381)
PORTFOLIO_SIZE	+	0.0058	0.0334	0.0170
		(0.0187)	(0.0299)	(0.0251)
FIRM_SIZE	?	0.0023	0.0028 **	0.0023 **
		(0.0014)	(0.0012)	(0.0011)
Adjusted R-square		10.0%	29.0%	17.5%
N		1,665	472	1,006

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (one-tailed if sign is in the predicted direction, two-tailed otherwise). The model is estimated using ordinary least squares where the dependent variable is SALES. Robust standard errors clustered by firm are presented in parentheses below coefficient estimates. SALES equals the total amount of held-to-maturity and available-for-sale securities sales (from cash flow statement), scaled by average liabilities (bhck2948). SALES_I equals industry-wide sales of held-to-maturity and available-for-sale securities, scaled by industry-wide average liabilities (bhck2948). CAPITAL_RATIO equals the beginning Tier1 Capital Ratio (bhck7206). ΔCAPITAL_RATIO equals the change in the Tier1 Capital Ratio (bhck7206) during quarter q-1. EARNINGS equals pretax earnings (bhck4301) plus extraordinary items (bhck4320) minus other-than-temporary-impairments (*OTTI*) minus bad debt expense (bhck4230), scaled by average liabilities (bhck2948). OTTI equals other-than-temporary impairments of available-for-sale and held-to-maturity securities, scaled by average liabilities (bhck2948). BDE equals the charge related to management's expectations about future uncollectible loan and lease amounts (bhck4230), scaled by average liabilities (bhck2948). CH_TREASURY equals the quarterly change in the amortized cost of held-to-maturity (bhck0211) and available-for-sale Treasury securities (bhck1286), scaled by average liabilities (bhck2948). PORTFOLIO_SIZE equals the beginning amortized cost of non-Treasury held-to-maturity and available-for-sale securities (bhck1754 + bhck1772 – bhck0211 – bhck1286), scaled by average liabilities (bhck2948). FIRM_SIZE equals the natural log of the average of total liabilities (bhck2948). All items beginning with "bhck" come from Federal Reserve Y-9C reports.