Do Bank Portfolio Managers Exhibit Loss Aversion in Securities Transactions?

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I. Introduction

On September 8, 2006, PNC Financial Services Group announced that it would take a $200 million charge resulting from the sale of $6 billion of securities. Three weeks later, it announced that a second balance sheet restructuring would add $50 million in losses associated with securitizing $2 billion in mortgages. Other large banks soon followed with similar announcements.[1] The stated motive was to 'reduce the bank's exposure to credit spreads and interest rate volatility' in anticipation of a steeper yield curve.[2] Analysts responded, in part, by emphasizing PNC's ability to effect the sale because it would offset the losses with a $1.6 billion gain from a transaction where Merrill Lynch sold a business to BlackRock, of which PNC was the primary owner. They also noted the positive impact that the sales and reinvestment of proceeds would have on PNC's net interest income the next year.

Bank announcements of securities sales at a large loss garner attention because they occur infrequently and often signal a shift in strategy regarding the future course of interest rates. During the latter months of 2006, bank portfolio managers were responding to pressures on net interest margins from a flat yield curve. The anticipated decline in rates if the Federal Reserve were to ease, necessitates banks being less asset sensitive if they choose to speculate on future rate moves. In addition, security sales raise possible accounting issues. In 2001, an Emerging Issues Task Force representing the FFIEC signaled that the sale of securities may require that accountants designate the entire portfolio of remaining securities of that type as 'tainted' if the bank doesn't have the ability to

[1]For example, during October 2006 Huntington Bancshares and Bank of America announced a $34.7 million charge and $469 million charge, respectively, for securities sales.
[2] See "PNC to Sell Securities, Will Take $200M Charge," by Tim Massucca, American Banker, September 11, 2006, p. 23.

carry them. As such, a bank would have to mark the unsold securities to market and report any decline in value as a loss on the income statement.

For banks that pursue active portfolio strategies, taking securities gains or losses may lead to higher expected earnings without a significant increase in risk or may allow a reduction in risk without reducing expected earnings. Yet, many small banks never sell securities. Furthermore, the conventional wisdom among smaller institutions states that when selling securities banks should sell only those that have appreciated in price. Such sales enhance reported earnings and key profit ratios used to compare peer performance. Banks that sell securities at a loss may, in turn, find that shareholders attribute the losses to poor management.

Any tendency to sell securities at gains but not losses, absent accounting issues, contradicts sound financial analysis. A security is priced at a gain because the prevailing market rate on a comparable risk instrument is below the coupon rate on the security. A buyer pays a premium to receive the above-market coupon interest. Selling a security to capture the gain foregoes the higher coupon interest and creates a tax liability without offsetting losses elsewhere. Viewed independently, the selling bank would invest a greater amount of principal, reduced by applicable taxes, at a lower yield unless it chose to increase risk.[3] If the bank does not alter the risk structure of its investment, it will report lower future coupon interest. Management thus substitutes higher reported profits today for lower interest income in the future. The opposite occurs when securities are sold at a loss. A selling bank invests a lesser principal amount at a higher yield and effectively substitutes lower current reported profits for higher interest income in the future. Of course, it may be optimal to simultaneously sell securities trading at both gains and losses so that the net gain or loss is close to

[3] The pure financial decision can be viewed as a simple capital budgeting problem. The initial investment equals the after-tax proceeds from the sale of securities. The periodic cash flows equal the incremental coupon interest from reinvesting the proceeds. Selling securities at a gain allows a bank to reinvest the original principal plus the after-tax gain from the sale, but the incremental coupon interest is negative. The opposite occurs when a bank sells securities at a loss. There is a smaller investment amount, but the incremental cash flows are positive. Sales at losses typically generate positive net present values while sales at gains generate negative net present values.

zero with little tax impact. Such trades generate cash flows that can be reinvested to rebalance a bank's balance sheet with no substantive or adverse reporting consequences.

The previous discussion suggests several interesting research issues. First, which banks manage their securities portfolios actively versus passively? Second, do banks that actively manage their portfolios exhibit a greater tendency to sell securities at gains or at losses? Third, does the tendency to sell securities at a gain (or loss) harm overall profitability? Fourth, what factors may make bank portfolio managers unwilling to sell securities at a loss? Finally, did the emerging issues task force guidance reduce banks' willingness to sell securities at losses? We address these issues in the following analysis. In doing so, we pay particular attention to investor loss aversion as anecdotal evidence suggests that smaller banks do not sell securities at losses.

II. Loss Aversion Among Bank Portfolio Managers

Loss aversion means that banks hold poor performing investments longer than better performing investments. The idea behind loss aversion comes from Kahneman and Tversky's (1979) prospect theory where individuals treat losses and gains differently. Specifically, individuals are more risk averse for gains and more willing to take on risk for losses because of an 'S'-shaped utility function that is kinked around a reference point. In the extreme, individual investors hold investments with paper losses while selling investments that have paper gains. Shefrin and Statman (1985) call selling winners while holding losers the disposition effect. Recent research has documented numerous examples of loss aversion affecting individual sell decisions. For example, Odean (1998) and Grinblatt and Keloharju (2001) document that individual investors in the U.S. and Finland are reluctant to realize losses in equities. In addition to documenting loss aversion, Odean (1998) presents evidence that loss aversion is detrimental to overall portfolio performance.

While Odean (1998) and Grinblatt and Keloharju (2001) provide empirical evidence of loss aversion, this pattern of behavior does not necessarily affect market prices. There are several reasons why loss aversion among certain groups of investors might not matter to the general public. First, researchers may have found chance anomalous results among select groups of investors. Second, large groups of unsophisticated investors may fall prey to behavioral biases that negatively affect their performance, but because these investors do not represent the marginal investor their trades do not affect prices. If these individuals are a minority of traders and the impact of their trades is swamped by the activities of professionals, their trading activity has no effect on anyone but themselves.

The previous arguments rely on loss aversion not being widespread. Recent research has thus focused on whether other groups of investors, particularly professional investors, are reluctant to realize losses. Coval and Shumway (2005) and Haigh and List (2005) provide evidence that professional traders from the Chicago Board of Trade (CBOT) exhibit loss aversion. Coval and Shumway (2005) use CBOT transactions data from 1998 to show that traders with morning losses are more likely to make "price-setting" trades in the afternoon. Haigh and List (2005) provide experimental evidence that a sample of 54 professional futures and options pit traders from the CBOT are more likely to exhibit behavior consistent with myopic loss aversion than a sample of 64 undergraduate students. Using data from the Chicago Mercantile Exchange, Locke and Mann (2005) also find evidence that traders hold positions at loss longer than they hold positions at a gain. However, they do not find evidence that this is detrimental to performance.

There are rational arguments as to why bank portfolio managers might sell bonds at gains but not losses. First, analysts typically designate banks as high or low performers on the basis of aggregate profit ratios such at return on equity and return on assets. Such peer benchmarking is important to senior managers and bank boards of directors in assessing the quality of management.

Furthermore, many banks have incentive compensation programs that are driven by whether these same ratios exceed target thresholds. If compensation programs do not exclude the impact of one-time securities gains on earnings, managers can sell securities to help trigger bonuses. Second, bank managers indifferent to profit ratios may still realize gains to offset losses generated elsewhere recognizing that the effective tax rate on the gains is zero. Securities transactions cannot be viewed independently of the tax profile of the owners of the bank. This is especially relevant for S Corporation banks where income is 'passed through' to shareholders and taxed as partnership income without any corporate income tax paid by the bank.[4] Such a strategy is the counterpart to what PNC did in taking securities losses to offset gains available from other transactions. Third, banks with publicly-traded stock that must meet earnings expectations may defer losses to ensure that earnings targets are met. Finally, banks facing capital constraints do not have the ability to take losses that will further reduce capital.

III. Empirical Analysis

The following analysis empirically examines the frequency with which bank fixed-income portfolio managers, presumably professional traders, sell securities at gains or losses or choose not to sell securities. Fixed-income securities generally comprise 20% - 40% of bank assets and managers should exhibit significant portfolio expertise relative to the general population. While our data do not include information on individual bonds within a bank's portfolio, we can measure whether the overall portfolio is trading at a gain or loss such that we know the total realized and unrealized gains or losses from the portfolio each year. Quantifying the actual gains and losses actually realized allows us to assess how many banks are active versus passive traders and the relative frequency of loss aversion.

[4] Approximately 30% of U.S. commercial banks were taxed as S Corporations in 2005. Given the limitation that S Corp banks cannot have more than 100 shareholders, S Corp banks are generally small banks.

After determining the extent to which loss aversion exists for commercial banks, we examine whether there is any association between loss aversion and overall bank performance. This issue is particularly interesting given the conflicting results in the extant literature on whether or not loss aversion is harmful. We then examine factors that potentially influence management's choice of reporting securities gains even when the underlying portfolio is valued at a loss.

A. Data

We examine securities gains and losses for a sample of over 6,000 commercial and savings banks annually from 1995-2004. The sample includes only banks that existed in 2005 and thus exhibits significant survivorship bias.[5] The sample size differs each year as additional de novo banks begin operations. The data set starts in 1995, the first year after banks were required to report both the cost basis and the fair market value of their bond portfolios. The data include the cost basis and fair market values for all bonds designated as available-for-sale (AFS) for each bank in the sample which enables us to calculate unrealized capital gains and losses for each bank's total AFS bond holdings.[6] We include selected balance sheet and income statement data for realized capital gains/losses from investments, aggregate profit ratios, total assets, and capital. Finally, we have an identifier for S Corp tax filing status and geographic region in which the bank primarily operates.[7]

While this data set covers a large number of banks for a relatively long time period, it does not provide any detail on individual bond holdings. However, once unrealized gains and losses are

[5] A priori, we have no reason to expect that banks merged out of existence should exhibit performance different from that observed in this sample. Only 55 banks and thrifts failed from 1995 through 2006.

[6] Banks determine a bond's accounting treatment when they purchase the security. They can choose to designate it as held-to-maturity in which case the value is recorded on the balance sheet at historical or amortized cost. Changes in market value do not affect the income statement or balance sheet. Alternatively, banks can designate a bond as available-for-sale in which case they report its market value on the balance sheet with any increases or decreases in value associated with interest rate changes reported as an unrealized gain or loss under stockholders' equity. Banks can sell AFS securities at any time without adverse reporting consequences. Banks can also designate securities as held for trading purposes. Such securities are listed separately from investments on the balance sheet, are marked-to-market, with gains or losses appearing on the income statement as trading profit or loss. We restrict our analysis to AFS bonds because of regulatory and accounting restrictions and penalties faced by banks for selling HTM bonds prior to maturity. Most banks don't operate trading accounts and thus do not designate bonds as held for trading purposes.

[7] Data are from SNL and the Federal Reserve's call and income reports.

calculated and compared to realized gains and losses, we can determine whether banks that are taking gains are doing so from a portfolio that began the year with aggregate gains or aggregate losses. We use this information along with the frequency of reported losses as indicators of individual bank loss aversion.

Anecdotal evidence suggests that large banks manage their bond portfolios more actively and are more likely to sell securities at losses. We thus initially divide banks into size categories based on whether they have total assets under $250 million, between $250 million and $500 million, between $500 million and $1 billion, and greater than $1 billion. We then examine key figures across size categories.

B. Reporting Frequency for Bank Securities Gains and Losses

Table 1 provides information on the number of banks reporting securities gains and losses during each year. Panel A lists the number that report realized gains, realized losses, or zero net realized gains/losses. Note that the largest number of banks report zero realized gains or losses in each year ranging from 44 percent to 56 percent of the total banks. Thus, many banks appear to either not own AFS securities, or to buy and hold securities regardless of whether they classify the securities as AFS or HTM. Implicitly, the latter group represents passive portfolio managers. Passive investment behavior is consistent with the well-known laddered-maturity approach to investing. Here, portfolio managers determine a maximum acceptable maturity for any security type and simply invest proceeds from maturing securities plus any new commitments into securities of the same type with the longest acceptable maturity. For example, if 10 years represents the longest acceptable maturity, a bank would have approximately 10 percent of the portfolio mature each year such that management would need to invest the maturing 10 percent in new 10 year securities during the year.

Importantly, in only one of the 10 years did more banks report realized losses than realized gains. In 2000, rates were at periodic highs relative to rates in the surrounding years. Prior to 2000, the number of banks reporting realized gains was 85 percent higher than the number reporting realized losses. The differential increased sharply to 426 percent from 2001-2004 after the Emerging Issues Task Force released its guidance.

Contrast the figures in Panel A with those in Panel B for the number of banks reporting unrealized gains or losses and zero unrealized gains/losses. Banks with zero unrealized gains or losses, ranging from 10 percent to 14 percent of the total, generally don't own bonds or classify all bonds as HTM. The latter typically includes de novo banks in the early stages of operation. Virtually all banks reported unrealized losses in 1999. In all other years, the number reporting unrealized gains was greater, often by a substantial amount. The data in Panel A do not recognize the magnitude of reported gains or losses. If management was selling securities with gains at the same time it was selling securities with losses in order to minimize any tax effect, the net effect would still be to report a small realized gain or loss. Panel C adjusts the data in Panel A by separating banks that report realized gains or losses that comprise less than two percent of a bank's reported net income for the year from banks with greater gains or losses (in absolute value) as a fraction of net income. Banks that closely match realized gains and losses are presumably more tax efficient. Panel C demonstrates that around 30 percent of banks approximately match gains and losses each year. With this characterization, more banks reported securities losses in two years, 1995 and 2000, with the same relative pattern appearing elsewhere.

Tables 2 and 3 provide similar information on the number of banks reporting securities gains and losses during each year for the largest and smallest groups of banks, respectively. For banks with more than $1 billion in assets, more banks reported realized gains in each year compared with banks reporting realized losses. In all years except 1995 and 2000 when interest rates were at relative

peaks, the difference was substantial. The number reporting zero realized gains or losses fluctuated between 18 percent and 35 percent of the total number of banks. As indicated in Panel B, however, substantially more of the large banks held AFS portfolios with unrealized gains. Not surprisingly, few large banks reported zero unrealized gains or losses as most of these banks classify most bond holdings as AFS. Thus, up to one-third of large banks manage their AFS portfolios passively by not trading during any one year. Panel C indicates that a large fraction of these banks appear to not sell securities and attempt to match securities gains with losses.

The data in Table 3 for banks with less than $250 million in assets indicate that in most years more than one-half of small banks report zero realized gains or losses a much higher percentage of banks than those reporting zero unrealized gains or losses. The implication is that more small banks appear to follow a buy and hold strategy and thus do not actively manage their AFS portfolios. In all years except 1995 and 2000, more small banks report realized securities gains than losses following the pattern of other banks. The data in Panel C further suggest that many small banks closely match securities gains with losses such that the net effect on net income is small.

Figure 1 presents histograms that track reporting tendencies in terms of the frequency with which individual banks report securities gains or losses. The sample is restricted to banks that operated from 1995 through 2004 and thus exhibits substantial survivorship bias. Figure 1A plots the number of banks that report realized gains all 10 years versus those that report gains in successively fewer years (nine through one). Interestingly, regardless of whether the overall portfolio was trading at a gain or loss, almost 300 banks reported gains each year with an increasing number reporting gains each successively lower number of years. Figure 1B presents similar figures for banks that reported realized losses. Given the predominance of portfolios with gains over this period, the number of banks reporting losses in six or more years is relatively low. Only 19 banks reported realized losses in 8 or more years. Finally Figure 1C indicates that the largest number of banks, over

1000, reported zero realized gains or losses in all 10 years. These banks clearly follow a buy and hold strategy or don't own AFS bonds. For each of the other categories, the number of banks ranges between 400 and 600.

Figures 2 and 3 plot data similar to that in Figure 1, but do it for large banks with more than $1 billion in assets and small banks with less than $250 million in assets, respectively. Note that many large banks systematically report realized gains. In fact, the fraction of banks reporting gains in five or more years far exceeds the fractions reporting gains in just one to three years. Banks in this size category that report gains appear to do so regularly regardless of whether or not their portfolios have unrealized losses. In contrast, a smaller percentage of the smallest banks systematically report realized securities gains while few systematically report realized losses. Again, many small banks appear to passively manage their portfolios. Those that actively sell securities don't seem to follow a specific pattern.

Table 4 reports the percentage of banks that fall into one of four categories based on the realized gains (losses) in year t and unrealized gains (losses) in year t-1, in their available-for-sale portfolio. The categories are:

RG:UL – Banks that realized net gains for the year given the underlying AFS bond portfolio began the year trading at an unrealized loss.

RL:UG – Banks that realized net losses for the year given the underlying AFS bond portfolio began the year trading at an unrealized gain.

RG:UG – Banks that realized net gains for the year given the underlying AFS bond portfolio began the year trading at an unrealized gain.

RL:UL – Banks that realized net losses for the year given the underlying AFS bond portfolio began the year trading at an unrealized loss.

If portfolio managers sell bonds without thought of whether the security is trading at a gain or loss, RG:UG (row 3) should be the more common than RL:UG (row 2) because these transactions simply represents the sale of bonds that reflect the cumulative value of the portfolio. RG:UG is

much more common than RL:UG as, on average, 50% of the banks in our sample are in the RG:UG category vs. 13% of the banks in the RL:UG category. While this is consistent with a strategy of blindly selling bonds out of a portfolio that is on average trading at a gain, it is also consistent with loss aversion.

Just as RG:UG (row 3) should be the more common than RL:UG (row 2), if managers trade with no regard to whether bonds are at a gain or loss in the portfolio, then RL:UL (row 4) should be more common than RG:UG (row 1). However, this is not the case in our sample. In seven of the ten years, more of the banks that start off the year with a portfolio that is trading at a loss take gains. In addition, the average for RL:UL is 17% over our ten year sample, while the average for RG:UL is 20%. These banks are clearly not randomly selling bonds out of their portfolios. Banks in the RG:UL category are the ones that are acting in a way most consistent with loss aversion as they are realizing net gains even though the underlying portfolio started the year with net unrealized losses.

Table 5 shows the same result in a slightly different way. In Table 5 we report the following ratios,

RG / UG = RG:UG / (RG:UG + RL:UG)

RG / UL = RG:UL / (RG:UL + RL:UL)

RG / UG equals the percentage of banks that realized net gains given the fact that the portfolio was, on average, valued at a gain. These are banks that are selling bonds with gains from a portfolio that contains gains. RG / UG ranges from 64% to 91% with an average of 78%. Thus, 78% of the sample banks that have portfolios with unrealized gains at the beginning of the year, on average, sell bonds at a gain during the year. RG / UL equals the percentage of banks that realized gains given the fact that the portfolio at the beginning of the year was, on average, priced at a loss. This ratio is a crude measure of loss aversion. The figures range from 37% to 85% with an average of 62%. As

such, an average of 62% of the banks that had AFS portfolios trading at a loss at the beginning of the year, chose to sell bonds at a net gain during the year.[8]

C. Relative Loss Aversion and Bank Performance Analysis

The previous analysis indicates that some banks systematically sell securities at gains regardless of whether the underlying portfolio exhibits an unrealized gain or loss. Banks that take gains when the portfolio has an unrealized loss can offset the gains only if they can generate losses elsewhere. Such banks may be trying to temporarily boost earnings or may simply have an aversion to taking losses. Under accounting convention, no bank has to report a security loss on the income statement if no securities are sold as the opportunity loss is not formally recognized. We address two issues in the following analysis. First, do banks that exhibit loss aversion with securities sales report higher or lower aggregate profit ratios than banks that do not exhibit loss aversion in their securities transactions. Second, what factors make bank portfolio managers less willing to sell securities at a loss?

We incorporate the four categories of banks that realize securities gains and losses introduced previously to characterize relative loss aversion. Specifically, banks that sell securities at a gain when the underlying portfolio is valued at an unrealized loss (RG:UL) are designated as the most loss averse. Banks that sell securities at a loss when the underlying portfolio is valued at an unrealized gain (RL:UG) are designated as the least loss averse. Banks in the other two categories (RG:UG and RL:UL) that realize gains (losses) when the underlying portfolio is at a gain (loss) fall somewhere in between the most and least loss averse categories. Using annual data, we initially

[8] One could argue that the ratios in Tables 4 and 5 are symptomatic of the fact that interest rates generally declined over our sample. Because we measure unrealized gains and losses at the beginning of the year, a portfolio that was on average at a loss on January 1 could be valued at a gain, on average, by December 31. If managers sell more bonds late in the year, they could be selling from a portfolio that is trading at a gain. However, in one-half of the years of our sample rates are either flat or increasing. In addition, we calculate all of the ratios from Tables 4 and 5 using both unrealized and realized gains and losses from the same year. Our results are even stronger in this case. The ten year averages for the ratios in Table 4 are: RG:UL – 20%, RL:UG – 18%, RG:UG – 50%, and RL:UL – 12%. The averages from Table 5 are RG/UG – 73% and RG/UL – 66%.

compare the reported returns on assets (ROAs) between these two groups via mean difference t-tests. We then conduct a logit analysis relating various factors associated with bank asset size, the macroeconomy, geographic region, and a bank's operating profile to management's choice to sell securities at a loss or gain.

In order to evaluate whether banks that sell securities at gains or losses exhibit differences in aggregate profitability, we classify banks into two groups each year according to whether they are among the most loss averse, indicated by the bank selling securities at a gain when the underlying portfolio has an unrealized loss (RG:UL), or least loss averse, indicated by the bank selling securities at a loss when the underlying portfolio has an unrealized gain (RL:UG). The latter group may have the capacity to take securities losses given that overall profitability is exceptional and may also recognize that such a transaction adds to future earnings. The first group may need the gains to supplement poor earnings.

The first two columns of data in Table 6 report the average ROAs for each of the groups of banks in each year where the first column represents the most loss averse banks (RG:UL) and the second column represents the least loss averse banks (RL:UG). The last column reports the t-statistic for the difference in means. In each year, except for 1995 and 2000, the difference in means is negative and statistically different from zero.[9] Thus, on average, banks that sell securities at a gain from a portfolio with aggregate unrealized losses report lower ROAs than banks that sell securities at a loss from a portfolio with aggregate unrealized gains. One implication is that securities gains do not improve ROA sufficiently relative to make the bank a better performer. Of course, this analysis does not control for other structural differences in the two groups of banks.

[9] In both 1995 and 1999 there are very few banks that start the year with unrealized gains. Therefore we have only 25 and 37 banks in the RL:UG category for those years, respectively. The average number of banks in the RL:UG category is 530 in the other eight years.

Table 7 reports the results of two standard logistic regressions relating whether a bank is 'Most Loss Averse' or 'Least Loss Averse' to key explanatory variables. In the first case, the dependent variable takes a value of one if a bank sells securities at a gain when it starts the year with unrealized losses in its AFS portfolio (RG:UL), and equals zero otherwise. In the second case, the dependent variable takes a value of one if a banks sells securities at a loss when starts the year with unrealized gains (RL:UG) in its AFS portfolio. The explanatory variables include total assets, the average of ROA over the past five years, the spread between the 10-year and 1-year constant maturity Treasury rates, and indicator variables for whether the bank files taxes as an S Corp, the region in which the bank is located, and yearly dummy variables. A positive coefficient indicates a higher likelihood that the bank is willing to sell securities at a loss given the underlying unrealized gain in the portfolio.

Total assets serves as a proxy for bank size and is intended to capture the presumed willingness, or sophistication, of large banks to take securities losses. Average ROA, in turn, is used to control for aggregate profitability. The spread is an indicator of forward rates and thus anticipated rate movements. In particular, a positive spread indicates that the 10-year rate exceeds the 1-year rate and the consensus forecast is rising rates during the year. Such expectations may induce banks to take securities losses in anticipation of greater unrealized losses going forward. It may also signal that rebalancing the portfolio to be more asset sensitive is appropriate. The indicator variables are used as controls. S Corp status may be important in that banks thus filing do not pay corporate income taxes and the ultimate tax effect falls on the bank's shareholders. In cases where shareholders have gains elsewhere, securities losses may be attractive. Region of operation may be important if regulators in various parts of the U.S. do not uniformly enforce reporting requirements. Such a concern has been expressed after the Emerging Issues Task Force alluded to the potential 'tainting' of securities when a bank sells a fraction of its portfolio. Banks in the West are the omitted

group. Finally, yearly dummies allow for systematic changes in bank performance across different stages in the macroeconomy.

The coefficient estimates in the first column are generally consistent with the previous discussion. Specifically, larger banks are generally more loss averse with their securities sales. This likely reflects the behavior of all but the biggest banks with more than $50 billion in assets, which frequently sell securities at losses. Similarly, the higher is a bank's average ROA, the less likely is the bank to sell securities at gains from an underlying portfolio with losses. S Corp banks are also less likely to sell securities at gains while banks in the Southeast are the most likely to sell securities at gains.

Coefficient estimates in the second column generally indicate consistent results for the least loss averse banks that demonstrate a willingness to sell securities at a loss from a portfolio with unrealized gains. Generally, more profitable banks fall in this category. The larger is the spread, and implicitly the higher rates are expected to rise, the more likely banks are to sell securities at losses. S Corp banks are more likely to sell securities at losses from a portfolio with gains and banks in the Midwest are comparatively less loss averse than other banks.

III. Conclusions

Banks pursue sharply different strategies when managing their investment portfolios. Some managers actively sell securities at gains and losses in an effort to enhance returns relative to acceptable risk exposures. Other managers manage their portfolios passively by buying and holding securities until maturity. This research examines the trading activity of active bank portfolio managers. We are especially interested in whether such banks avoid selling securities at losses. Specifically, we examine the frequency with which banks sell securities classified as available-for-sale at gains versus losses paying particular attention to whether the underlying portfolio was trading

at an unrealized gain or loss at the beginning of the year. We designate banks that sell securities at a gain when the underlying portfolio is valued at a loss as the most loss averse banks. After identifying these banks, we examine whether specific factors related to bank size, tax status, profitability, and location are related to the likelihood that management exhibits loss aversion in securities transactions.

Empirical results indicate that a disproportionate number of banks sell securities at gains and that many banks do so even when the portfolio is valued at a loss, on average. We further document that larger banks and banks taxed as C Corporations are more likely to exhibit loss aversion. In addition, the greater is a bank's ROA the lower is the likelihood that banks sell securities at gains when the portfolio is valued at a loss.

References

Coval, Joshua D. and Tyler Shumway. "Do behavioral biases affect prices?" *Journal of Finance* 60 (2005), 1-34.

Grinblatt, Mark and Matti Keloharju. "What makes investors trade?" *Journal of Finance* 56 (2001), 589-616.

Haigh, Michael S. and John A. List. "Do professional traders exhibit myopic loss aversion? An experimental analysis." *Journal of Finance* 60 (2005), 523-534.

Kahneman, Daniel and Amos Tversky. "Prospect theory: an analysis of decision under risk." *Econometrica* 46 (1979), 171-185.

Locke, Peter R. and Steven C. Mann. "Professional trader discipline and trade disposition." *Journal of Financial Economics* 76 (2005), 401-444.

Mazzucca, Tim. "PNC to Sell Securities, Will Take $200M Charge." *American Banker,* September 11, 2006, p.23.

Mazzucca, Tim. "PNC Changing Its Sheet Again to Prepare for '07." *American Banker,* September 29, 2006, p.20.

Odean, Terrance. "Are investors reluctant to realize losses?" *Journal of Finance* 53 (1998), 1175-1798.

Shefrin, Hersh and Meir Statman. "The disposition to sell winners too early and ride losers too long: theory and evidence." *The Journal of Finance* 40 (1985), 777-790.

Table 1: Number of Banks Reporting Realized and Unrealized Gains or Losses or Reporting Zero Realized or Unrealized Gains or Losses

	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Panel A: Realized Gains and Losses for All Banks										
Realized Gains	1900	2258	2335	2909	2071	1287	3582	3654	3762	3327
Realized Losses	1822	1377	1316	480	1210	2003	490	609	550	1075
Zero Real. Gains/Losses	2957	3159	3300	3729	4055	4232	3584	3490	3564	3616
Total	6679	6794	6951	7118	7336	7522	7656	7753	7876	8018
Panel B: Unrealized Gains and Losses for All Banks										
Unrealized Gains	4512	3246	5077	5421	279	3646	5868	6809	5639	3208
Unrealized Losses	1230	2625	924	805	6241	2991	959	168	1427	3972
Zero Unreal. Gains/Losses	937	923	950	892	816	885	829	776	810	838
Total	6679	6794	6951	7118	7336	7522	7656	7753	7876	8018
Panel C: Realized Gains and Losses for Banks not Matching Gains and Losses[a]										
Realized Gains	746	758	769	1231	537	373	2124	2149	2255	1558
Realized Losses	810	397	280	88	389	785	149	251	190	382
[Gains(Losses)/NI] < 2%	2164	2480	2602	2069	2353	2131	1797	1863	1867	2462
Zero Real. Gains/Losses	2956	3158	3298	3729	4053	4228	3583	3487	3563	3613
Total	6676	6793	6949	7117	7332	7517	7653	7750	7875	8015

[a] Banks not matching gains and losses are designated as those with realized gains or realized losses equal to more than 2 percent of net income in absolute value in a year.

Table 2: Number of Banks With More than $1 Billion in Total Assets Reporting Realized and Unrealized Gains or Losses or Reporting Zero Realized or Unrealized Gains or Losses

	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Panel A: Realized Gains and Losses for All Banks										
Realized Gains	183	248	242	293	230	160	341	338	348	298
Realized Losses	135	89	86	35	97	149	38	56	63	103
Zero Real. Gains/Losses	124	111	130	137	145	164	102	88	75	89
Total	442	448	458	465	472	473	481	482	486	490
Panel B: Unrealized Gains and Losses for All Banks										
Unrealized Gains	339	243	371	376	27	253	387	450	347	247
Unrealized Losses	59	165	52	58	418	196	74	13	121	224
Zero Unreal. Gains/Losses	44	40	35	31	27	24	20	19	18	19
Total	442	448	458	465	472	473	481	482	486	490
Panel C: Realized Gains and Losses for Banks not Matching Gains and Losses[a]										
Realized Gains	71	77	80	121	46	40	172	173	198	136
Realized Losses	46	12	10	6	30	54	10	15	18	35
[Gains(Losses)/NI] < 2%	201	248	238	201	251	215	197	206	195	230
Zero Real. Gains/Losses	124	111	130	137	145	164	102	88	75	89
Total	442	448	458	465	472	473	481	482	486	490

[a] Banks not matching gains and losses are designated as those with realized gains or realized losses equal to more than 2 percent of net income in absolute value in a year.

Table 3: Number of Banks With Less Than $250 Million in Total Assets Reporting Realized and Unrealized Gains or Losses or Reporting Zero Realized or Unrealized Gains or Losses

	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Panel A: Realized Gains and Losses for All Banks										
Realized Gains	1227	1406	1490	1848	1266	733	2345	2433	2464	2139
Realized Losses	1319	1003	965	355	840	1437	324	366	347	740
Zero Real. Gains/Losses	2335	2559	2627	2994	3261	3353	2962	2924	3024	3087
Total	4881	4968	5082	5197	5367	5523	5631	5723	5835	5966
Panel B: Unrealized Gains and Losses for All Banks										
Unrealized Gains	3158	2252	3557	3866	159	2557	4240	4935	4098	2174
Unrealized Losses	954	1945	722	580	4512	2209	681	110	1018	3040
Zero Unreal. Gains/Losses	769	771	803	751	696	757	710	678	719	752
Total	4881	4968	5082	5197	5367	5523	5631	5723	5835	5966
Panel C: Realized Gains and Losses for Banks not Matching Gains and Losses[a]										
Realized Gains	479	486	480	774	326	193	1434	1521	1520	1024
Realized Losses	636	330	240	70	286	603	104	150	134	280
[Gains(Losses)/NI] < 2%	1429	1593	1735	1358	1492	1373	1129	1128	1157	1575
Zero Real. Gains/Losses	2334	2558	2625	2994	3259	3349	2961	2921	3023	3085
Total	4878	4967	5080	5196	5363	5518	5628	5720	5834	5964

[a] Banks not matching gains and losses are designated as those with realized gains or realized losses equal to more than 2 percent of net income in absolute value in a year.

Table 4

This table reports the percentage of all banks in each of four categories based on the realized gains (losses) and unrealized gains (losses) in their available-for-sale portfolios. The categories are: RG:UL – Banks that realized net gains for the year given their overall bond portfolio began the year trading at an unrealized loss; RL:UG – Banks that realized net losses for the year given their overall bond portfolio began the year trading at an unrealized gain; RG:UG – Banks that realized net gains for the year given their overall bond portfolio also began the year trading at an unrealized gain; RL:UL – Banks that realized net losses for the year given their overall bond portfolio began the year trading at an unrealized loss. Banks with zero unrealized gains/losses or zero realized gains/losses are omitted.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Avg.
RG:UL	48%	10%	24%	10%	6%	35%	39%	13%	2%	13%	20%
RL:UG	1%	29%	17%	11%	32%	1%	5%	11%	11%	17%	13%
RG:UG	2%	52%	39%	76%	57%	4%	49%	73%	86%	63%	50%
RL:UL	49%	10%	20%	4%	5%	60%	7%	3%	1%	7%	17%
N	3448	3469	3482	3244	3155	3209	3915	4117	4182	4278	3448

Table 5

This table reports the percentage of banks with unrealized gains that realized net gains for the year divided by the total number of banks with unrealized gains for the year: RG / UG = RG:UG / (RG:UG + RL:UG) and the percentage of banks with unrealized losses that realized net gains for the year divided by the number of banks with unrealized losses for the year: RG / UL = RG:UL / (RG:UL + RL:UL). Banks with zero unrealized gains/losses or zero realized gains/losses are omitted.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Avg.
RG / UG	77%	64%	70%	88%	64%	76%	91%	87%	88%	79%	78%
RG / UL	49%	49%	56%	74%	53%	37%	85%	80%	68%	65%	62%

Table 6: A Comparison of Return on Assets for Banks Exhibiting the Greatest Loss Aversion versus Banks Exhibiting the Least Loss Aversion.

Banks are categorized as the most loss averse if they sell securities during a year at a gain when the underlying portfolio exhibits an unrealized loss (RG:UL) at the beginning of the year. Banks are categorized as the least loss averse if they sell securities at a loss when the underlying portfolio exhibits an unrealized gain (RL:UG) at the beginning of the year. Data are for 1995 through 2004.

	Most Loss Averse Banks	Least Loss Averse Banks	Difference in Means t-stat
1995	1.02%	0.95%	0.65
1996	0.99%	1.15%	-4.80
1997	1.00%	1.21%	-9.29
1998	1.01%	1.22%	-5.04
1999	0.93%	1.15%	-4.75
2000	1.09%	1.12%	-0.44
2001	0.98%	1.10%	-2.97
2002	0.82%	1.10%	-7.17
2003	0.87%	1.05%	-1.96
2004	0.74%	1.07%	-9.89

Table 7: Logistic Regression Results

The table reports coefficient estimates and z-statistics (in parentheses) from two logistic regressions. The dependent variable in the first estimation takes a value of one if the bank realized gains in a year when they started the year with unrealized losses (RG:UL), and is zero otherwise. In the second estimation, the dependent variable takes a value of one if the bank realized losses in a year when they started the year with unrealized gains (RL:UG), and is zero otherwise. Total Assets is the assets of the bank in thousands. 5-Yr Avg ROA is the average ROA over the current year and the four years prior to that in decimals. Spread is the yield on the 10-year constant maturity treasury minus the yield on the 1-year treasury at the beginning of the calendar year in decimals. S Corp takes the value of one if the bank files taxes as an S Corporation, and is zero otherwise. Mid Atlantic, Mid West, North East South East, and South West are indicator variables that take the value of one if the bank is located in that region, and equal zero otherwise. West is omitted from the model. We also controlled for time with individual year dummy variables which are not reported in the table.

	Most Loss Averse Banks	Least Loss Averse Banks
Total Assets	2.57E-09 (3.20)	-1.53E-09 (-1.06)
5-Yr Avg ROA	-40.41 (-13.98)	18.57 (6.79)
Spread	-1.63 (-31.94)	1.14 (13.81)
S Corp	-0.07 (-2.09)	0.14 (3.73)
Mid Atlantic	0.02 (0.29)	-0.02 (-0.20)
Mid West	-0.34 (-5.42)	0.25 (3.43)
North East	-0.30 (-3.46)	-0.18 (-1.75)
South East	0.29 (4.42)	-0.10 (-1.30)
South West	-0.10 (-1.47)	-0.01 (-0.06)
Observations	35,171	35,171
Pseudo R^2	0.1607	0.1161

Figure 1: All Banks

Figure 1A is a histogram that shows the frequencies with which individual banks report realized gains. Figure 1B does the same with realized losses while Figure 1C shows years with zero gain/loss.

Figure 1A - All Banks

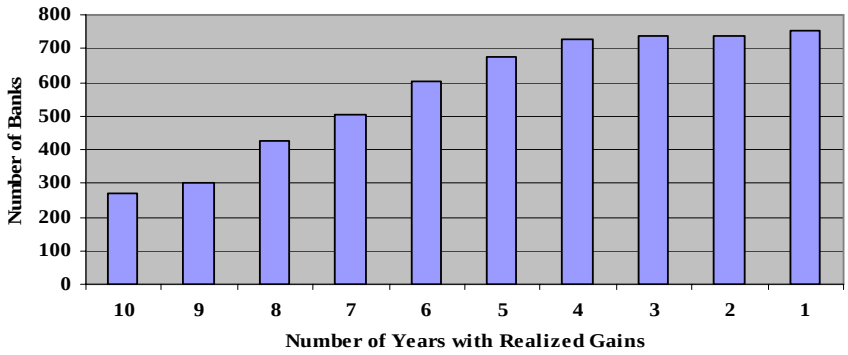

Figure 1B - All Banks

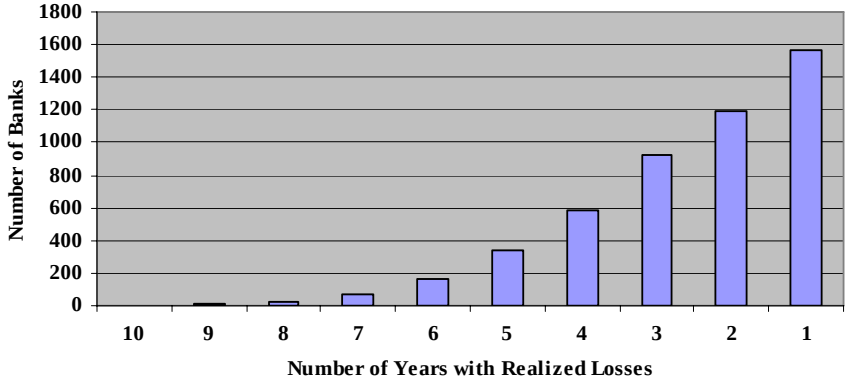

Figure 1C - All Banks

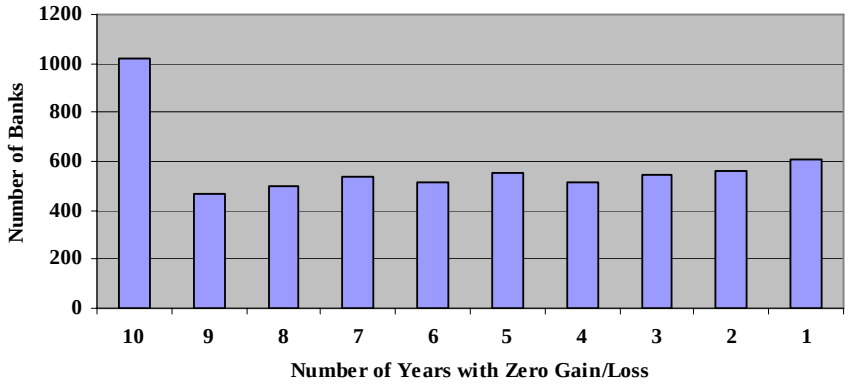

Figure 2: Banks with Total Assets Greater than $1 Billion

Figure 2A is a histogram that shows the frequencies with which large individual banks report realized gains. Figure 2B does the same with realized losses while Figure 2C shows years with zero gain/loss.

Figure 2A - Large Banks

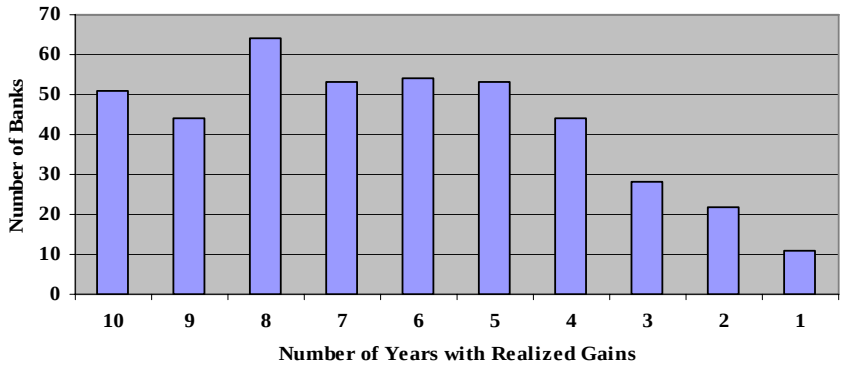

Figure 2B - Large Banks

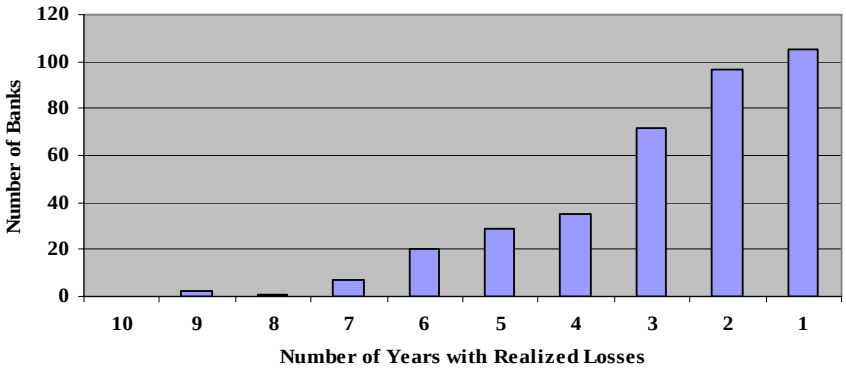

Figure 2C - Large Banks

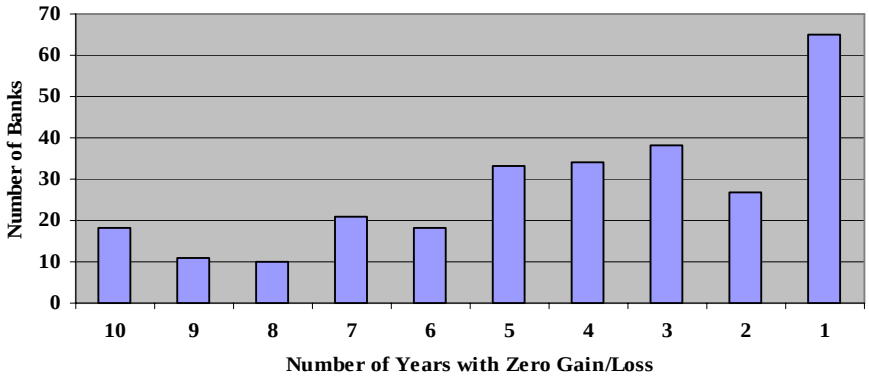

Figure 3: Banks with Total Assets Less than $250 Million

Figure 3A is a histogram that shows the frequencies with which small individual banks report realized gains. Figure 3B does the same with realized losses while Figure 3C shows years with zero gain/loss.

Figure 3A - Small Banks

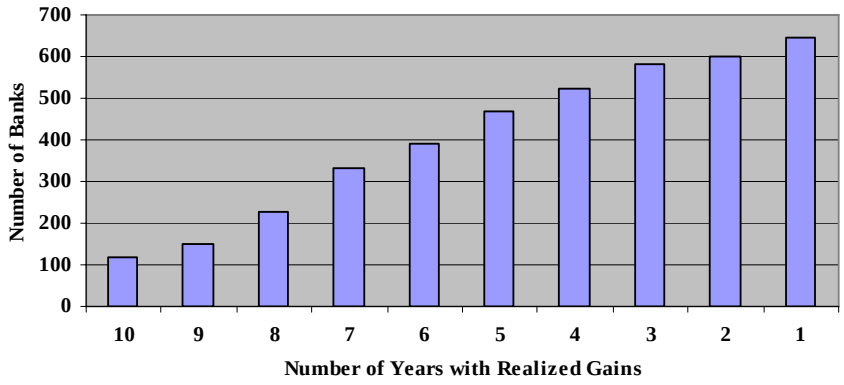

Figure 3B - Small Banks

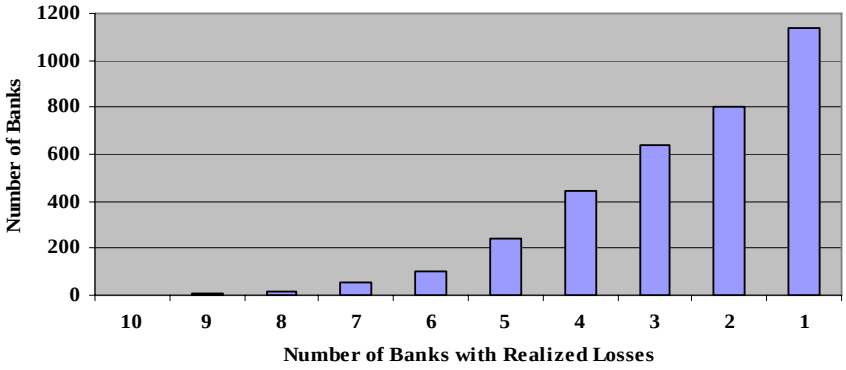

Figure 3C - Small Banks