RISK SHIFTING AND FAIR VALUE ACCOUNTING IN THE BANKING INDUSTRY

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ABSTRACT

I examine whether and how the improvements in fair value disclosures resulting from the adoption of Statement of Financial Accounting Standard No. 157, *Fair Value Measurement,s* affect banks' investment decisions. Using a sample of the largest one hundred publicly-traded bank holding companies, I find that, SFAS 157 does not affect the extent to which banks invest in high or low liquidity risk securities. Further cross-sectional analyses reveal that, following the adoption of SFAS 157m banks with high (low) funding liquidity needs reduce (increase) their holdings of high liquidity risk securities. These findings are consistent with the improved fair value disclosures contributing to mitigating the risk shifting incentives of banks with high funding liquidity needs and having no effect on a liquidity risk arbitrage strategy for banks with low funding liquidity needs. Consistent with the risk overhang hypothesis, I also find that banks with high funding liquidity needs use their discretion in fair value measurements to conceal the losses on their investment securities.

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1. Introduction

This study examines whether and how the improvements in fair value disclosures resulting from the adoption of Statement of Financial Accounting Standard No. 157, *Fair Value Measurements* (SFAS 157 hereafter) affect banks' investment decisions. Risk-taking by banks can be exacerbated by risk shifting[1] incentives resulting from banks' high leverage and the availability of deposit insurance (Jensen and Meckling 1976; Kareken and Wallace 1978; Boyd and Hakenes 2013). In addition, during a liquidity crisis, banks may also pursue a strategy of investing in illiquid securities for "arbitrage" reasons (Acharya and Viswanathan 2011; Ryan 2011; Diamond and Rajan 2011)[2]. Both risk shifting and arbitrage incentives result in increases in banks' overall risk, and particularly liquidity risk during a period marked by severe liquidity shocks such as the 2007-2009 financial crisis. SFAS 157 provides market participants with more transparent fair value disclosures for banks' financial instruments. Consistent with higher quality accounting information enabling a more efficient allocation of capital (Bushman and Smith 2003), I investigate the effects of the SFAS 157 on banks' investment decisions.

[1] Risk shifting is an agency conflict whereby an entrepreneur obtains financing from lenders and afterwards transfers wealth away from the lenders by switching her investment to riskier assets as the riskier assets maximize her return at the detriment of the lenders (Jensen and Meckling 1976).

[2] The term arbitrage is used here to refer to the possibility that some banks with spare liquidity during a liquidity shock may purchase assets at fire-sale prices and sell them later when the asset value recovers. I borrow the term from Acharya and Viswanathan (2011).

First, I examine whether the improved fair value disclosures affect banks' risk shifting incentives. On one hand, more precise fair value information in the form of providing a clear distinction between various classes of assets enables outsiders to rank banks based on the liquidity risk of their portfolio of investment securities. Banks with higher liquidity risk on their balance sheet would be exposed to more scrutiny from regulators and other outsiders,[3] thus mitigating their risk shifting incentives (Lu et al. 2011; Laux and Leuz 2010). On the other hand, improved fair value disclosures may exacerbate risk shifting by enabling banks to obtain more financing for their low liquidity risk securities.[4] The additional financing obtained enables the bank to expand its investment horizon, thus increasing the likelihood of risk shifting activities (Burkhardt and Strausz 2006). In a coarser disclosure regime such as the one prevailing before SFAS 157, banks with low liquidity risk securities may suffer from the "lemons" problem. The improvements in fair value disclosures enable the bank to finance its low liquidity risk securities at higher prices and invest in a broader class of assets with various risk levels.

Using a sample of the largest one hundred publicly traded bank holding companies which survived during the financial crisis and which received government assistance through the Capital Purchase Program (CPP) of the Troubled Asset Relief Program

[3] It is necessary to note that I focus on the informational effects of the new disclosures for the agency conflict between the bank and non-regulatory outsiders. In times of crisis, regulators are primarily concerned with containing the effects of the crisis, resulting in an expectation of excessive regulatory forbearance by the banks.

[4] It is necessary to note that this argument implies that banks have the ability to engage in within-quarter alterations of their portfolios of investment securities that can be unwound before the end of the quarter and thus not detectable by outsiders.

(TARP)[5], I examine the effects of SFAS 157 on risk shifting incentives in the banking industry. I measure the extent of risk shifting through the association between a change in a bank's liquidity risk and its purchases of investment securities. I focus on liquidity risk because the fair value hierarchy disclosure introduced by SFAS 157 informs about the reliability of the fair value inputs which are based on the liquidity of the market for the assets measured at fair value (Lev and Zhou 2009). I focus exclusively on a sample of banks which took part to the CPP because of the effects of expected regulatory forbearance on banks' incentives during the crisis[6]. The expectation that banks' may be bailed out strengthens risk shifting incentives and partially relieves my analyses from the burden of accounting for the restructuring in banks' securities portfolio because of the financial crisis.

A positive association between a change in bank's liquidity risk and its purchases of investment securities indicates that, on average, banks purchased securities with a liquidity risk higher than the average liquidity risk of their current portfolio. My findings suggest that, on average, SFAS 157 does not affect the extent to which banks invest in high or low liquidity risk securities.

My primary findings and the empirical equivalence between the effects of risk shifting and risk arbitrage incentives call for further analyses into the effects of SFAS 157 on banks' investment decisions. Second, I examine the cross-sectional variations in the effects of SFAS 157 on banks' investment decisions. A bank's funding liquidity status

[5] I focus on banks which received federal financial assistance through the CPP in order to capture the expectation of regulatory forbearance which results in these banks being primarily concerned with the agency conflict with non-regulatory outsiders.

[6] He et al. (2010) provide evidence indicating that contrary to other sectors of the financial services industry, commercial banks experience an increase in their holdings of investment securities during the financial crisis. One explanation for this behavior is the availability of implicit financial guarantees from the U.S. government and the Federal Reserve to the commercial banking sector and not to other sectors that were more dependent on private financing sources.

determines its incentive to engage in risk shifting (Acharya and Viswanathan 2011; Diamond and Rajan 2011). In addition, during a period characterized by shocks to liquidity, a bank's funding liquidity status may also determine its ability to engage in liquidity risk arbitrage (Ryan 2011; Sadka 2012). SFAS 157 is likely to more effectively dampen risk shifting for banks with high funding liquidity needs[7] than for banks with low funding liquidity needs. Banks with high funding liquidity needs have stronger incentives to engage in risk shifting both before and during a liquidity crisis (Diamond and Rajan 2011; He et al. 2010). The creditors of banks with high funding liquidity needs face a higher risk of expropriation and thus require and may use higher quality accounting information to constrain the risk shifting behavior of banks with high funding liquidity needs. Consequently, banks with high funding liquidity needs are more likely to refrain from investing in high liquidity risk securities as a result of the improvements in transparency associated with the informative fair value disclosures. On the other hand, during a liquidity crisis, banks with low funding liquidity needs may follow an "arbitrage" strategy by acquiring relatively safer securities whose depressed prices mostly reflect temporary liquidity discounts (Acharya and Viswanathan 2011; Ryan 2011; Diamond and Rajan 2011; Sadka 2012). As the markets emerge from the liquidity crisis, these securities return to their fundamental values faster than riskier securities.[8] The lower reliance of these banks on creditors to finance their operations mitigates the monitoring incentives of outsiders and reinforces the influence of banks' shareholders who are likely to encourage this strategy rather than constrain it.

[7] Hereafter, I use the terms funding liquidity needs and funding liquidity constraints interchangeably.
[8] Anecdotally, JP Morgan Chase Bank reports a $177 billion worth of purchases of AFS securities for the first quarter of 2009 compared to $46 billion for the first quarter of 2008. These purchases are free from the effects of the acquisition in mid-2008 of Bear Stearns and Washington Mutual by JP Morgan Chase Bank.

I test these hypotheses by distinguishing between banks using their net exposure to the market for securities sold under repurchase agreements. I consider banks with an above-median net liability position to be liquidity constrained. My findings indicate that SFAS 157 does lead to a reduction in risk shifting through investment securities for liquidity constrained banks. However, for banks with low funding liquidity needs, the results of these tests indicate an increase in the intensity of investment in high liquidity risk securities. Given their liquidity position and prior analytical evidence (Acharya and Viswanathan 2011; Diamond and Rajan 2011), I interpret these findings to suggest that these banks follow a risk arbitrage rather than a risk shifting strategy, and this behavior is not affected by SFAS 157.

Third, I examine the implications of risk shifting incentives for the reliability of fair value measurements. Reliable fair value measurements should result in a positive relation between the accumulated unrealized holding gains and losses on investment securities and the future realized gains and losses on these securities (Ryan 2007; Evans et al. 2013). This positive association reflects the opportunity costs and benefits of holding the cash flow rights to the financial instruments. Manipulations or errors in the fair value estimates of these securities distort this fundamental economic relation and are likely to reduce the positive association (Evans et al. 2013). These manipulations become more plausible after the adoption of FSP FAS 157-4. The FASB relaxed the fair value accounting rules by releasing FASB Staff Position FSP FAS 157-4 on April 9, 2009. The Staff Position relaxed the preeminence of market-based fair value measurements in periods of market inactivity. Conditional on the existence of a significant decrease in volume or level of activity for an asset or a liability, a firm may rely on internally

generated projections instead of quoted prices from an inactive market. This change in the fair value accounting rules provides banks with more flexibility in making fair value estimates, but also increases the risk of manipulations by bank managers who desire to hide the poor performance of their investments.

Managers of banks with high funding liquidity needs, who are more likely to follow a risk shifting strategy, face intense scrutiny from capital providers and will be concerned with concealing the poor performance of their investment securities (Gron and Winton 2001). These banks are likely to manipulate their fair value estimates so as to minimize external monitoring. On the other hand, a risk arbitrage strategy that is more likely to characterize the behavior of banks with low funding liquidity needs, may entail holding illiquid securities for a relatively long time through the erosion of the liquidity crisis. Till the resolution of the liquidity crisis, illiquid securities held by banks with risk arbitraging incentives are likely to experience further losses. In order to avoid the damaging effects to their capital, these banks may use the flexibility in fair value accounting rules to conceal such losses. Both types of banks seem to have strong incentives to manipulate fair value estimates for their illiquid securities. These manipulations are likely to distort the positive association between fair value holding gains and losses and realized gains and losses. Consequently, my third hypothesis posits that for both types of banks, after FSP FAS 157-4 becomes effective, we observe a relative reduction in the positive association between unrealized fair value gains and losses of investment securities with future realized gains and losses.

I find evidence consistent with a reduction in the reliability of fair value measurements only for banks with high funding liquidity needs. I observe a significant

reduction in the predictive ability of the unrealized fair value gains and losses for available-for-sale securities following the adoption of FSP FAS 157-4. These banks take advantage of that discretion in addition to the incremental flexibility in fair value rules stemming from the adoption of FSP FAS 157-4. Overall, the evidence indicates that FSP FAS 157-4 resulted in less reliable fair value measurements for banks with high funding liquidity needs.

This study primarily contributes to a better understanding of the revisions in fair value accounting rules which chronologically coincided with the beginning of the financial crisis of 2007-2009. Numerous studies have provided evidence consistent with the additional disclosures introduced through SFAS 157 resulting in higher quality information available to market participants (Kolev 2009; Goh et al. 2009; Song et al. 2010; Barron et al. 2013). However, higher quality information for outsiders does not necessarily result in less risk taking by the firms. I provide evidence consistent with SFAS 157 enabling outsiders to constrain risk shifting for banks with high funding liquidity needs and stronger incentives to "gamble for resurrection"; on the other hand, SFAS 157 does not seem to constrain the investment choices of banks with low funding liquidity needs. I interpret this latter finding as evidence of risk arbitrage activities by these banks rather than risk shifting. My interpretation is based on both the theoretical expectations (Acharya and Viswanathan 2011; Ryan 2011; Diamond and Rajan 2011) and the subsequent finding that banks with low funding liquidity needs do not take advantage of the additional flexibility in fair value measurements resulting from the adoption of FSP FAS 157-4. Furthermore, these findings also provide evidence that a bank's risk shifting incentives also depend on its funding liquidity status. In the midst of

the debate on the adoption of the Basel III regulatory framework which places a particular emphasis on banks' liquidity, my findings contribute to reinforcing the notion that sufficient liquidity may dampen excessive risk taking by banks.

My findings are complementary to those of Iselin and Nicoletti (2013). They examine the investment behavior of public and private banks around the adoption of SFAS 157. Following Riedl and Serafeim (2011), they provide evidence of a positive relation between public banks' cost of capital and their holdings of Level 3 assets. Consequently, compared to private banks, public banks have an incentive to minimize their holdings of Level 3 assets following the adoption of SFAS 157 which provides outsiders with more precise information about the extent of such holdings. They find evidence consistent with their hypothesis. I follow a slightly different approach in that I focus on cross-sectional differences within a sample of public banks which received government assistance during the crisis. While Iselin and Nicoletti (2013) focus on the bank's cost of capital as a driver of the decision to minimize holdings of Level 3 assets, I examine whether banks' purchases of high liquidity risk securities are driven by risk shifting or risk arbitrage incentives regardless of cost of capital considerations. Second, my analyses incorporate the possibility that the information improvements resulting from the adoption of SFAS 157 may have unintended consequences on banks' investment choices. Third, my sample period is different from theirs and I specifically exclude the year 2008 to minimize the effects of the financial crisis.

The findings of this study provide evidence on the importance of statement of cash flow information for an assessment of firm's risk. Most studies in the literature on value and risk relevance of accounting information relate market-based measures of value or

risk to either income statement or balance sheet constructs. In this study, in addition to the end-of-year balance, I provide evidence that information from the statement of cash flows can help in assessing the risk implications of banks' investment decisions. Morgan (2002) notes that banks' trading asset positions are particularly slippery and their risk implications are difficult to assess using end-of-year balances. This is particularly relevant in the presence of strong risk shifting incentives as the bank may engage in "window dressing" at the end of every period. I provide evidence that it is necessary to evaluate how within period banks' investment choices affect the overall riskiness of their investment security portfolio.

The rest of the study is organized as follows. In Section 2, I provide a discussion of risk shifting incentives and develop hypotheses on the implications of higher quality fair value information for risk shifting in the banking industry. In Section 3, I provide the details about the research design. Section 4 is devoted to the presentation of results. I conclude the study with Section 5.

2. Risk Shifting Incentives

In this study, I examine whether and how fair value accounting rules play a role in either exacerbating or mitigating banks' incentives to engage in risk shifting. Risk shifting is a form of asset substitution resulting from the asymmetric payoff structures of debt and equity claims at highly levered firms (Jensen and Meckling 1976; Myers 1977). The managers and shareholders of highly levered firms substitute risky assets for safer ones as leverage and the probability of default increase. Risk shifting activities therefore result in a wealth transfer from creditors to shareholders.

The incentives to engage in risk shifting originate from the limited liability of shareholders of highly levered firms in the event of bankruptcy. Risk shifting incentives can be explained from the perspective of Merton (1974) on the capital structure of the firm. While shareholders hold a call option on the firm's assets, creditors are long on the firm's assets and short on the call option. The strike price of the call option is the face value of the debt. The value of the call option increases with the volatility of the cash flows of the investment project, leading the shareholders to prefer high risk investments. The shareholders of highly levered firms will only exercise the call option once the value of the firm's assets exceed the face value of the debt, thus absorbing all the benefits from investing in high risk projects and limiting their losses to their initial investment. On the other hand, the creditors' benefits are limited to the face value of the debt even though

they are fully exposed to decreases in the value of the firm's assets. This asymmetry in payoff structure is the source of an agency conflict which can lead shareholders and managers of highly levered firms to collude and invest in high risk projects at the detriment of creditors.

In the case of industrial firms, incidences of risk shifting are sparse because creditors can resort to price-protection mechanisms against risk shifting, resulting in shareholders bearing the cost of expected risk shifting (Harris and Raviv 1991; Eisdorfer 2008; Loktionov 2009). Convertible debt allows debtholders to share in the benefits of risky investment projects, thus reducing the gains accruing to shareholders from excessive risk taking, thus minimizing their incentives to engage in risk shifting (Green 1984). Secured debt contracts and other forms of debt covenants such as restrictions on investments and restrictions on disposition of assets also minimize risk shifting incentives by easing the transfer of control over the safer assets to debtholders (Smith and Warrner 1979). Debt contracts of shorter maturity provide debtholders with the opportunity to more frequently assess the riskiness of the firm's investments and set the contract terms accordingly (Barnea, Haugen and Senbet 1980).

Similarly, the agency conflicts between shareholders and debtholders from which risk shifting emanates could also be attenuated through managerial compensation contracts (John and John 1993). Managerial contracts with low pay-performance sensitivity serve as pre-commitment devices which enable debtholders to mitigate excessive risk taking that is encouraged by the shareholders of firms with high leverage.

The afore-mentioned mechanisms are more appropriate for non-financial firms. The business model of financial firms is based on higher levels of leverage, resulting in stronger incentives for bank shareholders to encourage investment activities consistent with a risk shifting strategy.

2.1. Risk Shifting in the Banking Industry

Prior research identifies high levels of leverage and default risk as primary indicators of the existence of risk shifting incentives (Jensen and Meckling 1976; Smith and Warner 1979; Green and Talmor 1986; Brealey, Myers and Allen 2006; Eisdorfer 2008). Banks are characterized by much higher levels of leverage compared to firms in other industries. These high levels of leverage enable banks to optimally execute their liquidity provision and intermediation roles (DeAngelo and Stulz 2013). However, banks' leverage and exposure to financial distress exacerbate their incentives to engage in risk shifting. Allen and Gale (2000) note that the high levels of leverage lead to risky lending, which could fuel asset bubbles, and lead to banking crises, such as the 2007-2009 financial crisis. Relatedly Landier et al. (2011) analytically demonstrate and empirically document that risk shifting incentives are so prevalent in the financial services industry such that closeness to bankruptcy does not appear to be a necessary condition as is the case with non-financial firms.

Banks finance their activities using funds provided by equity holders, depositors, and other non-depository creditors. Duran and Lozano-Vivas (2013) develop of taxonomy of risk shifting in banking that depends on the group of stakeholders to which

bank shareholders shift risk. I focus on only two of the most prominent forms of the four types of risk shifting that they identify. First, doubled-sided risk shifting refers to situations where both depositors and non-depository creditors bear the cost of excessive risk taking. Second, deposit-based risk shifting focuses on risk shifting incentives associated with the availability of deposit insurance.

Numerous studies have examined the implications of deposit insurance as a source of risk shifting incentives in the banking industry. Merton (1977) notes that deposit insurance can be viewed as a put option written by the Federal Deposit Insurance Corporation (FDIC) and held by banks' shareholders. The value of the put option increases with increases in the risk of the bank's assets and with increases in the bank's leverage. Consequently, the availability of deposit insurance leads banks' shareholders to prefer more than socially optimal levels of risk taking. Similarly, Kareken and Wallace (1978) analytically show that a deposit insurance scheme such as the one prevailing in the U.S. with the FDIC results in excessive risk taking by banks unless deposit insurance premiums depend on the riskiness of the bank's portfolio of assets. For deposit insurance premiums to fully capture the extent of risk taking, both regulators and creditors need to be fully informed about the composition of the bank's portfolio of assets.

The empirical evidence suggests the availability of deposit insurance creates and exacerbates risk shifting incentives. Using a sample of U.S. banks during the period 1985-1994, Hovakimiam and Kane (2000) find evidence consistent with banks extracting a deposit insurance subsidy, with risk shifting incentives due to deposit insurance being even stronger for weaker banks, and with the inability of regulators to eliminate risk shifting incentives through deposit insurance reform.

Cross-country studies provide an even more appropriate setting to examine the effects of deposit insurance on risk shifting incentives. Hovakimiam et al. (2003) documents a positive association between risk shifting incentives and explicit guarantees resulting from the introduction of deposit insurance in a sample of banks from 56 countries. Nevertheless, the extent to which banks extract deposit insurance subsidy depends on institutional features such as the existence loss-control features such risk-sensitive deposit insurance premiums, coverage limits and coinsurance.

Prudential regulation can be used to constrain risk shifting incentives in the banking industry. However, the effectiveness of prudential regulation depends on the quality of the information available to regulators. The repeated banking crises attest to the failure of prudential models in assessing the extent of risk taking by banks. Particularly, the central role banks play in the economy forces the authorities to relax the regulatory regime during periods of crisis in order to avoid generalized panics. Regulatory forbearance limits the ability of prudential regulation in constraining risk shifting incentives. Diamond and Rajan (2011) formalize this notion by analytically showing that following a fear of bank run due to the deterioration in banks' portfolio of assets, regulators could opt to stabilize the financial system through various liquidity improvement mechanisms.

In the presence of these strong risk shifting incentives, regulators and outsiders need additional sources of information to enable them to assess banks' risk exposures. In this study, I focus on how these stakeholders could acquire higher quality information about banks' risk exposures through investment securities. I take advantage of the regulatory change affecting the disclosure requirements for investment securities to

assess whether a change in the reporting environment for such instruments affects banks' risk shifting incentives[9].

In the case of banks' investments securities, their opaque nature (Morgan 2002) makes it difficult for outsiders to assess the extent of banks' risk exposures. He et al. (2010) examine the movements of assets across various sectors of the financial industry during the financial crisis. While the hedge fund sector reduced their asset holdings, the commercial banking sector substantially increased their holdings of assets and relatedly their leverage. From the fourth quarter of 2007 to the first quarter of 2009, commercial banks' holding of investment securities went from 1,659 billion dollars to 1,774 billion dollars. One explanation for this increase in holdings of investment securities is the availability of implicit government guarantees. These government guarantees may have exacerbated banks' risk shifting incentives during this period.

In this study, I adopt an information perspective to evaluate whether a change in financial reporting rules influences the extent of risk shifting in the banking industry. I focus on risk shifting through investment securities, and I evaluate whether and how the changes in fair value accounting rules in 2006 affect banks' incentives to engage in risk shifting.

[9] Banks can also engage in risk shifting through their lending activities. Landier et al. (2011) provide evidence of risk shifting through lending with an analysis of sub-prime originations by New Century Financial Corporation in the years preceding the financial crisis of 2008. In this study, I focus on the effects of SFAS No. 157 on banks' risk shifting incentives and SFAS No. 157 does not affect the disclosure requirements for loans held for investment, banks' most economically significant assets. In addition, banks' loan portfolios are not as volatile and slippery as their portfolios of investment securities. For those reasons, I restrict the analyses on the informational effects of SFAS No. 157 on banks' portfolios of investment securities.

2.2. Accounting Information and Risk Shifting Incentives

The debtholders-shareholders agency conflict can be resolved through various mechanisms among which is the disciplining and monitoring role of accounting information (Bushman and Smith 2001). Particularly, in the context of investment efficiency, accounting information can help in mitigating both over- and under-investment (Biddle and Hilary 2006; Biddle, Hilary, and Verdi 2009, Hong et al. 2013). Higher quality accounting information reduces the information asymmetry between the firm and capital providers, thus enabling financially constrained firms to fund positive net present value projects. At the same time, higher quality accounting information curtails managerial incentives to over-invest for empire-building reasons. The literature on the role of accounting conservatism in debt contracting provides evidence about the monitoring role of higher quality accounting information (Beatty et al. 2010; Loktionov 2009). Thus far, the literature on the role of accounting information in mitigating risk shifting incentives has focused on the effect of the quality of financial reporting on information asymmetry in general.

Closer to this study, Fernandez and Gonzalez (2005) examine the role played by a country's accounting and auditing systems on banks' risk shifting incentives. In the presence of regulatory safeguards aimed at minimizing the extent of risk shifting, it is not clear what role a country's accounting and external audit requirement can play. They find a negative relation between the stringency of a country's accounting and auditing systems and bank risk taking. However, this relation is weakened by banks' charter value. Furthermore, their results suggest the existence of a complementarity relation between accounting and auditing systems and minimum capital requirements. On the other hand,

accounting and auditing acts as substitutes for restrictions on banks' activities and official discipline. These findings provide macro-evidence indicating that banks' risk shifting incentives could be constrained through improvements in the financial reporting environment.

Also related to my study, Bushman and Williams (2012) examine whether the extent of risk shifting is related to the discretionary reporting behavior of banks in different reporting regimes. Higher transparency may help in curbing excessive risk taking. In a reporting regime encouraging forward-looking loan loss provisioning, accounting reports incorporate more information about future expected losses and mitigate pro-cyclicality. On the other hand a reporting regime encouraging opportunistic discretionary loan loss provisioning in the form of smoothing results in less transparent accounting reports. Using a sample of 27 countries, they find evidence indicating that banks in high smoothing regimes engage in more risk shifting compared to banks in high forward-looking discretionary loan loss provisioning.

Both Fernandez and Gonzalez (2005) and Bushman and Williams (2012) focus on a general approach to risk shifting. I specifically examine risk shifting through investment securities by examining the role accounting information plays in improving the liquidity of a bank's asset and its implications for risk shifting incentives.

2.3. Hypotheses Development: Fair Value Accounting and Risk Shifting Incentives

In 2006, the Financial Accounting Standards Board (FASB) adopted Statement of Financial Accounting Standard No. 157, *Fair Value Measurements* (SFAS 157 hereafter) which became effective in 2008 (in the Accounting Codification, these rules are part of Topic ASC 820). When adopting SFAS 157, the standard setters mentioned the need to achieve consistency[10] across standards and comparability across firms in the area of fair value measurements as some of the reasons for adopting SFAS 157. In Appendix C to the first version of SFAS No. 157, the FASB notes the following:

> The Board believes that, in part, those concerns result because there is limited guidance for applying the fair value measurement objective in GAAP. The guidance that *currently exists has evolved piecemeal over time and is dispersed* among the accounting pronouncements that require fair value measurements. *Differences in that guidance have created inconsistencies that have added to the complexity in GAAP*. (Emphasis added).

The lack of consistency across standards is detrimental to the quality of reported accounting information. Wustemann and Wustemann (2010) note that achieving consistency across firms in the application of accounting rules presupposes the existence of internal consistency in the accounting standards themselves. In the case of fair value

[10] According to the FASB, the standard's main purpose is to eliminate the inconsistencies associated with the use of fair value measurements in financial reporting. Prior to the adoption of SFAS No. 157, accounting pronouncements (SFAS No. 107, SFAS No. 115, and others) required the disclosure or recognition of many of a bank's assets and liabilities at fair value. However, there was not a unified framework for the determination and disclosure of these fair value estimates. In addition, the SEC Staff in its Report on mark-to-market accounting mandated by Section 133 of the Emergency Economic Stabilization Act of 2008 pointed out that suspending SFAS No. 157 would result in inconsistent and sometimes conflicting guidance on fair value measurements.

measurements, and especially for many financial instruments, the existence of homogenous markets will imply that instruments of the same nature held by different banks should be measured similarly. However, the existence of inconsistencies across standards in the notion of fair value before the adoption of SFAS No. 157 may lead to cross-firm differences and over time differences in the relevance and reliability of these measurements. To achieve consistency in fair value measurements, SFAS 157 introduces a new definition of fair value which establishes the perspective of market participants as an essential principle for fair value measurements. In SFAS No. 157, fair value is defined as the price that would be received to sell an asset or to transfer a liability in an orderly transaction in the principal (or most advantageous) market at the measurement date under current market conditions (that is, an exit price) regardless of whether that price is directly observable or estimated using another valuation technique.

SFAS 157 also introduced a new set of additional disclosures, the most prominent being the fair value hierarchy with the objectives of informing investors about the reliability of the fair value measurements. The fair value hierarchy requires firms to provide users of financial statements with information about the reliability of their fair value estimates by disclosing the level under which they fall. When the fair value is determined using prices quoted on active markets for identical assets, the fair value measurement falls under Level 1 of the hierarchy. Level 2 of the hierarchy is reserved for those measurements based on quoted prices other than from active markets for identical assets or liabilities. Finally, Level 3 is used when an unobservable input has been used to estimate fair value. This hierarchy of inputs allows firms to indicate the degree of reliability of their fair value measurements. The Level 1 inputs which reflect the directly

observable perspective of market participants are deemed the most reliable and the Level 3 inputs which incorporate the unobservable assumptions made by the reporting entity are considered the least reliable in the hierarchy. With this additional level of detail in the fair value disclosures, one should expect users of financial statements information to benefit from the expanded disclosures[11].

Numerous studies have documented overall positive effects for SFAS 157 on the quality of accounting information. As an example Kolev (2009), Goh, Ng, and Yong (2009) and Song, Yi and Thomas (2010) evaluate the value relevance of the expanded disclosures and provide evidence consistent with the fair value hierarchy being representative of a reliability ordering in fair value measurements. Reidl and Serafeim (2011) adopt a cost of capital perspective and examine whether the fair value hierarchy reflects an ordering in information uncertainty. They find evidence supporting the hypothesis that assets in higher levels of the fair value hierarchy suffer from lower information uncertainty than those in lower levels. Barron et al. (2013) examine the effects of SFAS 157 on analysts' information environment and show that the new disclosures improve the quality of information available to and produced by analysts. The findings from these studies indicate that SFAS 157 enables outsiders to at least distinguish between various classes of assets on a firm's balance sheet.

An improvement in information quality about banks' assets may result in dampened incentives to engage in risk shifting. Lu et al. (2011) examine the implications of fair value and historical cost accounting for banks' tradeoff between risk shifting and

[11] Appendices 1 through 3 provide some illustrations of the changes in fair value disclosures for financial instruments under SFAS 107, SFAS 115, and SFAS 157.

underinvestment. They analytically show that fair value accounting in comparison to historical cost accounting, mitigates risk shifting incentives by providing regulators with more timely signals about the quality of banks' assets. Their results are consistent with the view that fair value accounting provides a more accurate representation of banks' economic condition (Benston et al. 1986), and the general perspective of higher quality accounting information playing a monitoring role which constrains risk shifting. It is noteworthy to mention that Lu et al. (2011) focus on the differences between fair value accounting and historical cost accounting on the recognition of economic events in income and on the balance sheet. The changes in fair value accounting rules of 2008-2009 mainly affect the quality of accounting information through a disclosure channel. Nevertheless, the new set of disclosures provides outsiders with more detailed information about the distribution of risk in the bank's portfolio of investment securities.

Burkhardt and Strausz (2006) adopt a different perspective when it comes to the improved transparency about banks' assets and risk shifting incentives. They maintain the assumption of frictionless markets adopted by Lu et al. (2011) and they analytically demonstrate that the reduction in information asymmetry associated with using fair value accounting instead of historical cost accounting can exacerbate banks' risk shifting incentives. Their analyses focus on the informational superiority of fair value accounting over historical cost accounting from a disclosure standpoint. This is consistent with the improvements in disclosure quality resulting from the adoption of SFAS 157. More transparent accounting information leads to substantial improvements in the market liquidity of the low liquidity risk assets held by the bank. The improved disclosure quality attenuates the "lemons" problem for these high quality assets. Consequently,

higher asset liquidity aggravates the risk of asset substitution by reducing the bank's incentive to commit to a particular trading strategy when its balance sheet is made up of highly liquid assets (Dewatripont and Tirole 1994; Freixas and Rochet 1997; Myers and Rajan 1998; Morgan 2002). Essentially improved accounting information has perverse implications captured by Myers and Rajan (1998) through what they call the "Paradox of Liquidity".

If we relax the assumption of frictionless markets for the banks' assets, it is still not obvious that the improvement in the quality of accounting information will result in dampened risk shifting incentives. O'Hara (1993) shows that mark-to-market accounting introduces a valuation bias against long-term illiquid assets, which leads banks to engage in a myopic behavior of investing in short-term assets which are more exposed to liquidity shocks due to the constant search for refinancing. Relatedly, Diamond and Rajan (2011) examine the behavior of solvent and distressed banks during a liquidity crisis. They show that in the presence of pricing difficulties due to shocks to liquidity, timely signals are not available to regulators, thus leading both solvent and distressed banks to hold on to and acquire illiquid securities. The distressed banks' behavior is consistent with risk shifting, whereas that of solvent banks is consistent with illiquidity arbitrage (Ryan 2011). However, both behaviors result in further investment in risky securities and are related to the inability of fair value accounting to adequately account for liquidity risk. Given that improved fair value accounting may result in either more or less risk shifting, I formulate my first hypothesis in null form:

H1: SFAS 157 does not alter the extent of risk shifting activity by banks

It is necessary to mention at this point that the chronological proximity between the financial crisis of 2007-2009 and the effective date of SFAS 157 substantially affect my ability to extract the effects of SFAS 157 on banks' risk shifting incentives. I may document a reduction in risk shifting following SFAS 157 simply because banks were forced to unwind their risky positions in non-agency mortgage backed securities and other risky investment securities as the crisis hit. To cross this hurdle, I rely on the interaction between risk shifting incentives and the probability of government intervention during the crisis.

From a theoretical perspective, banks' risk shifting incentives during the crisis may not have dramatically changed compared to the pre-crisis period because of the expectation of regulatory forbearance (Diamond and Rajan 2011). Conscious of their systemic importance and of the systemic risk shifting (Acharya 2009) prevalent in the industry, some banks may not substantially alter their strategy of undertaking risky investments. Duchin and Sosyura (2012, 2013) provide initial answers consistent with this moral hazard perspective. First Duchin and Sosyura (2012) find that politically connected banks are more likely to receive government support (through the Capital Purchase Program instituted under the Troubled Asset Relief Program), but their investments underperform those of unconnected banks. Second, Duchin and Sosyura (2013) obtain evidence that banks used the funds from the Capital Purchase Program (CPP)[12] to make risky loans and invest in risky securities. Particularly, they document an ex-post increase in loan charge-offs and an increase in market perception of the banks'

[12] In September 2007 the U.S. Treasury proposed the TARP program which was initially designed to allow the purchase of illiquid assets from financial institutions. After numerous political deliberations, the TARP program was made effective through the Economic Emergency Stabilization Act of 2008. Its most prominent feature consisted in the U.S. Treasury injecting capital in financial institutions through the CPP

risk through higher stock volatility, beta, and default risk. Based on this evidence, it is not entirely clear that finding a reduction in risk shifting after the adoption of SFAS 157 can be entirely attributed to the financial crisis of 2007-2009.

I then proceed to perform more refined analyses of the changes in risk shifting incentives following the changes in the fair value accounting rules. More precisely, I examine the implications of funding liquidity risk for risk shifting incentives. As noted earlier, risk shifting incentives can emerge from the shareholder-debtholder agency conflict (Jensen and Meckling 1976). On average, compared to their industrial counterparts, banks and other financial institutions experience higher levels of leverage. During turbulent economic times a bank's exposure to funding liquidity risk is an indication of its degree of leverage and its ability to withstand severe liquidity shocks[13]. As noted by Brunermeier and Pedersen (2009), a market maker's ability to enable trading in particular assets depends on, and also affects its funding liquidity. At the extreme, banks may resort to the market for the repurchase agreements (repo markets hereafter) as a source of liquidity. Increased reliance on the repo markets reflects a more vulnerable liquidity position for the bank. Depending on a bank's funding liquidity status, two possible investment strategies could take place.

Risk shifting incentives are more pronounced for banks with high funding liquidity needs. An already illiquid bank may acquire even more illiquid securities because of an incentive to "gamble for resurrection" (Diamond and Rajan 2011;

[13] The Basel III regulatory framework introduced in 2011 places a particular emphasis on bank's liquidity from both a short-term and a long-term perspective. It requires a bank to hold sufficient liquid assets so as to withstand a 30-day period of severe short-term liquidity shocks. Basel III introduced the Liquidity Coverage Ratio (LCR) as a measure of short-term liquidity strength. On a long-term basis, a banks' liquidity strength is evaluated using the Net Stable Funding Ratio (NSFR). This is to ensure that a bank has enough liquidity to survive an extended closure of wholesale funding markets.

Brunermeier and Oehmke 2013). The shareholders of such a bank have weak incentives to liquidate their current position to satisfy the claims of creditors. These shareholders of weakly funded banks may encourage holding or investing in more illiquid securities expecting to maximize their returns if they emerge from the liquidity shock. In addition, risk shifting can also serve the interests of the managers of banks with high funding liquidity needs. Akerlof and Romer (1993) and Boyd and Hakenes (2014) analytically show that risk shifting activities encouraged by banks' shareholders can be used by bank managers for looting purposes. The recent evidence from the financial crisis of 2008 corroborates their conclusions. There is convincing empirical evidence on the positive association between excess managerial compensation and poor performance during the financial crisis (Bhagat and Bolton 2014), suggesting mutual reinforcement between risk shifting and managerial looting. Consequently, I expect the new set of disclosures provided by banks because of SFAS 157 to help the outsiders of such banks in constraining the strong risk shifting incentives at play.

H2a: SFAS 157 mitigates the extent to which banks with high funding liquidity needs invest in high liquidity risk securities.

On the other hand, for banks with low funding liquidity needs, they may invest in securities whose prices reflect liquidity discounts for reasons other than risk shifting incentives. During the 2007-2009 crisis, most securities' prices include a liquidity discount because of the systematic component of liquidity risk. Large financial institutions with sufficient funding may take advantage of such a situation by investing in cheap high liquidity risk securities during a liquidity crisis and selling those securities progressively as the liquidity crisis gets resolved. Sadka (2012) provides evidence of this

behavior in the hedge fund industry. Using a macro-approach, He et al. (2010) show that during the crisis, while the hedge fund and broker/dealer sectors of the financial services industry engaged in deleveraging through asset sales, those assets ended up on the balance sheets of the commercial banks with sufficient funding liquidity. This risk arbitrage strategy (Diamond and Rajan 2011; Ryan 2011) will not be as detrimental to the banks' outsiders as a risk shifting strategy. The banks' buffer of liquidity levels provide outsiders with an assurance that their claims will be met on time. Consequently, the banks' investment strategy may remain unaffected even in the presence of the more informative disclosures introduced by SFAS 157.

H2b: SFAS 157 has no effect on the extent of investment in high liquidity risk securities for banks with low funding liquidity needs.

Thus far, I have examined the effects of SFAS 157 on risk shifting incentives through its implications for the transparency of the bank's overall portfolio of investment securities. However, in April 2009 the FASB introduced the FASB Staff Position FSP FAS 157-4 to help preparers in determining fair value when the volume and level of activity in the markets have significantly decreased and to identify transactions that are not orderly. The following represent some of the factors used to identify such conditions: (a) Few recent transactions, (b) price quotations that are not based on current information, (c) price quotations vary substantially either over time or among market makers (for example, some brokered markets), (d) indexes that previously were highly correlated with the fair values of the asset or liability are demonstrably uncorrelated with recent indications of fair value for that asset or liability, (e) significant increases in implied

liquidity risk premiums, yields, or performance indicators (such as delinquency rates or loss severities) for observed transactions or quoted prices when compared with the reporting entity's estimate of expected cash flows, considering all available market data about credit and other nonperformance risk for the asset or liability, (f) there is a wide bid-ask spread or significant increase in the bid-ask spread, (g) there is a significant decline or absence of a market for new issuances (that is, a primary market) for the asset or liability or similar assets or liabilities, (h) little information is released publicly (for example, a principal-to-principal market).

FSP FAS 157-4, considered by many as a relaxation of fair value rules, provides significantly more flexibility to preparers (Bhat et al. 2011). The new guidance enables a bank to use its own assumptions (Level 3) in lieu of quoted prices (Level 1 and Level 2) which are deemed unreliable because of poor market conditions. Level 3 fair values are substantially more subject to managerial discretion and banks with strong incentives to hide poor performance could resort to manipulating these fair value measurements.

Banks with an overhang of risky and illiquid securities from the pre-crisis period have an incentive to use the discretion in fair value rules to conceal losses on their prior investments in high liquidity risk securities (Gron and Winton 2001). Banks with liquidity constraints may rely on the flexibility from FSP FAS 157-4 to avoid the scrutiny from capital providers and regulators. Banks without liquidity constraints on the other hand may have to hold their illiquid securities for a relatively long time through the erosion of the liquidity crisis. Till the resolution of the liquidity crisis, these illiquid securities are likely to experience further losses. In order to avoid the damaging effects to

their capital, these banks may also use the flexibility in fair value accounting rules to conceal such losses.

The efforts by both types of banks to hide the poor performance of their investment decisions may have detrimental implications for the predictive ability of reported accounting numbers. Banks are required to disclose the difference between the fair value and historical cost of their investment securities. This difference referred to as accumulated fair value gains or losses has a predictive value for future interest income (for interest-bearing securities), realized gains and losses, and future cash flows from the securities (Ryan 2007; Evans et al. 2013). Accumulated fair value gains (losses) reflect a decrease (increase) in the market return for comparably risky securities. A security with a return above (below) the market return records an increase (decrease) in its fair value. The recorded increase (decrease) in fair value compared to historical cost represents the opportunity benefit (cost) of holding a security with higher (lower) future interest income, thus the positive association between accumulated fair value gains and losses and future interest income. Similarly, the accumulated fair value holding and losses are positively related to future realized gains and losses and future cash flows from investment securities as management may decide to cash in or liquidate their positions.

The reliability of the difference between a security's fair value and historical cost depends on the precision of the fair value measurement. Evans et al. (2013) show that higher measurement errors in fair value estimates reduce the predictive value of accumulated fair value gains and losses. Similarly, manipulations of the fair value estimates are likely to negatively affect the predictive value of accumulated fair value gains and losses. An overstated fair value will not materialize as either future interest

income or future realized gains and losses and cash flows. Accordingly, for both types of banks, the manipulation of their fair value estimates to hide their poor performance will result in a reduction in the predictive ability of their accumulated fair value gains and losses for future realized gains and losses.

H3: Post-FSP FAS 157-4, there is a reduction in the predictive value of accumulated fair value gains and losses of investment securities held by banks with both high and low funding liquidity needs.

3. Research Design

3.1. Sample Selection and Data

My sample comprises the largest hundred publicly traded bank holding companies which obtained financial support through the CPP and which also survived from 2004 to 2012. I focus on banks receiving CPP support in order to minimize the effects of the financial crisis on risk shifting incentives. With the prospect of receiving CPP funds, these banks may not totally alter their investment strategy as they expect regulatory forbearance. For these banks, from the statement of cash flows, I collect annual information about their purchases of their investment securities classified as available-for-sale and held-to-maturity[14]. I obtain the other financial statement information from their regulatory FRY 9-C filings. I collect stock price information from the Center for Research in Security Prices (CRSP).

Funding liquidity constraints represent a central aspect of this study. In Acharya and Viswanathan (2011), a bank's ability to maintain adequate levels of funding liquidity determines its propensity to engage in risk arbitrage or risk shifting. To operationalize the exposure to funding liquidity shocks, I follow Bordeleau and Graham (2010) and

[14] Information about banks' activities with respect to their portfolio of investment securities is available from the regulatory filings. However, the reported numbers are aggregated and do not permit the distinction between securities in the available-for-sale portfolio and those in the held-to-maturity portfolio. There are substantial differences in terms of risk, maturities, and other factors across these two portfolios. Nevertheless, in the robustness analyses, I use a larger sample based on the availability of machine-readable data.

compute a bank's net reliance on repurchase agreements. Banks can obtain (provide) financing from selling (buying) securities with an agreement to repurchase (resell). Strong reliance on this source of financing exposes the banks to shocks in the market for short-term funds and can lead to the bank's demise as was the case with Lehman Brothers in the fall of 2008. I classify banks with an above median net liability position on repurchase agreements as low funding liquidity (banks with risk shifting incentives) banks, and banks with a below median net liability position on repurchase agreements as high funding liquidity banks (banks with risk arbitrage incentives). I restrict the pre-SFAS 157 period to fiscal years 2004 to 2007. The post-SFAS 157 period starts in 2009 and ends in 2012. With respect to FSP FAS 157-4, the delineating year is 2009, the year of adoption and effectiveness of the pronouncement. I delete observations with missing data for the variables in the econometric models. My final sample spans the period 2004-2012 and consists of 686 observations.

3.2. Econometric models

The literature on risk shifting relates the volatility (risk) of a firm's assets to the change in its investments. In the case of banks, since deposit insurance is an important determinant of risk shifting incentives most studies examine the extent of risk shifting through the relation between deposit insurance premium and a bank's leverage and volatility of returns. Ronn and Verman (1986), Duan et al. (1992), Hovakimiam and Kane (2000) Hovakimiam et al. (2003) and Bushman and Williams (2012) start their analyses using the following specification:

$$IPP \quad = \gamma_0 + \gamma_1 \sigma_V + \gamma_2 {}^{B}/_{V} \quad + \varepsilon_1 \ (1),$$

Where:

IPP	=	Deposit insurance premium per dollar of deposit and that is sensitive to bank risk
σ_V	=	The standard deviation of asset returns
B	=	The face value of deposits and other debt
V	=	The market value of a bank's assets

Under this this framework, a bank's cost of deposit insurance is increasing in both the riskiness of the bank's assets and its leverage. Banks' risk shifting incentives stem from their joint choice of leverage and asset risk subject to the monitoring by insured and uninsured creditors. Equation (1) can then be decomposed into a system of simultaneous equations reflecting this joint choice:

$$B/V = \alpha_0 + \alpha_1 \sigma_V + \varepsilon_2 (2)$$

$$IPP = \beta_0 + \beta_1 \sigma_V + \varepsilon_3 (3)$$

Substituting equation (2) into equation (3) allows a full consideration of the tension faced by bank shareholders who have an incentive to take on more risk as leverage increases, but also face the constraints of deposit insurance premiums which are positively related to the degree of risk taking. This econometric specification results in an estimation of the relation between risk shifting and alternative deposit insurance contracts. Hovakimiam and Kane (2000) adopt it to evaluate the changes in risk shifting following reforms to deposit insurance regulation in the U.S. setting. Hovakimiam et al. (2003) and Bushman and Williams (2012) use the same specification or some variants in their examination of risk shifting across different countries with some variations in deposit insurance regulations.

To conduct a within-country study absent a change in deposit insurance regulation, I follow the approaches proposed by Eisdorfer (2008) and Loktionov (2009). With the sparse evidence on risk shifting in non-financial industries, Eisdorfer (2008) relies on the theoretical negative relation between investment intensity and uncertainty. From a real options perspective, the value of delaying investments increases with the degree of uncertainty about the payoffs of the project. In the case of financially distressed firms, he analytically shows and empirically tests the proposition that financial distress weakens the negative relation between investment intensity and uncertainty. The shareholders of financially distressed firms consider the increase in uncertainty as an opportunity to invest in even riskier projects with a potential for even higher returns, thus strengthening their risk shifting incentives. The specification from Eisdofer (2008) suffers from the difficulty of finding a suitable proxy for uncertainty which is independent of the firm's decisions. In order to avoid this pitfall, I rely on the approach of Shrieves and Dahl (1992) and Duran and Lozano-Vivas (2013) to directly relate a measure of bank risk-taking to some measure of investment intensity.

I conduct my analyses by examining how a bank's purchases of investment securities affect the banks' liquidity risk. I relate the change in a bank's liquidity beta to measures of the bank's activities in its portfolio of investment securities. A bank's liquidity beta reflects the sensitivity of the bank's stock returns to fluctuations in aggregate liquidity (Pastor and Stambaugh 2003; Amihud et al. 2005). I test H1 and H2 using the following model:

$$Delta\beta^{L}_{it} = b_0 + b_1 Purch\_afs_{i,t} + b_2 Purch\_htm_{i,t} + b_3 Afs_{i,t-1} + b_4 Htm_{i,t-1} + b_5 \beta^{L}_{i,t-1} + b_6 Size_{i,t-1} + c_1 Repo_{i,t} + c_2 Repo * Purch\_afs_{i,t} + c_3 Repo * Purch\_htm_{i,t} + d_1 Post_{i,t} + d_2 Post * Purch\_afs_{i,t} + d_3 Post * Purch\_htm_{i,t} + e_1 Repo * Post_{i,t} + e_2 Repo * Post * Purch\_afs_{i,t} + e_3 Repo * Post * Purch_{htm\,i,t} + \varepsilon_{i,t} \quad (4)$$

where, for bank *i*, in period *t*:

$Delta\beta^{L}$	=	Change in liquidity beta from year t-1 to year t
$Purch\_afs$	=	Purchases of investment securities classified as available-for-sale (AFS) scaled by beginning total assets
$Purch\_htm$	=	Purchases of investment securities classified as held-to-maturity (HTM)scaled by beginning total assets
β^{L}	=	Liquidity beta
$Repo$	=	An indicator variable that equals 1 if the observation refers to a bank with net liability position in repurchase financing above median and zero otherwise
$Post$	=	An indicator variable that equals 1 if the observation belongs to the fiscal period after 12/31/2007, and zero otherwise
$Size$	=	Natural logarithm of total assets

Model (4) focuses on the effects of purchases of investment securities on the change in liquidity beta. I estimate a bank's liquidity beta following Pastor and Stambaugh (2003). I obtain the series of monthly innovations in liquidity from Lubos Pastor's

website at The University of Chicago. I obtain the series of Fama-French Factors (Rm-Rf, SMB, and HML) from Kenneth French's website at Dartmouth College. I use rolling monthly regressions of the following model to estimate bank-specific monthly liquidity betas:

$$(R_{i,t} - r_{f,t}) = a_0 + \beta^L L_t + \beta_1(R_{m,t} - r_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \mu_{i,t} \quad (5)$$

where, for bank *i*, in month *t*:

$(R_{i,t} - r_{f,t})$	=	The bank's monthly stock return minus the risk-free rate of return
L_t	=	Monthly innovations in market liquidity
$(R_{m,t} - r_{f,t})$	=	Market's monthly return minus the risk-free rate of return
SMB	=	Size factor
HML	=	Value factor

In Model (4), a positive (negative) association between $Delta\beta^L$ and *Purch_afs* indicates a shift towards securities with higher (lower) liquidity risk, ultimately resulting in an increase in the banks' overall liquidity risk. H1 predicts that SFAS 157 has no effect on the risk shifting behavior of banks. Should their investment strategies be different following SFAS 157, I expect the coefficients d_2 and d_3 to be different from zero. Positive (negative) coefficients indicate that the information effects of SFAS 157 result in mitigated (exacerbated) risk shifting incentives.

H2a and H2b examine whether the effects of SFAS 157 on investment in high liquidity risk securities vary by type of bank. For banks with liquidity constraints, they face stronger scrutiny from regulators and other creditors, thus reinforcing the monitoring role of SFAS 157 and leading to a stronger reduction in risk shifting compared to banks

without liquidity constraints. A stronger reduction in risk shifting incentives for banks with liquidity constraints will translate into negative coefficients e_2, and e_3.

H3 examines the predictive ability of banks' accumulated fair value gains and losses on investment securities. Following Evans et al. (2013), I estimate the following models:

$$\begin{aligned}\text{sec}\_inc_{i,t+1} = {} & \delta_0 + \delta_1 diff\_afs_{i,t} + \delta_2 diff\_htm_{i,t} + \delta_3 \text{sec}\_inc_{i,t-1} + \delta_4 purch\_afs_{i,t} \\ & + \delta_5 purch\_htm_{i,t} + \delta_6 repo_{i,t} + \delta_7 repo * diff\_afs_{i,t} \\ & + \delta_8 repo * diff\_htm_{i,t} + \delta_9 post_{i,t} + \delta_{10} post * repo_{i,t} \\ & + \delta_{11} post * diff\_afs_{i,t} + \delta_{12} post * diff\_htm_{i,t} \\ & + \delta_{13} post * repo * diff\_afs_{i,t} + \delta_{14} post * repo * diff\_htm_{i,t} \\ & + \delta_{15} Size_{i,t} + \xi_{i,t} \quad (6)\end{aligned}$$

$$\begin{aligned}\sum_{\tau=1}^{3} \text{sec}\_inc_{i,t+\tau} = {} & \delta_0 + \delta_1 diff\_afs_{i,t} + \delta_2 diff\_htm_{i,t} + \delta_3 \text{sec}\_inc_{i,t-1} \\ & + \delta_4 purch\_afs_{i,t} + \delta_5 purch\_htm_{i,t} + \delta_6 repo_{i,t} + \delta_7 repo * diff\_afs_{i,t} \\ & + \delta_8 repo * diff\_htm_{i,t} + \delta_9 post_{i,t} + \delta_{10} post * repo_{i,t} \\ & + \delta_{11} post * diff\_afs_{i,t} + \delta_{12} post * diff\_htm_{i,t} \\ & + \delta_{13} post * repo * diff\_afs_{i,t} + \delta_{14} post * repo * diff\_htm_{i,t} \\ & + \delta_{15} Size_{i,t} + \xi_{i,t} \quad (7)\end{aligned}$$

where, for bank *i:*

$\text{sec}\_inc_{i,t+1}$ = The sum of one-year-ahead realized and unrealized gains and losses on investment securities classified as available-for-sale and held-to-maturity scaled by beginning historical cost of available-for-sale and held-to-maturity securities

$diff\_afs_{i,t}$ = The difference between the fair values and historical costs of investment securities classified as available-for-sale maturity scaled by beginning historical cost of available-for-sale securities

$diff\_htm_{i,t}$ = The difference between the fair values and historical costs of investment securities classified as held-to-maturity scaled by beginning historical cost of held-to-maturities securities

Models (6) and (7) relate future income on investment securities to the end of year difference between the securities' fair values and historical costs (unrealized holding gains and losses). Consistent with differences in holding horizons across banks, I estimate three models with the dependent variable being the income from investment securities at t+1, the sum of income from investment securities at t+1 and t+2, and the sum of income from investment securities at t+1 and t+2, and t+3.

In the cross-section, a positive association between unrealized holding losses (gains) and future income from investment securities reflects the opportunity costs (benefits) of holding securities which currently underperform (outperform) market's expectations for similarly risky securities. This positive association could be detrimentally affected by measurement errors in the reported fair value numbers. Banks experiencing losses on their investment securities may attempt to conceal their losses through the flexibility in fair value measurement resulting from the adoption of FSP FAS 157-4.

H3 examines the change in the predictive ability of accumulated fair value gains and losses of investment securities held by banks from pre- to post-FSP FAS 157-4. I test this hypothesis for banks without (with) liquidity constraints by examining whether the coefficients δ_{11} ($\delta_{11}+\delta_{13}$) and δ_{12} ($\delta_{12}+\delta_{14}$) are different from zero.

4. Results

4.1. Descriptive Statistics and Univariate Comparisons

<Insert Table 1>

Panels A, B, and C of Table 1 present descriptive statistics and univariate comparisons for the variables used in Models (4) through (7). On average, banks with high funding liquidity needs outsize banks with low funding liquidity needs. However, these differences are reversed at the level of the portfolio of investment securities. The banks with low funding liquidity needs devote a substantially larger portion of their assets to both AFS and HTM securities (21.1 percent versus 15 percent for AFS and 3.5 percent versus 2.1 percent for HTM). These findings are consistent with prior literature. Nissim and Penman (2007) report that investment securities measured at fair value (available-for-sale securities) represent 19 percent of total assets for large bank holding companies. Banks with low funding liquidity needs seem to experience a higher level of activity in their portfolio of investment securities compared to banks with high funding liquidity needs. During the year, their purchases of AFS (HTM) securities represent 21.3 (1.4) percent of their beginning balance in the portfolio compared to 9.2 (0.7) percent for the banks with high funding liquidity needs. This difference in the intensity of purchases suggests a higher trading intensity for banks with low funding liquidity needs. A liquidity arbitrage strategy based on within-quarter changes in the holdings of the banks requires a

high trading intensity as exhibited by these banks. It is noteworthy to mention that I do not observe any statistically significant difference in liquidity beta for these two types of banks. This is consistent with the time-varying nature of liquidity beta (Pastor and Stambaugh 2003). From the correlation matrix in Table 2, there are substantial differences across the two types of banks in terms of the relation between liquidity beta and the other variables. In the case of banks with low funding liquidity needs, I only observe a positive correlation with *purch_afs* and *sec_inc.* The positive association with *purch_afs* suggests that on average these banks invest in riskier securities compared to their current holdings. The positive association with *sec_inc* follows up as it indicates that those banks may be experiencing more volatility in their realized and unrealized fair value gains and losses.

In the case of banks with high funding liquidity needs, besides the negative correlation coefficient with the *afs,* there is a positive association between the banks' liquidity beta and almost all the other variables. Particularly interesting are the positive correlation coefficients for *purch_afs, sec_inc, diff_afs, diff_htm,* and *diff_sec*. They all seem to suggest that banks with high funding liquidity needs follow a riskier investment strategy which results in more volatility in their financial statements balances.

<Insert Table 2>

4.2. Regression Results

4.2.1. SFAS 157 and risk shifting incentives

<Insert Table 3>

H1 examine the pre- to post-SFAS 157 change risk shifting. SFAS 157 provides more precise information about the riskiness of the investment securities in the banks' portfolio. On one hand, more precise information results in increased liquidity for the high quality securities of the bank. The increased liquidity for the bank's assets exacerbates risk shifting incentives as the bank now has access to a larger set of investment opportunities. On the other hand, SFAS 157 may mitigate banks' risk shifting incentives by providing outsiders with more timely signals about the quality of the bank's assets.

Table 3 presents the results for the test of H1. In column (1), I estimate the risk shifting model without considering the effects of SFAS 157. The positive and statistically significant coefficients b_1 (0.065, p-value <0.001) and b_2 (0.35, p-value = 0.017) indicate that on average, during the period 2004-2012, for both the AFS and HTM portfolios, banks invest in securities with higher liquidity risk compared to their current holdings.

Column (2) breaks down the results between the pre- and post-SFAS 157 periods. The lack of statistical significance on the coefficients d_2 (-0.03, p-value = 0.376) and d_3 (0.054, p-value = 0.925) is consistent with the failing to rejecting the null H1 that SFAS 157 has no effect on risk shifting through investment securities. One explanation for these findings is that risk shifting incentives vary by type of banks. As noted earlier risk shifting incentives may be affected by the leverage position of the bank, by regulatory pressures, and numerous other factors. For these reasons, it is necessary to perform cross-

sectional analyses on this sample to examine the differential implications of SFAS 157 on risk shifting for various types of banks.

4.2.2. Funding liquidity and the effects of SFAS 157 on investment in high liquidity risk securities

<Insert Table 4>

H2a and H2b examine the cross-sectional variations on the implications of SFAS 157 for banks' investment decisions. More precisely, an investment in high liquidity risk securities may reflect a risk shifting strategy or a risk arbitrage strategy depending on the bank's funding liquidity status. H2a predicts that the more informative fair value disclosures introduced through SFAS 157 mitigates the incentives to invest in high liquidity risk securities for banks with high funding liquidity needs. On the other hand, H2b predicts that these disclosures do not affect the investment choices of banks with low funding liquidity needs.

In these analyses, the pre-SFAS 157 period corresponds to a boom period in the banking industry with excessive risk-taking by most banks. In order to minimize the effects of the financial crisis, I choose the post-SFAS 157 period to start in 2009. In column (1) of Table 4, I present the results for the full sample period without consideration for the effects of SFAS 157. The results indicate that banks with low (high) funding liquidity needs invest in high (low) liquidity risk securities as evidenced by the positive (negative) coefficients b_1 (0.36, p-value = 0.02) and c_2 (-0.3, p-value = 0.05).

These full sample analyses indicate that the monitoring pressures faced by banks with high funding liquidity needs outweigh their incentives to "double down" on risk taking.

Column (2) presents the results of the differential effects of SFAS 157 for the two groups of banks. In the pre-SFAS 157 period, the positive coefficients b_1 (0.16, p-value = 0.04) and c_3 (1.71, p-value = 0.07) indicate a propensity for both types of banks to invest in high risk securities. However, the two types of banks differ in their strategies. While the banks with low funding liquidity needs invest in high risk securities through their AFS portfolio, the banks with high funding liquidity needs use their HTM portfolio. The reliance on the HTM (AFS) portfolio by banks with high (low) funding liquidity needs banks is consistent with a risk shifting (arbitrage) behavior. By classifying securities as HTM, banks with high funding liquidity needs have the opportunity to conceal the unrealized fair value losses on these high risk securities since securities classified as HTM are accounted for at historical cost. On the other hand, the low funding liquidity banks use the AFS classification because they intend to maintain a more active investment strategy of purchasing securities at a discount during a liquidity crisis and being able to sell them as the liquidity crisis vanishes away.

Looking at the effects of SFAS 157 on this investment behavior confirms the explanation of risk shifting versus risk arbitrage. The positive coefficients d_2 (0.21, p-value <0.001) and negative coefficient e_3 (-0.39, p-value = 0.07) indicate that SFAS 157 results in information improvements that facilitates (curtails) the investment in risky securities for banks with low (high) funding liquidity needs.

4.2.3. Relaxation of Fair Value Accounting Rules and The Predictive Ability of Fair Value for Future Financial Performance

<Insert Table 5>

H3 examines the predictive ability of accumulated fair value gains and losses on investment securities around the relaxation of fair value accounting rules through the adoption of FSP Fas 157-4. As noted by prior studies (Huizinga and Laeven 2012) banks may use their discretion to conceal the poor quality of their investments. This is particularly relevant for banks with high funding liquidity needs as the tests of H2 suggest that they rely on the HTM classification to engage in risk shifting. FSP FAS 157-4 makes it easier for banks to use their discretion in fair value measurements to avoid reporting unrealized losses on their investment portfolios. Doing so may result in less reliable fair value measurements.

I test H3 by estimating Models (6) and (7) and by examining whether the coefficients δ_{11} (δ_{11}+ δ_{13}) and δ_{12} (δ_{12}+ δ_{14}) are statistically significantly different from zero. Panel A, B, and C of Table 5 respectively provides the results for the analyses using the one-year-ahead, the sum of one- and two-year-ahead, and the sum of one-, two-, and three-year-ahead income on investment securities. In all three panels and all three specifications, the positive coefficients δ_1 and δ_7 confirm the predictive ability of current unrealized gains and losses on AFS securities for future realized and unrealized fair value gains and losses on AFS securities (Evans et al. 2013). On the other hand, for HTM securities, the current unrealized gains and losses do not seem to be reliably associated with future realized and unrealized fair value gains and losses. In the case of banks with low funding liquidity needs, δ_2 is positive and significant in only one specification (Panel

B, column 3). For banks with high funding liquidity needs, it is even worse as δ_8 is negative and significant in most specifications. These results suggest that the unrealized gains and losses on HTM securities suffer from substantial estimation errors or manipulations which detrimentally affect their reliability. This effect is concentrated in banks with high funding liquidity needs. Since the tests of H2 also showed that these banks are more likely to engage in risk shifting through their HTM portfolio, I can conclude that these banks are more likely to rely on the discretion in fair value rules to conceal their poor investment choices.

To examine whether banks use the additional discretion in fair value measurements embedded in FSP-FAS 157-4, I focus on column (3) in Panels A, B, and C. For banks with low funding liquidity needs, the non-statistical significance of the coefficients δ_{11} and δ_{12} in all three panels indicates that FSP-FAS 157-4 does not result in a change in the reliability of the fair value measurements of these banks. On the other hand, in all three panels, δ_{13} is negative and statistically significant, indicating a decrease in the reliability of fair value measurements for the AFS portfolio of banks with high funding liquidity needs. These findings indicate that banks with high funding liquidity needs take advantage of the flexibility in fair value measurements resulting from the adoption of FSP FAS 157-4 to conceal their losses.

4.3. Sensitivity Analyses

One concern in the preceding analyses is that they may capture an industry-wide or time-related change in investment behavior which may not be related to the changes in fair value disclosure rules. To alleviate this concern, I adopt two approaches. The first

one is to consider whether the effect of the bank's loan portfolio on the bank's liquidity risk. Loans held for investment are accounted for at amortized cost and represent the largest assets of a typical bank holding company. A change in fair value accounting rules should not affect these loans. I therefore examine whether there is change in the association between the bank's liquidity risk and its holdings of loans.

I re-estimate Model (4) in Table 6 with an additional control for the change in loans held for investment scaled by total assets. The results in both Panels A and B indicate that from the pre- to post-SFAS 157, there is no difference in the effect of banks' loan portfolio on the bank's liquidity risk. Furthermore, when comparing the effects of investment securities to those of loans, we observe in Panel B that in the pre-SFAS 157 period, banks with high funding liquidity needs invest in high liquidity risk securities, but that is not the case for the new loans they make. These loans have the same impact on the banks' liquidity risk as the loans made in earlier periods. In the post-SFAS 157 period, banks with high funding liquidity needs reduce the extent of their investment in high liquidity risk AFS securities, but the impact of their loan portfolio on the banks' liquidity risk remain the same. These analyses reinforce the earlier findings suggesting that the reduction in investment in high liquidity risk by banks with high funding liquidity needs is related to the change in reporting regime associated with the adoption of SFAS 157.

To alleviate concerns about the existence of confounding factors, I use placebo dummy variables representing the change in accounting regulation. Instead of 12/31/2007 as the cutoff date, I conduct the analyses using 12/31/2008 and 12/31/2010. I fail to detect any significant change in the banks' behavior using these placebo dates.

5. Conclusion

Risk shifting is a manifestation of the moral hazard agency conflict that is particularly relevant to the banking industry because of banks' high leverage and the availability of deposit insurance. Higher quality accounting information may help in mitigating this agency conflict by providing outsiders with more precise information about the riskiness of banks' investment decisions. In this study, I examine whether and how the improvements in fair value disclosures resulting from the adoption of SFAS 157 affect banks' investment decisions. More precisely, I focus on banks' investments in high liquidity risk securities. SFAS 157 introduced a new set of fair value disclosures with the most prominent being the fair value hierarchy which provides information about the reliability of banks' inputs for fair value measurements. Indirectly, the fair value hierarchy informs about the level of liquidity of the markets for the banks' investment securities. My findings indicate that on average, following the introduction of the more precise fair value disclosures, banks do not modify their investment decisions.

However, the period around the adoption SFAS 157 is marked by severe liquidity shocks which may substantially alter banks' investment decisions. During a period of liquidity uncertainty, banks with high funding liquidity needs face even stronger risk shifting incentives whereas banks with low funding liquidity needs may follow an

"arbitrage" strategy. Further cross-sectional analyses based on banks' funding liquidity status reveal that the adoption of SFAS 157 is associated with a reduction (increase) in investment in high liquidity risk securities for banks with high (low) funding liquidity needs. Consistent with the risk shifting agency conflict being more acute for banks with high funding liquidity needs, these findings confirm the monitoring role of the more precise fair value disclosures introduced by SFAS 157.

The FASB adopted FSP FAS 157-4 in April 2009 to provide preparers with more flexibility in fair value reporting given the tumultuous market conditions. More precisely, FSP FAS 157-4 enables preparers to identify conditions indicating that the market for an asset measured at fair value is active and liquid enough to warrant a Level 1 classification. For securities with deteriorated market conditions, a preparer may replace a market-based Level 1 measurement by a firm-based Level 3 measurement. Level 3 measurements are by nature more subjective than Level 1 and Level 2 fair value measurements. The change in rules opens up the possibility of opportunistic fair value measurements, especially during a period of declining prices. For banks with high funding liquidity needs, their risk overhang from poor prior investment decisions may reinforce their propensity to manipulate their fair value estimates to conceal losses. For banks with low funding liquidity needs, they may manipulate their fair value estimates because of the uncertainty with respect to the timing in the resolution of the liquidity crisis. My findings indicate that it is only banks with high funding liquidity needs which opportunistically take advantage of the additional flexibility in fair value measurements. Following the adoption of FSP FAS 157-4, they experience a substantial reduction in the

predictive ability of their unrealized fair value gains and losses for future realized and unrealized fair value gains and losses.

This study helps in shedding some light on the monitoring role of accounting information. More precisely, in assessing under which conditions more precise fair value information mitigates risk taking. These analyses also shed some light on the importance of information gleaned through the Statement of Cash Flows. Banks' trading positions are particularly slippery. Market participants can obtain a perspective on the degree of commitment to a specific investment strategy by relying on the level of turnover in the bank's portfolio of investment securities using Statement of Cash Flows information.

Appendix 1: Fair value disclosure for investment securities under SFAS No. 107 for JPMorgan Chase & Co., Fiscal year 2004.

Notes to consolidated financial statements

JPMorgan Chase & Co.

The following table presents the carrying value and estimated fair value of financial assets and liabilities valued under SFAS 107; accordingly, certain assets and liabilities that are not considered financial instruments are excluded from the table.

	2004			2003[a][b]		
December 31, (in billions)	Carrying value	Estimated fair value	Appreciation/ (depreciation)	Carrying value	Estimated fair value	Appreciation/ (depreciation)
Financial assets						
Assets for which fair value approximates carrying value	$ 125.7	$ 125.7	$ —	$ 84.6	$ 84.6	$ —
Federal funds sold and securities purchased under resale agreements	101.4	101.3	(0.1)	76.9	77.2	0.3
Trading assets	288.8	288.8	—	252.9	252.9	—
Securities	94.5	94.5	—	60.3	60.3	—
Loans:						
Wholesale, net of allowance for loan losses	132.0	134.6	2.6	73.2	74.5	1.3
Consumer, net of allowance for loan losses	262.8	262.5	(0.3)	137.0	138.2	1.2
Interests in purchased receivables	31.7	31.8	0.1	4.8	4.8	—
Other assets	50.4	51.1	0.7	61.0	61.5	0.5
Total financial assets	$ 1,087.3	$ 1,090.3	$ 3.0	$ 750.7	$ 754.0	$ 3.3
Financial liabilities						
Liabilities for which fair value approximates carrying value	$ 228.8	$ 228.8	$ —	$ 146.6	$ 146.6	$ —
Interest-bearing deposits	385.3	385.5	(0.2)	247.0	247.1	(0.1)
Federal funds purchased and securities sold under repurchase agreements	127.8	127.8	—	113.5	113.6	(0.1)
Trading liabilities	151.2	151.2	—	149.4	149.4	—
Beneficial interests issued by consolidated VIEs	48.1	48.0	0.1	12.3	12.3	—
Long-term debt-related instruments	105.7	107.7	(2.0)	54.8	57.0	(2.2)
Total financial liabilities	$ 1,046.9	$ 1,049.0	$ (2.1)	$ 723.6	$ 726.0	$ (2.4)
Net appreciation			$ 0.9			$ 0.9

(a) Heritage JPMorgan Chase only.
(b) Amounts have been revised to reflect the current year's presentation.

Appendix 2: Fair value disclosure for investment securities under SFAS No. 115 for Bank of America, Inc., Fiscal year 2005.

Note 4—Trading Account Assets and Liabilities

The Corporation engages in a variety of trading-related activities that are either for clients or its own account.

The following table presents the fair values of the components of Trading Account Assets and Liabilities at December 31, 2005 and 2004.

	December 31	
	2005	2004
(Dollars in millions)		
Trading account assets		
Corporate securities, trading loans and other	$ 46,554	$ 35,227
U.S. government and agency securities(1)	31,091	20,462
Equity securities	31,029	19,504
Mortgage trading loans and asset-backed securities	12,290	9,625
Foreign sovereign debt	10,743	8,769
Total	$ 131,707	$ 93,587
Trading account liabilities		
U.S. government and agency securities(2)	$ 23,179	$ 14,332
Equity securities	11,371	8,952
Foreign sovereign debt	8,915	4,793
Corporate securities and other	7,407	8,538
Mortgage trading loans and asset-backed securities	18	39
Total	$ 50,890	$ 36,654

(1) Includes $22.1 billion and $17.3 billion at December 31, 2005 and 2004 of government-sponsored enterprise obligations that are not backed by the full faith and credit of the U.S. government.

(2) Includes $1.4 billion and $1.2 billion at December 31, 2005 and 2004 of government-sponsored enterprise obligations that are not backed by the full faith and credit of the U.S. government.

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BANK OF AMERICA CORPORATION AND SUBSIDIARIES

Notes to Consolidated Financial Statements—(Continued)

Note 6 – Securities

The amortized cost, gross unrealized gains and losses, and fair value of AFS debt and marketable equity securities, and Held-to-maturity securities at December 31, 2005, 2004 and 2003 were:

(Dollars in millions)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Available-for-sale securities				
2005				
U.S. Treasury securities and agency debentures	$ 730	$ —	$ 13	$ 717
Mortgage-backed securities	197,101	198	5,268	192,031
Foreign securities	10,944	1	54	10,891
Other taxable securities[1]	13,198	126	99	13,225
Total taxable	221,973	325	5,434	216,864
Tax-exempt securities	4,693	31	32	4,692
Total available-for-sale securities	$ 226,666	$ 356	$ 5,466	$ 221,556
Available-for-sale marketable equity securities[2]	$ 4,060	$ 305	$ 18	$ 4,347
2004				
U.S. Treasury securities and agency debentures	$ 826	$ —	$ 1	$ 825
Mortgage-backed securities	173,697	174	624	173,247
Foreign securities	7,437	36	26	7,447
Other taxable securities[1]	9,493	—	13	9,480
Total taxable	191,453	210	664	190,999
Tax-exempt securities	3,662	87	5	3,744
Total available-for-sale securities	$ 195,115	$ 297	$ 669	$ 194,743
Available-for-sale marketable equity securities[2]	$ 3,571	$ 32	$ 2	$ 3,601
2003				
U.S. Treasury securities and agency debentures	$ 710	$ 5	$ 2	$ 713
Mortgage-backed securities	56,403	63	575	55,891
Foreign securities	2,816	23	38	2,801
Other taxable securities[3]	4,765	36	69	4,732
Total taxable	64,694	127	684	64,137
Tax-exempt securities	2,167	79	1	2,245
Total available-for-sale securities	$ 66,861	$ 206	$ 685	$ 66,382
Available-for-sale marketable equity securities[2]	$ 2,803	$ 394	$ 31	$ 3,166
Held-to-maturity securities				
2005				
Taxable securities	$ 4	$ —	$ —	$ 4
Tax-exempt securities	43	—	—	43
Total held-to-maturity securities	$ 47	$ —	$ —	$ 47
2004				
Taxable securities	$ 41	$ 4	$ 4	$ 41
Tax-exempt securities	289	—	1	288
Total held-to-maturity securities	$ 330	$ 4	$ 5	$ 329

Appendix 3: Fair value disclosure for investment securities under SFAS No. 115 for Wells Fargo, Inc., Quarter 1, Fiscal year 2011.

Fair Value Measurements from Independent Brokers or Independent Third Party Pricing Services
For certain assets and liabilities, we obtain fair value measurements from independent brokers or independent third party pricing services and record the unadjusted fair value in our financial statements. The detail by level is shown in the table below. Fair value measurements obtained from independent brokers or independent third party pricing services that we have adjusted to determine the fair value recorded in our financial statements are not included in the following table.

		Independent brokers			Third party pricing services	
(in millions)	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
March 31, 2011						
Trading assets (excluding derivatives)	**$ -**	**1,448**	**12**	**38**	**1,835**	**-**
Securities available for sale:						
Securities of U.S. Treasury and federal agencies	**-**	**-**	**-**	**910**	**596**	**-**
Securities of U.S. states and political subdivisions	**-**	**15**	**-**	**-**	**14,995**	**170**
Mortgage-backed securities	**-**	**169**	**54**	**-**	**94,826**	**226**
Other debt securities	**-**	**232**	**4,918**	**-**	**15,607**	**814**
Total debt securities	**-**	**416**	**4,972**	**910**	**126,024**	**1,210**
Total marketable equity securities	**-**	**-**	**-**	**2**	**824**	**16**
Total securities available for sale	**-**	**416**	**4,972**	**912**	**126,848**	**1,226**
Derivatives (trading and other assets)	**-**	**50**	**6**	**-**	**667**	**8**
Loans held for sale	**-**	**-**	**-**	**-**	**1**	**-**
Derivatives (liabilities)	**-**	**32**	**18**	**-**	**785**	**-**
Other liabilities	**-**	**87**	**-**	**-**	**508**	**-**
December 31, 2010						
Trading assets (excluding derivatives)	$ -	1,211	6	21	2,123	-
Securities available for sale:						
Securities of U.S. Treasury and federal agencies	-	-	-	936	263	-
Securities of U.S. states and political subdivisions	-	15	-	-	14,055	-
Mortgage-backed securities	-	3	50	-	102,206	169
Other debt securities	-	201	4,133	-	14,376	606
Total debt securities	-	219	4,183	936	130,900	775
Total marketable equity securities	-	-	-	201	727	16
Total securities available for sale	-	219	4,183	1,137	131,627	791
Derivatives (trading and other assets)	-	15	44	-	740	8
Loans held for sale	-	-	-	-	1	-
Derivatives (liabilities)	-	-	46	-	841	-
Other liabilities	-	20	-	-	393	-

Note 13: Fair Values of Assets and Liabilities *(continued)*

Assets and Liabilities Recorded at Fair Value on a Recurring Basis

The tables below present the balances of assets and liabilities measured at fair value on a recurring basis.

(in millions)	Level 1	Level 2	Level 3	Netting	Total
March 31, 2011					
Trading assets (excluding derivatives)					
Securities of U.S. Treasury and federal agencies	$ 2,243	4,443	-	-	6,686
Securities of U.S. states and political subdivisions	-	2,319	130	-	2,449
Collateralized debt obligations (1)	-	-	1,910	-	1,910
Corporate debt securities	-	10,845	97	-	10,942
Mortgage-backed securities	-	10,920	144	-	11,064
Asset-backed securities	-	2,167	252	-	2,419
Equity securities	2,475	482	32	-	2,989
Total trading securities	4,718	31,176	2,565	-	38,459
Other trading assets	930	1,076	144	-	2,150
Total trading assets (excluding derivatives)	5,648	32,252	2,709	-	40,609
Securities of U.S. Treasury and federal agencies	912	595	-	-	1,507
Securities of U.S. states and political subdivisions	-	16,129	5,030	-	21,159
Mortgage-backed securities:					
Federal agencies	-	75,552	-	-	75,552
Residential	-	18,938	10	-	18,948
Commercial	-	13,499	281	-	13,780
Total mortgage-backed securities	-	107,989	291	-	108,280
Corporate debt securities	38	10,296	494	-	10,828
Collateralized debt obligations (2)	-	-	5,616	-	5,616
Asset-backed securities:					
Auto loans and leases	-	190	4,244	-	4,434
Home equity loans	-	986	98	-	1,084
Other asset-backed securities	-	6,519	3,411	-	9,930
Total asset-backed securities	-	7,695	7,753	-	15,448
Other debt securities	-	60	-	-	60
Total debt securities	950	142,764	19,184	-	162,898
Marketable equity securities:					
Perpetual preferred securities (3)	788	734	1,989	-	3,511
Other marketable equity securities	1,348	114	35	-	1,497
Total marketable equity securities	2,136	848	2,024	-	5,008
Total securities available for sale	3,086	143,612	21,208	-	167,906
Mortgages held for sale	-	25,617	3,314	-	28,931
Loans held for sale	-	1,003	-	-	1,003
Loans	-	-	98	-	98
Mortgage servicing rights (residential)	-	-	15,648	-	15,648
Derivative assets:					
Interest rate contracts	6	56,864	715	-	57,585
Commodity contracts	-	5,386	60	-	5,446
Equity contracts	626	2,298	874	-	3,798
Foreign exchange contracts	86	4,995	59	-	5,140
Credit contracts	-	1,935	2,645	-	4,580
Other derivative contracts	1	-	8	-	9
Netting	-	-	-	(54,113) (4)	(54,113)
Total derivative assets (5)	719	71,478	4,361	(54,113)	22,445
Other assets	39	141	311	-	491
Total assets recorded at fair value	$ 9,492	274,103	47,649	(54,113)	277,131
Derivative liabilities:					
Interest rate contracts	$ (10)	(53,149)	(416)	-	(53,575)
Commodity contracts	-	(4,877)	(63)	-	(4,940)
Equity contracts	(328)	(2,553)	(1,099)	-	(3,980)
Foreign exchange contracts	(67)	(3,441)	(36)	-	(3,544)
Credit contracts	-	(1,993)	(3,796)	-	(5,789)
Other derivative contracts	-	-	(26)	-	(26)
Netting	-	-	-	59,793 (4)	59,793
Total derivative liabilities (6)	(405)	(66,013)	(5,436)	59,793	(12,061)
Short sale liabilities:					
Securities of U.S. Treasury and federal agencies	(3,982)	(1,259)	-	-	(5,241)
Corporate debt securities	-	(4,887)	-	-	(4,887)
Equity securities	(1,917)	(36)	-	-	(1,953)
Other securities	-	(144)	(106)	-	(250)
Total short sale liabilities	(5,899)	(6,326)	(106)	-	(12,331)
Other liabilities	-	(179)	(136)	-	(315)
Total liabilities recorded at fair value	$ (6,304)	(72,518)	(5,678)	59,793	(24,707)

(1) Includes collateralized loan obligations of $740 million that are classified as trading assets.
(2) Includes collateralized loan obligations of $5.0 billion that are classified as securities available for sale.
(3) Perpetual preferred securities are primarily ARS. See Note 7 for additional information.
(4) Derivatives are reported net of cash collateral received and paid and, to the extent that the criteria of the accounting guidance covering the offsetting of amounts related to certain contracts are met, positions with the same counterparty are netted as part of a legally enforceable master netting agreement.
(5) Derivative assets include contracts qualifying for hedge accounting, economic hedges, and derivatives included in trading assets.
(6) Derivative liabilities include contracts qualifying for hedge accounting, economic hedges, and derivatives included in trading liabilities.

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Table 1: Descriptive Statistics

Table 1	Descriptive statistics							
Panel A	**High funding needs liquidity banks**							
Variable	**N**	**Mean**	**Min**	**Q1**	**Median**	**Q3**	**Max**	**Std. Dev.**
size	342	17.070	14.632	15.588	16.452	18.171	21.582	1.809
afs	342	0.149	0.000	0.096	0.136	0.192	0.524	0.086
htm	342	0.021	0.000	0.000	0.000	0.014	0.494	0.063
purch_afs	342	0.092	0.000	0.031	0.061	0.117	1.435	0.129
purch_htm	342	0.007	0.000	0.000	0.000	0.002	0.251	0.027
sec_inc	342	0.001	-0.094	0.000	0.000	0.003	0.096	0.012
diff_afs	341	0.006	-0.212	-0.009	0.006	0.021	0.214	0.036
diff_htm	199	0.005	-0.471	0.000	0.008	0.028	0.143	0.057
diff_sec	342	0.006	-0.193	-0.008	0.007	0.021	0.214	0.035
beta	342	0.049	-1.380	-0.214	-0.009	0.235	2.090	0.444
netrepo	342	0.008	-0.213	0.000	0.010	0.020	0.081	0.029
Panel B	**Low funding needs liquidity banks**							
Variable	**N**	**Mean**	**Min**	**Q1**	**Median**	**Q3**	**Max**	**Std. Dev.**
size	344	16.288	13.836	15.534	16.016	16.660	21.526	1.192
afs	344	0.211	0.009	0.132	0.185	0.253	0.773	0.117
htm	344	0.035	0.000	0.000	0.009	0.043	0.516	0.062
purch_afs	344	0.213	0.000	0.032	0.077	0.150	18.182	1.038
purch_htm	344	0.014	0.000	0.000	0.000	0.007	0.691	0.059
sec_inc	344	0.000	-0.327	0.000	0.000	0.002	0.127	0.021
diff_afs	344	0.004	-0.085	-0.008	0.006	0.020	0.059	0.022
diff_htm	262	0.007	-0.305	-0.006	0.004	0.021	0.146	0.040
diff_sec	344	0.005	-0.085	-0.008	0.007	0.022	0.059	0.022
beta	344	0.028	-1.431	-0.236	0.052	0.257	1.639	0.394
netrepo	344	0.070	-0.031	0.035	0.052	0.081	0.642	0.078

Notes: This table presents the descriptive statistics of banks by funding liquidity needs for the period 2004-2012. **Size** is the natural logarithm of total asset; afs is the book value of available-for-sale securities at year end divided by the book value of total assets of the firm; **htm** is the book value of held-to-maturity securities at year end divided by the book value of total assets; **purch_afs** refers to the purchases of investment securities classified as available-for-sale securities and made during the current fiscal year; **purch_htm** refers to the purchases of investment securities classified as held-to-maturity and made during the current fiscal year; **sec_inc** refers to sum of realized and unrealized gains and losses on investment securities classified as available-for-sale and held-to-maturity scaled by the beginning historical cost of available-for-sale and held-to-maturity securities; **diff_afs** refers to the difference between the fair values and historical costs of investment securities classified as available-for-sale scaled by the beginning of period historical cost of available-for-sale securities; **diff_htm** represents the difference between the fair values and historical costs of investment securities classified as held-to-maturity scaled by beginning historical cost of held-to-maturities securities; **diff_sec** is the sum of diff_afs and diff_htm; **beta** is the firm-year measure of liquidity beta computed using a four-factor model ; **netrepo** is the difference between the securities sold and purchased under repurchase agreements scaled by the book value of total assets

Panel C	Univariate differences			
Variable	**High funding liquidity needs**	**Low funding liquidity needs**	**Difference**	**p-value**
size	17.070	16.288	0.782	<0.0001
afs	0.149	0.211	-0.062	<0.0001
htm	0.150	0.212	-0.062	<0.0001
purch_afs	0.092	0.213	-0.121	0.03
purch_htm	0.007	0.014	-0.007	0.06
sec_inc	0.001	0.000	0.001	0.418
diff_afs	0.006	0.004	0.002	0.402
diff_htm	0.005	0.007	-0.002	0.591
diff_sec	0.006	0.005	0.001	0.626
beta	0.049	0.028	0.021	0.518

Table 2: Correlation Matrix

Table 2	Correlation matrix									
	High funding liquidity needs banks (lower diagonal) and Low funding liquidity needs banks (upper diagonal)									
	afs	**htm**	**purch_afs**	**purch_htm**	**sec_inc**	**diff_afs**	**diff_htm**	**diff_sec**	**beta**	**netrepo**
afs		**0.999**	**0.275**	**-0.116**	0.051	-0.044	0.151	-0.036	0.073	0.174
htm	**-0.144**		0.011	**0.856**	-0.077	0.081	0.061	0.041	0.010	0.078
purch_afs	0.006	-0.060		-0.002	0.030	-0.009	0.070	-0.008	**0.100**	0.065
purch_htm	-0.066	**0.128**	-0.026		-0.015	0.126	**0.074**	0.080	0.035	0.044
sec_inc	0.049	-0.023	0.017	0.022		**0.442**	**0.256**	**0.464**	**0.095**	**-0.173**
diff_afs	0.038	-0.056	0.011	-0.029	**0.303**		**0.368**	**0.982**	0.052	**-0.113**
diff_htm	0.006	0.003	0.013	0.019	0.025	**0.314**		**0.449**	0.039	**-0.193**
diff_sec	0.004	-0.017	0.004	-0.034	**0.294**	**0.949**	**0.450**		0.052	**-0.120**
beta	**-0.153**	**0.094**	**0.128**	0.044	**0.109**	**0.111**	**0.263**	**0.144**		0.025
netrepo	**0.365**	**0.422**	0.002	0.034	-0.003	**-0.110**	**-0.104**	**-0.123**	**-0.208**	

Notes: This table presents the correlation matrix of banks by funding liquidity needs for the period 2004-2012. The upper (lower) diagonal presents the information for the high (low) funding liquidity banks. The bold correlation coefficients indicate statistical significance of at least 10%. **Size** is the natural logarithm of total asset; afs is the book value of available-for-sale securities at year end divided by the book value of total assets of the firm; **htm** is the book value of held-to-maturity securities at year end divided by the book value of total assets; **purch_afs** refers to the purchases of investment securities classified as available-for-sale securities and made during the current fiscal year; **purch_htm** refers to the purchases of investment securities classified as held-to-maturity and made during the current fiscal year; **sec_inc** refers to sum of realized and unrealized gains and losses on investment securities classified as available-for-sale and held-to-maturity scaled by the beginning historical cost of available-for-sale and held-to-maturity securities; **diff_afs** refers to the difference between the fair values and historical costs of investment securities classified as available-for-sale scaled by the beginning of period historical cost of available-for-sale securities; **diff_htm** represents the difference between the fair values and historical costs of investment securities classified as held-to-maturity scaled by beginning historical cost of held-to-maturities securities; **diff_sec** is the sum of diff_afs and diff_htm; **beta** is the firm-year measure of liquidity beta computed using a four-factor model ; **netrepo** is the difference between the securities sold and purchased under repurchase agreements scaled by the book value of total assets

Table 3: Changes in Fair Value Accounting Rules and Risk Shifting

Table 3	**Changes in fair value accounting rules and risk shifting**			
	(1)		**(2)**	
	Estimate	**p-value**	**Estimate**	**p-value**
Intercept	(0.110)	0.728	(0.113)	0.697
purch_afs	**0.065**	**<.0001**	**0.088**	**0.020**
purch_htm	**0.350**	**0.017**	**0.352**	**0.006**
afs_{t-1}	(0.153)	0.426	(0.151)	0.400
htm_{t-1}	0.041	0.868	0.040	0.903
$beta_{t-1}$	(0.472)	0.011	(0.489)	0.016
size	0.009	0.538	0.002	0.888
post			0.245	0.079
post_purch_afs			(0.030)	0.376
post_purch_htm			0.055	0.925
Adjusted R^2	0.24		0.34	
N	677		677	
This table presents regression results from the estimation of Model (4) with the dependent variable the change in bank's liquidity beta. The standard errors are clustered at the bank and year levels.				

$Delta\beta^{L}$	=	Change in liquidity beta from year t-1 to year t
$Purch\_afs$	=	Purchases of investment securities classified as available-for-sale scaled by beginning total assets
$Purch\_htm$	=	Purchases of investment securities classified as held-to-maturity scaled by beginning total assets
Afs	=	Investment securities classified as available-for-sale scaled by beginning total assets
Htm	=	Investment securities classified as held-to-maturity scaled by beginning total assets
$beta$	=	Liquidity beta
$Post$	=	An indicator variable that equals 1 if the observation belongs to the fiscal period after 12/31/2007, and zero otherwise
$Size$	=	Natural logarithm of total assets

Table 4: Changes in fair value accounting rules and risk shifting conditional on funding liquidity needs

Table 4	**Changes in fair value accounting rules and risk shifting conditional on funding liquidity needs**			
	(1)		**(2)**	
	Estimate	**p-value**	**Estimate**	**p-value**
Intercept	(0.081)	0.575	(0.043)	0.756
purch_afs	**0.366**	**0.022**	**0.169**	**0.042**
purch_htm	0.282	0.763	(1.246)	0.197
afs_{t-1}	(0.173)	0.246	(0.152)	0.325
htm_{t-1}	0.038	0.913	0.151	0.668
$beta_{t-1}$	(0.472)	<.0001	(0.492)	<.0001
size	0.006	0.448	(0.002)	0.760
repo	0.021	0.533	(0.013)	0.733
repo_purch_afs	**(0.306)**	**0.056**	(0.081)	0.422
repo_purch_htm	0.086	0.927	**1.713**	**0.077**
post_purch_afs			**0.216**	**<.0001**
post_purch_htm			0.365	0.088
repo_post			1.210	0.337
repo_purch_afs_post			0.017	0.790
repo_purch_htm_post			**(0.397)**	**0.076**
Adjusted R^2	0.25		0.34	
N	677		677	

This table presents regression results from the estimation of Model (4) with the dependent variable the change in bank's liquidity beta. The standard errors are clustered at the firm and year levels.

Table 5: Changes in fair value accounting rules and risk shifting conditional on funding liquidity needs

Table 5	**Changes in fair value accounting rules and risk shifting conditional on funding liquidity needs**					
Panel A	**One-year-ahead income on investment securities**					
	(1)		**(2)**		**(3)**	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Intercept	(0.014)	0.141	(0.014)	0.151	(0.014)	0.129
diff_afs	**0.205**	**<.0001**	**0.117**	**0.003**	**0.140**	**0.058**
diff_htm	(0.013)	0.502	0.015	0.538	0.021	0.495
sec_inc_{t-1}	**0.105**	**0.021**	**0.110**	**0.014**	**0.141**	**0.002**
purch_afs	0.000	0.930	(0.000)	0.954	(0.000)	0.933
purch_htm	0.003	0.836	0.007	0.639	0.008	0.577
size	0.001	0.180	0.001	0.190	0.001	0.154
repo			0.000	0.885	0.001	0.822
repo_diff_afs			**0.248**	**0.000**	**0.458**	**<.0001**
repo_diff_htm			**(0.068)**	**0.075**	(0.061)	0.228
post					(0.001)	0.796
post_diff_afs					(0.030)	0.727
post_diff_htm					(0.013)	0.795
repo_post					**0.005**	**0.225**
repo_diff_afs_post					**(0.504)**	**0.001**
repo_diff_htm_post					0.033	0.678
Adjusted R^2	0.11		0.13		0.16	
N	460		460		490	

This table presents regression results from the estimation of Model (6) and Model (7). The dependent variable is the one-year-ahead income on investment securities (realized and unrealized). The standard errors are clustered at the firm and year levels.

Panel B	**Sum of one- and two-year-ahead income on investment securities**					
	(1)		**(2)**		**(3)**	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Intercept	(0.020)	0.097	(0.022)	0.071	(0.023)	0.051
diff_afs	**0.325**	**<.0001**	**0.197**	**<.0001**	**0.311**	**0.001**
diff_htm	0.006	0.812	0.046	0.139	**0.065**	**0.094**
sec_inc_{t-1}	0.089	0.125	**0.098**	**0.086**	**0.148**	**0.009**
purch_afs	0.000	0.980	(0.000)	0.864	(0.000)	0.829
purch_htm	0.009	0.652	0.014	0.470	0.016	0.388
size	0.001	0.134	0.001	0.110	0.001	0.078
repo			0.002	0.471	0.001	0.720
repo_diff_afs			**0.360**	**<.0001**	**0.530**	**0.000**
repo_diff_htm			**(0.100)**	**0.042**	**(0.109)**	**0.092**
post					0.000	0.933
post_diff_afs					(0.147)	0.182
post_diff_htm					(0.049)	0.445
repo_post					0.007	0.159
repo_diff_afs_post					**(0.550)**	**0.003**
repo_diff_htm_post					0.077	0.447
Adjusted R^2	0.15		0.18		0.22	
N	460		460		490	

This table presents regression results from the estimation of Model (6) and Model (7). The dependent variable is the sum of the one-year-ahead and two-year-ahead income on investment securities (realized and unrealized). The standard errors are clustered at the firm and year levels.

Panel C	**Sum of one-, two- and three-year-ahead income on investment securities**					
	(1)		**(2)**		**(3)**	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Intercept	(0.024)	0.082	(0.029)	0.045	(0.030)	0.033
diff_afs	**0.370**	**<.0001**	**0.235**	**<.0001**	**0.391**	**0.000**
diff_htm	(0.004)	0.890	0.048	0.191	0.070	0.125
sec_inc_{t-1}	**0.094**	**0.171**	0.103	0.126	0.169	0.012
purch_afs	0.000	0.983	(0.000)	0.862	(0.000)	0.798
purch_htm	0.027	0.245	0.032	0.166	**0.036**	**0.108**
size	0.001	0.111	0.002	0.075	**0.002**	**0.057**
repo			0.003	0.254	0.001	0.884
repo_diff_afs			**0.377**	**0.000**	**0.476**	**0.004**
repo_diff_htm			**(0.130)**	**0.025**	**(0.153)**	**0.045**
post					**0.001**	**0.752**
post_diff_afs					(0.207)	0.111
post_diff_htm					(0.059)	0.431
repo_post					**0.011**	**0.048**
repo_diff_afs_post					**(0.532)**	**0.015**
repo_diff_htm_post					0.083	0.490
Adjusted R^2	0.14		0.16		0.21	
N	460		460		490	

This table presents regression results from the estimation of Model (6) and Model (7). The dependent variable is the sum of the one-year-ahead, two-year-ahead, and three-year-ahead income on investment securities (realized and unrealized). The standard errors are clustered at the firm and year levels.

Table 6: Changes in fair value accounting rules and risk shifting

Table 6	**Changes in fair value accounting rules and risk shifting**	
Panel A		
	Estimate	**p-value**
Intercept	(0.097)	0.515
purch_afs	**0.089**	**0.074**
purch_htm	0.355	0.248
loans	0.053	0.848
afs_lag1	(0.164)	0.193
htm_lag1	0.045	0.849
beta1_lag1	**(0.493)**	**<.0001**
size	0.001	0.940
post	0.27	<.0001
post_purch_afs	(0.03)	0.57
post_purch_htm	(0.00)	0.997
post_loans	(0.44)	0.3105
Adjusted R2	0.32	
N	677	
Test	**F-stat**	**p-value**
post_purch_afs= post_loans	0.89	0.347
post_purch_htm= post_loans	0.22	0.641

This table presents regression results from the estimation of Model (4) with the dependent variable the change in bank's liquidity beta. In addition, I control for the changes in loans held for investment to assess their relative impact on the bank's liquidity risk. The standard errors are clustered at the bank and year levels.

Panel B	**Changes in fair value accounting rules and risk shifting conditional on funding liquidity needs**	
	Estimate	**p-value**
Intercept	(0.046)	0.869
purch_afs	0.178	0.192
purch_htm	(1.272)	0.226
loans	0.136	0.384
afs_lag1	(0.168)	0.385
htm_lag1	0.164	0.639
beta1_lag1	**(0.495)**	**0.013**
size	(0.003)	0.815
repo	0.008	0.800
repo_purch_afs	(0.090)	0.467
repo_purch_htm	**1.737**	**0.098**
repo_loans	(0.257)	0.413
post	**0.229**	**0.155**
post_purch_afs	**0.360**	**0.054**
post_purch_htm	1.205	0.281
post_loans	(0.145)	0.753
repo_post	0.036	0.631
repo_purch_afs_post	**(0.390)**	**0.037**
repo_purch_htm_post	(0.920)	0.561
repo_loans_post	(0.534)	0.342
Adjusted R2	0.32	
N	677	
Test	**F-stat**	**p-value**
repo_purch_afs= repo_loans	1.01	0.249
repo_purch_htm= repo_loans	3.03	0.06
post_purch_afs= post_loans	4.13	0.03
post_purch_htm= post_loans	0.97	0.357
repo_post_purch_afs= repo_post_loans	3.66	0.07
repo_post_purch_htm= repo_post_loans	1.31	0.289

This table presents regression results from the estimation of Model (4) with the dependent variable the change in bank's liquidity beta. In addition, I control for the changes in loans held for investment to assess their relative impact on the bank's liquidity risk. The standard errors are clustered at the bank and year levels.