The economic consequences of including fair value adjustments to shareholders' equity in regulatory capital calculations

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ABSTRACT
We investigate the economic consequences of the implementation of a particular aspect of Basel III in the U.S. Specifically, the Basel III proposal and the corresponding U.S. rule (hereafter referred to as the removal of the AOCI filter) to make the inclusion of unrealized fair value gains and losses of available-for-sale (AFS) securities in regulatory capital mandatory for all banks was highly controversial. The regulators' view that such an inclusion would result in greater bank regulatory discipline was met with the concern that the regulatory costs of such regulatory tightening would exceed any possible benefits. Specifically, opponents of this rule argue that the inclusion of unrealized gains and losses would result in unrealistic volatility in regulatory capital and would force banks to make costly changes to their investment and risk management. Using a comprehensive sample of U.S. banks we provide three pieces of evidence: First, we find that inclusion of unrealized fair value gains and losses on AFS securities for the period 2009 to 2013 would have resulted in increased volatility of regulatory capital. Second, bank share prices reacted negatively (positively) to pronouncements that increased (decreased) the likelihood that this rule would be implemented and these market reactions are strongly positively related to the relative amount of unrealized gains and losses. Third, we do not find evidence that banks affected by the AOCI filter removal (i.e., advanced approaches banks) make the costly changes in their investment behavior as argued by opponents of this rule change. In particular, affected banks do not reduce the maturity of their investment portfolio. Moreover, they do not reclassify AFS securities to the held-to-maturity category more than unaffected benchmark banks. Interestingly, our results suggest that affected banks reduce a larger percentage of their illiquid investment securities than unaffected banks. Given that we observe these changes *before* the actual implementation date of the new rule, we believe our results speak to the *ex ante* effects of fair value accounting on banks' risk taking behavior.

Keywords: Banks, Fair Value Accounting, Prudential regulation, Regulatory Capital

JEL Classifications: G21, M41

1. Introduction

In this paper we examine the economic consequences of the implementation of Basel III in the U.S. More specifically, we investigate the effects of the requirement of the "Final Rule" to include unrealized fair value gains and losses on investment securities in Tier 1 regulatory capital. Given the large size of interest rate sensitive investment portfolios on banks' balance sheets, this requirement is expected to have a major impact on banks' regulatory capital.

Under the previous U.S. regulatory capital guidelines (in force until December 2013), unrealized fair value gains and losses on available-for-sale (AFS) debt securities are filtered out of Tier 1 capital, which is commonly referred to as the "Accumulated Other Comprehensive Income (AOCI) filter". In June 2012 regulators issued three notices of proposed rulemaking (hereafter referred to as the Proposal), which, besides significant changes in the calculation of regulatory capital and risk weightings, proposed the removal of the AOCI filter for *all* banks subject to the new regulatory framework.[1] Many market observers regarded "...the removal of the AOCI filter ...[as] the biggest single issue the industry is lobbying over in terms of financial regulation"[2]. Following tremendous opposition from banks, the Final Rule, issued on July 2, 2013, provides an opt-out option for non-advanced approaches banks (i.e., generally banks with an asset size less than $250 billion) to make a one time, permanent election to continue the previous regulatory treatment of unrealized gains and losses. Advanced approaches banks (i.e., generally banks with an asset size greater than $250 billion) have to apply this rule from January 1, 2014, while non-advanced approaches banks will be affected from January 1, 2015, if they do not elect to opt out from the inclusion of AOCI in regulatory capital.

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1 Subject to the proposed rules were all banks with total assets greater than $500 million.

2 See article in Risk magazine "Banks fear capital swings if Basel III kills bond filter", 04 March 2013, citing Peter Sime, Head of Risk and Research at the International Swaps and Derivatives Association.

Bank representatives argue that this rule is likely to have a major (adverse) impact on banks' regulatory capital, which in turn, will lead to changes in banks' investment and capital strategy. Typically, banks hold significant portions of their investment portfolio in the AFS category to manage liquidity and/or to hedge interest rate risk of deposits. For example, AFS holdings at Bank of America Merrill Lynch, Citi, JP Morgan and Wells Fargo stood at $1.2 trillion at the end of the second quarter of 2012, with interest rate sensitive government or agency securities making up the bulk of that figure. Banks are concerned that when interest rates rise, it will cause a substantial hit to their Tier 1 capital.

Anticipating the regulatory capital effects arising from the removal of the AOCI filter, US banks argue that they will be forced to hold an additional capital buffer and will be discouraged from holding a pool of high-quality liquid assets for liquidity risk management purposes (ABA et al. 2012). For example, to mitigate the impact of interest rate changes on regulatory capital, banks may hold fewer interest-rate sensitive assets or invest only in securities with short maturities. Given that banks are important traders in long-term government and agency securities, this might heavily affect demand and trading in these markets.[3] Alternatively, banks may classify existing bonds out of the AFS category, and classify them as held-to-maturity (HTM) where unrealized gains and losses are not recognized. However, HTM bonds cannot be traded and this would reduce the flexibility of banks to use such investment securities for liquidity management, which in turn might affect banks' ability to lend. Specifically, they might reduce loan commitments extended to firms, because they are less able to provide liquidity on demand when firms take down the loan (Kashyap et al. 2002).

In contrast, regulators argue that the removal of AOCI filter results in a better regulatory measure that is more sensitive to banks' risk. Indeed, banks might hold substantial portions of

[3] It has been argued that this could lead to an increase in the borrowing costs of communities that rely heavily on this form of financing.

their AFS portfolio in illiquid assets. These illiquid assets especially during stressed times are likely to have illiquidity discounts (i.e., fair values below amortized cost) which under previous regulations were not recognized in regulatory capital. While such discounts might recover over time, at a given point in time, they might materialize when a bank is forced to sell the relevant asset to meet liquidity shocks (Laux 2012).

In this paper we investigate the empirical validity of banks' concerns. First, because the main concern with the removal of the AOCI filter is the resulting increase in the volatility of regulatory capital, we investigate how regulatory capital volatility would have been affected if unrealized gains and losses on AFS securities were included in the calculation of Tier 1 capital before the effective date of the Final Rule. Second, we employ event study methodology to examine capital market reactions to pronouncements leading up to the passage of the Final Rule. On the one hand, the earlier recognition of fair value losses might increase regulatory discipline of banks. On the other hand, the increased volatility of regulatory capital will likely lead to increased regulatory costs given the increased risk of breaching regulatory capital requirements (regulatory cost hypothesis). The sign and magnitude of capital market reactions will depend on the perceived benefits from greater regulatory discipline of bank risk taking and the associated costs of the higher likelihood of regulatory intervention. To the extent that investors perceive the removal of the AOCI filter, on average, as costly we should observe negative (positive) market reactions to events that increase (decrease) the likelihood of inclusion of AFS fair value gains and losses in regulatory capital.

Third, we investigate whether banks change their investment behavior in anticipation of the implementation of the Final Rule. Changes in the regulatory treatment of accounting items are expected to provide strong incentives for banks to change their real activities (Beatty 1995; Hodder et al. 2002). Our setting is particularly opportune to investigate the change in banks'

investment behavior. Specifically, we can exploit the fact that the original Proposal of removing the AOCI filter from June 2012 would have affected all banks (with >$500 million total assets), while the Final Rule from July 2013 provides an opt-out option for non-advanced approaches banks to make a one time, permanent election to continue excluding unrealized gains and losses from the calculation of regulatory capital. Thus, only advanced approaches banks will be subject to the mandatory AOCI filter removal.[4] Small banks with total assets of less than $500 million are not affected by any of the Final Rule provisions. Such a setting allows us to investigate changes in investment behavior around the Proposal date (a time of regulatory uncertainty) and around the date of the Final Rule for both advanced approaches and non-advanced banks with that of completely unaffected banks. Specifically, we examine whether banks reduce the maturity of their investment securities and change the relative amount of their total securities classified as available-for-sale and. Moreover, we test whether banks change the composition of their AFS portfolio. Specifically, banks might have incentives to reduce the level of illiquid assets (measured as the proportion of Level 3 fair value assets relative to the total AFS portfolio) whose unrealized losses recognized in the other comprehensive component of equity would be deducted from regulatory capital once the AOCI filter is removed.

Using quarterly data of U.S. banks for the period from 2009 to 2013 we find that the inclusion of unrealized fair value gains and losses on AFS securities in regulatory capital would have significantly increased the volatility of Tier 1 capital. Further, our findings indicate that capital market reactions are in line with the regulatory cost hypothesis. Specifically, we find statistically significant negative (positive) market reactions to news that increase (decrease) the likelihood of AOCI filter removal. In contrast, for our benchmark sample of insurance

[4] Non-advanced approaches banks have to make the AOCI filter opt-out election when they file the Call Report or FR Y-9 report for the first reporting period after the date upon which they become subject to the final rule. The new capital regulations for non-advanced approaches banks are effective from January 1, 2015.

companies we do not find similar market reactions, mitigating the concern that our results are driven by confounding events. Because some of our main events relate to the implementation of the whole Basel III framework, we are concerned that market reactions cannot be attributed *specifically* to the removal of the AOCI filter. However, in cross-sectional analyses, we find that market reactions are primarily associated with the magnitude of unrealized gains and losses. This finding gives further credence to the regulatory cost explanation for the observed market reaction.

Finally, we do not find that advanced and non-advanced approaches banks decrease the maturity of their investment portfolio in the Proposal period, where both groups of banks would have been affected by the AOCI filter removal, and in the Final period, where only advanced approaches banks are affected. Further, it seems that both advanced approaches and non-advanced approaches banks decrease the relative proportion of AFS securities (and, hence increase the proportion of HTM) to a similar extent both after the Proposal and Final Rule event. The similar reductions of the AFS portfolio, especially in the Final Rule period, casts doubt that these reductions are driven by the AOCI filter removal. Rather, this behavior is probably driven by banks desire to lock in unrealized gains created by the past low interest rate environment and to protect against an expected future rise in interest rates. Interestingly, advanced approaches banks significantly reduce the proportion of illiquid (Level 3 fair valued) assets in the AFS portfolio both after the Proposal and after the issuance of the Final Rule. We observe only a minor reduction of Level 3 investments for non-advanced approaches banks in the Proposal period and no further reduction in the Final Rule period. Overall, our results do not support the concerns of banks and their representatives. In fact, our findings are consistent with advanced approaches banks reducing their exposure to riskier illiquid assets in response to the removal of the AOCI filter. Given that we observe these changes *before* the actual implementation date of

the Final Rule, we believe our results speak to the *ex ante* effects of fair value accounting on banks' risk taking behavior.

Our current analyses have some limitations. First, unfortunately only a small sample of banks is affected by the mandatory AOCI filter removal. This sample represents the largest, global systematically important banks whose investment choices during the sample period might be affected by other concurrent regulations and events. Therefore, currently we cannot rule out the possibility that the more pronounced reduction in the illiquid AFS securities of advanced approaches banks' investment portfolio is driven by the generally more restrictive regulations that these banks face. However, at least regarding our finding related to illiquid AFS securities, this concern is mitigated by the fact that we do not observe similar changes in the proportion of Level 3 assets in the held-for-trading portfolio of advanced approaches banks. Second, it is debatable to what extent the sample of small banks unaffected by Basel III is a valid benchmark group. Because non-advanced approaches banks represent another benchmark for advanced approaches banks, we believe that our main findings are unlikely to be heavily affected by this issue.

Our findings contribute to the limited extant prior literature which studies the economic effects of changes in prudential regulation on management's economic decisions. To our knowledge this is the first study which documents market reactions to news about the AOCI filter removal. Moreover, by exploiting a powerful setting, our research extends the literature investigating the impact of changes in regulation on the investment behavior of banks. More generally, we contribute to the debate about the real effects of fair value accounting (e.g., Laux and Leuz 2009; Laux and Leuz 2010; Plantin et al. 2008).

The paper proceeds as follows. Section 2 delineates the accounting and the current regulatory treatment of unrealized fair value gains and losses of available-for-sale securities and

describes the events leading up to the passage of the Final Rule. Section 3 discusses the implications of the removal of the AOCI filter and the related literature, and develops the hypotheses. Section 4 describes our sample. Section 5 details our empirical approach and provides our main empirical findings. Section 6 concludes.

2. Background

2.1. Accounting for investment securities

Banks hold a significant proportion of financial assets in their investment portfolio. These are generally marketable debt securities, for example, instruments issued by the U.S. government and its agencies and government sponsored entities, but also mortgage backed securities, and to some extent equity securities. Debt securities that the bank intends and is able to hold until maturity are classified as *held-to-maturity (HTM)*. The sale of HTM securities before maturity is restricted under current accounting rules. Specifically, if "more than an insignificant amount" of HTM assets is sold, the entire HTM portfolio of debt securities has to be reclassified and subsequently measured at fair value. Given the restrictive interpretation of this rule, generally banks do not classify much of their financial assets in this category. Changes in fair value of HTM securities due to changes in interest rates, changes in credit risk, or both are generally not recognized in income. However, since the beginning of 2009 non-credit related other-than-temporary impairments (OTTIs) on HTM securities have to be recognized in other comprehensive income, if the bank has the intent and the ability to hold the asset until maturity.

The bulk of the investment portfolio is classified as *available-for-sale* (AFS). AFS securities are measured at fair value. However, unlike *held for trading* (HFT) and *fair value option* (FVO) assets, the changes in fair value of AFS were directly recognized in equity as part of the other comprehensive income (OCI). Unrealized gains are realized in income (“recycled”) when the

securities are sold or mature. Before 2009 unrealized losses were recognized in income only when management judged the losses to be "other-than-temporary" which is the case if there is significant doubt about the firm's intent or ability to hold the security until the fair value recovers (FSP FAS 115-1 and 124-1). This accounting treatment provided management with the opportunity to influence reported earnings by recognizing gains through securities sales (Beatty 1995; Beatty et al. 2002; Hunton et al. 2006; Barth et al. 2012). Moreover, in bad times, when fair values of AFS securities were below their amortized cost, banks could delay the recognition of losses in income until very late. Because of this concern in 2009 the FASB issued a new rule requiring entities to recognize credit risk-related unrealized losses in income and non-credit related losses in OCI. Therefore, since 2009 fair value losses due to changes in interest rate risk and liquidity risk are recognized in OCI, while unrealized losses related to changes in credit risk are recognized in income.

2.2. Regulatory treatment of fair value gains and losses on *available-for-sale* securities

Bank regulators' main objective is to ensure financial stability and to protect the interests of depositors who do not have the power and the ability to monitor banks. By imposing minimum capital requirements that are sensitive to the risk of banks' assets, regulators attempt to reduce banks' risk taking incentives. Specifically, capital regulations induce bank owners to raise capital and place more of their personal wealth at risk in the bank, when they invest in more risky assets (Kim and Santomero 1994). Bank regulators use accounting equity to determine regulatory capital. However, to preserve the prudential role of regulatory capital, regulators apply so-called prudential filters to adjust accounting amounts. For example, they exclude goodwill and unrealized gains that result from a deterioration of own credit risk of fair valued liabilities.

Of particular interest to our study is the prudential treatment of AFS securities. Under previous US regulations (and currently in many other countries around the world) fair value changes on AFS debt securities were excluded from the calculation of regulatory capital. Losses on AFS debt securities affected regulatory capital only when they were realized through impairment or sale. The original motivation behind this prudential treatment was to exclude (presumably temporary) unrealized fair value changes on AFS debt securities that were irrelevant for regulatory purposes if banks held the securities until maturity (Laux 2012). Indeed, during the financial crisis this favorable regulatory treatment acted as a safeguard by shielding banks' regulatory capital from unrealized losses on AFS debt securities (Laux and Leuz 2010; Badertscher et al. 2012).

However, by not considering fair value changes of AFS securities, the regulator effectively relaxes the solvency constraint. It treats AFS securities as if they were accounted at historical cost, where deterioration of underlying asset values does not lead to a transfer of control. As a result the solvency constraint has less bite which creates strong incentives for asset substitution (Lu et al. 2012). When asset prices are rising, these rules allow banks to increase their earnings and regulatory capital by selling AFS securities with large unrealized gains. In contrast, during times of depressed market values, the risk of regulatory intervention is reduced, providing banks with incentives to hold risky illiquid assets which might socially be more costly than selling them early (Diamond and Rajan 2011). As a result, while *ex post* prudential filters might dampen the impact of fair value losses on regulatory capital, *ex ante* they provide adverse incentives for excessive risk taking at the expense of depositors (more precisely deposit insurance funds and taxpayers).

In contrast to debt securities, unrealized losses on AFS equity securities are generally also deducted from Tier 1 capital. Fair value gains on AFS equity securities can be included in Tier 2

capital using a haircut to account for market illiquidity and future tax charge.[5] The more restrictive regulatory treatment of equity securities might explain the low proportion of these securities classified as AFS.[6]

The discussion above highlights that a policy action (e.g., the regulatory exclusion of unrealized losses or the reclassification option provided by the IASB in 2008) that reduces the losses of shareholders in a bad state is undesirable from an *ex ante* incentive perspective, because it increases the scope of moral hazard (Kashyap et al. 2008). Regulators have recognized this problem and future regulations require the inclusion of unrealized gains and losses on AFS debt securities in regulatory capital as outlined in the next section (Basel 2011, Final Rule 2013).

2.3. History of events leading up to the removal of the AOCI filter

The pertinent events leading to the removal of the AOCI filter for advanced approaches BHCs are shown in Table 1. In Table 1 we classify these events based on whether they increase or decrease the likelihood that the removal of the AOCI filter will be implemented in the Final Rule. On December 16, 2010, the Basel Committee issued details of the Basel III regulatory framework which was hailed as "a landmark achievement that will help protect financial stability and promote sustainable economic growth" (BCBS, 2010). Paragraph 52 of Basel III lists what banks must include in common equity Tier I. One of the elements that has to be recognized in common equity Tier I is accumulated other comprehensive income (AOCI), which contains the unrealized gains and losses of available-for-sale (AFS) securities, along with pension costs and cash flow hedges that are not included in the profit-and-loss statement. This regulatory framework was subsequently revised and the final Basel III regulatory framework, which

[5] The haircuts also vary across countries (see Bischof et al. 2011)
[6] See for an international sample of banks Fiechter and Novotny-Farkas (2014).

maintained the provision regarding the inclusion of AFS, was issued on June 1, 2011 (BCBS, 2011). Several organizations expressed concerns about the potential detrimental effect of this particular regulatory change amid fears that the Basel recommendations would be incorporated into U.S. rules implementing the Basel III framework (e.g., The Clearing House 2011). We include these two events in our analysis of capital market reactions, because investors might have had similar concerns around these dates.

Indeed, on June 7, 2012 the Federal Reserve published three notices of proposed rulemaking (NPR)[7], which proposed the removal of the AOCI filter for all banks subject to the Basel III regulatory framework, and invited interested parties to submit their comments by September 7, 2012. However, just a month after publication, the comment period was extended to October 22, 2012 'to allow interested persons more time to understand, evaluate and prepare comments on the Proposal (Federal Reserve, 2012). A news article carried on SNL Financial (Event no. 5) attributes the decision to extend the comment period to the sheer number of comment letters received by regulators. In particular, the article mentions the comment letter submitted by ISDA in which they note that 'the AOCI provision would bring the unintended consequences of increased volatility and pro-cyclicality into capital requirements' (Stovall, 2012). Such concern was shared by Thomas Curry, Comptroller of the Currency at an American Bankers Association (ABA) convention, who promised to carefully look at the impact AOCI filter removal would have on community banks (Event no.6).

[7] The three notices of proposed rulemaking (NPR) were titled Regulatory Capital Rules: Regulatory Capital, Implementation of Basel III, Minimum Regulatory Capital Ratios, Capital Adequacy, and Transition Provisions; Regulatory Capital Rules: Standardized Approach for Risk-weighted Assets; Market Discipline and Disclosure Requirements; and Regulatory Capital Rules: advanced Approaches Risk-based Capital Rule; Market Risk Capital Rule.

The concern about the possible impact the implementation of the published NPRs[8] would have on banks led the Federal Reserve, FIDIC and the OCC to issue a joint press release in which they advised interested parties that the NPRs wouldn't be implemented by the previously published effective date of January 1, 2013 (Event no.7). Notwithstanding the end of the NPR comment period and the delay in the issue of the final rule implementing the NPRs, various industry representatives continued to come out against the AOCI filter removal[9]. In February 2013, Federal Reserve Governor Daniel Tarullo was summoned to a U.S. Senate Committee on Banking, Housing and Urban Affairs meeting to update the Committee on Wall Street reforms and consumer protections. During the hearing Tarullo explained that the Federal Reserve received over 2,000 comment letters on the NPRs, most of which focused on the extent to which aspects of the proposed rules such as the removal of the AOCI filter would be burdensome for small and community banks (Event no.10).

On June 26, 2013, SNL Financial published a news article in which the impending issue of the final rules implementing the previously published NPRs was discussed. In particular, SNL Financial carried out an analysis in which it is concluded that 'the inclusion of unrealized gains and losses would have boosted regulatory capital notably…' since 'banks would have experienced median increases to their Tier 1 capital on an average of about 1.98% a quarter over the last 17 quarters beginning in the first quarter of 2009…' (Schraibman and Stovall, 2013). The Federal Reserve issued the Final Rule which removes the AOCI filter for advanced approaches banks and gives a one-time option to standard approaches banks to opt-in or out of the AOCI filter, on July 2, 2013.

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8 In particular concern about the AOCI removal proposal.

9 These included Independent Community Bankers of America (Events no.8 and no.11) and Insurer-owned banks (Event no.9).

<<Insert Table 1 around here>>

In Table 1, each news event is deemed as either increasing or decreasing the likelihood of the AOCI filter removal. Events are deemed to decrease the likelihood of AOCI filter removal if they reported opposition to the proposed rule. In most cases these news events reported events in which industry representatives came out against the removal of the AOCI filter. Conversely, events which are deemed to increase the likelihood of AOCI filter removal, are those that report progress in the implementation of the Basel III requirements.

3. Related literature and hypotheses development

In this paper we examine the empirical validity of banks' concerns. We do not determine whether these concerns are derived from an internally consistent economic theory. First, we examine whether regulatory capital would have increased prior to the rule change if unrealized gains and losses on AFS debt securities would have been recognized in regulatory capital. Second, we investigate whether investors share bank representatives concerns that the inclusion of AOCI in regulatory capital would increase regulatory intervention costs. Third, we examine whether banks subject to the removal of the AOCI filter change their investment behavior.

3.1. The potential impact of AOCI inclusion on regulatory capital volatility

We begin our investigation by reexamining Barth et al.'s (1995) analysis of the extent to which inclusion of AFS unrealized gains and losses would have increased regulatory capital volatility. Barth et al. (1995) find that for the period 1971 to 1990 U.S. banks' regulatory capital calculated using disclosed fair values is more volatile than regulatory capital based on historical cost. In our sample period fair value gains and losses on AFS debt securities are *recognized* in

accounting equity. Specifically, we examine the period between 2009 and 2013, because accounting for AFS instruments has been amended in the beginning of 2009.[10] We compare the volatility of actual Tier 1 capital ratios, *MovVola_Tier1* with the volatility of Tier 1 capital ratios that are adjusted for AFS unrealized gains and losses, *MovVola_Tier1_Unr*. *MovVola_Tier1* and *MovVola_Tier1_Unr* are both rolling standard deviations calculated over 6 quarters consisting of the current and the prior 5 quarters. Based on prior empirical evidence we expect higher volatility of regulatory capital when fair value changes are included. Therefore, we formulate the following hypothesis:

Hypothesis 1: Inclusion of unrealized fair value gains and losses on available-for-sale securities would (have) increase(d) regulatory capital volatility.

We also perform this analysis separately for advanced and non-advanced approaches banks, respectively. Specifically, bank representatives argue that smaller banking organizations do not have the means to tackle the increase in regulatory capital volatility that the inclusion of AOCI would cause. If this argument is valid, we should observe higher regulatory capital volatility for smaller banks.

3.2. Capital market reactions

3.2.1. Overall capital market reactions

Our paper is closely related to the studies by Cornett et al. (1996) and Beatty et al. (1996) which analyzed stock market reactions to an important accounting change that was likely to affect banks' book equity volatility. Specifically, in 1993 the FASB issued SFAS 115 that

[10] As noted before banks have to recognize credit-related changes in fair values of AFS debt securities in net income. Thus only fair value changes due to interest rate or liquidity fluctuations are recognized in AOCI.

required previously disclosed unrealized fair value gains and losses on investment securities (classified as available-for-sale) to be recognized in shareholders' equity. Like the regulatory change analyzed in this study, the adoption of SFAS 115 was also very controversial. While SEC and FASB argued that the standard would improve the accuracy of equity, bank representatives argued that it would induce excess volatility in equity. Both studies find negative stock market reactions around the event related to the promulgation of fair value accounting, which they attribute to wealth transfers due to changes in bond covenants and/or expected increases in regulatory costs.

In the setting analyzed by these studies it is difficult to identify the primary cause for the negative stock market reactions for at least two reasons. First, during the FASB's deliberation period of SFAS 115 it was uncertain whether regulators would include unrealized gains and losses on available-for-sale securities in regulatory capital. Hence, it is not clear to what extent investors expected regulatory intervention costs. Second, the change from disclosure to recognition of fair values could have affected firm value for a variety of reasons, such as through changes in taxes, management compensation or debt covenants (Beatty et al. 1996).

The regulatory change analyzed in this study provides a cleaner setting, where we can directly link stock market reactions to regulatory costs and benefits of the rule change. First, the regulatory change does not change the reliability of information about the firm's value, because it does not affect accounting information. Second, it does not affect managers' earnings-based compensation contracts because for accounting purposes non-credit related unrealized fair value gains and losses are still not affecting earnings. Also, the regulatory change still maintains managers' flexibility to manage earnings by selectively selling securities from the AFS portfolio. Finally, debt contracts are also unlikely to be affected to the extent that they are written on

accounting amounts rather than regulatory numbers. The primary impact of this regulatory change is in the calculation of regulatory capital.

The sign and magnitude of capital market reactions will depend on the expected net benefits of the rule change. The net benefits depend on the rule's effect on regulatory discipline of bank risk-taking, on the costs of regulatory intervention and costs related to changes in banks' behavior in anticipation of the rule change. Bank representatives argue that the benefits of the rule from limiting risk taking is low, because current accounting regulation already requires recognition of credit related losses in income, and thus regulatory capital. Unrealized gains and losses recognized in AOCI result primarily from changes in the interest rate environment and mostly reverse until the maturity of the affected instruments. Recognizing these transitory changes in regulatory capital would result in excess regulatory capital volatility that does not reflect economic reality.

Bank regulators counter that while unrealized gains and losses on AFS debt securities might be temporary in nature and reverse over a longer time horizon, unrealized losses could materially affect a banks' capital position at a particular point in time (Final Rule 2013, 62058). In addition, unrealized gains and losses might not only be attributable to changes in benchmark interest rates, but also to changes in the liquidity of AFS debt securities. Temporary price distortions due to illiquidity in markets might not be important if a bank can hold on to assets, but they can be very relevant when banks are likely to be forced to sell these assets (Laux 2012). In particular during times of financial distress liquidity risk is inextricably intertwined with credit risk. In fact, by not recognizing unrealized gains and losses in regulatory capital the current regulatory rules might have provided banks with incentives to hold on to or even increase illiquid assets in the AFS category, when disposing these assets early would have been socially more beneficial (Diamond and Rajan 2011). To the extent that investors' expect the inclusion of AOCI in regulatory capital

to limit banks' risk taking, we might observe positive stock market reactions. However, because of the put option value of deposit insurance, investors might actually benefit from banks' risk taking. In the latter case investors would react negatively to the limitation of risk taking incentives.

The inclusion of accumulated other comprehensive income represents a tightening of the regulatory constraint, and thus, *ceteris paribus* increases the likelihood of costly regulatory intervention. A particular issue of the regulatory change is that it requires the recognition of unrealized gains and losses on the asset side, but ignores offsetting effects on the liability side. Specifically, bank representatives argue that a primary purpose of AFS debt securities is to hedge against the interest rate risk associated with fixed-rate deposit liabilities, which are not measured at fair value for accounting purposes (ABA 2012, p. A-6). Thus, only including unrealized gains and losses from one leg of the hedging relationship would lead to artificial volatility in regulatory capital (see also Carey 1995). To the extent that regulators do not see through this artificial volatility, and, as a consequence, the likelihood of costly regulatory intervention increases, investors will react negatively.

The regulatory change may affect cash flows, and thus firm value, directly, if managers change their investment and risk management strategy in anticipation of the rule change. Bank representatives argue that in order to reduce the impact of the rule change on regulatory capital volatility they would shorten maturity of the investment portfolios and reclassify AFS securities into the HTM category. Shortening the maturity of securities reduces the interest income of banks. Furthermore, because selling securities from the HTM category is restricted, management's ability to manage liquidity risk will be reduced. To the extent investors anticipate these costly changes in investment behavior we would expect negative stock market reactions.

Overall, ex ante it is difficult to determine the net benefits of the regulatory change from investors' perspective. Generally, the arguments above predict negative market reactions. In addition, two recent studies find that relaxation of fair value accounting rules, and thus the relaxation of regulatory constraints, leads to positive stock market reactions during the financial crisis (Bischof et al. 2011; Bowen and Khan 2014). This evidence suggests that investors might perceive the costs associated with regulatory intervention to outweigh the benefits of greater regulatory discipline when the regulatory constraint is tightened. In line with this evidence, we expect events which increase (decrease) the likelihood of AOCI removal to be viewed negatively (positively) by market participants and events which decrease the likelihood of AOCI removal to be viewed positively by market participants. Thus our second hypothesis is:

H2: There is a negative (positive) market reaction to events which increase (decrease) the likelihood of AOCI filter removal.

3.2.2. Cross-sectional capital market reactions

A potential limitation of analyzing average capital market reactions to the above events is that they might be driven by other aspects of the new regulatory framework, and not (solely) by the removal of the AOCI filter. To mitigate this concern we also investigate whether capital market reactions vary cross-sectionally with variables that are related to the expected effects of the AOCI filter removal. As discussed above the primary regulatory capital impact of the AOCI filter removal will result from securities held in the available-for-sale category. We include two sets of variables. First, we include a set of variables that capture the characteristics of available-for-sale portfolio. Second, we include variables designed to measure the closeness to violating

regulatory capital requirements. The latter set of variables is also likely to capture effects stemming from other regulatory provisions of the Final Rule.

First, we expect that the impact of the rule change will increase with the size of the AFS portfolio. We measure *AFS_Size* as the amortized cost value of AFS securities divided by total assets averaged over the sample period. Second, we predict that the expected effects of the rule change will depend on the volatility of the fair values of available-for-sale securities. The volatility of securities' fair values is related to their interest rate sensitivity, which increases in the maturity of securities. Following Beatty et al. (1996) we measure *Maturity* as total debt securities maturing in three years or more divided by the total value of securities averaged over the sample period. Investors of banks that hold longer term maturity investment securities could react negatively because they expect an increase in volatility of regulatory capital, and, as a consequence, a higher risk of costly regulatory intervention. Moreover, we might observe market reactions, if investors expect that banks reduce the maturity of assets, which would result in lower net interest income from these securities. Further, we examine the one time effect of the rule change on the level of regulatory capital. We capture the expected change in regulatory capital using *URGL_Size*, which is calculated using the amount of unrealized gains and losses on securities recognized in equity divided by total assets averaged over the sample period. We expect a positive relation between unrealized gains and losses and signed abnormal returns.

As argued before, one of the concerns of bank representatives is that including AOCI leads to artificial regulatory capital volatility that does not reflect true underlying risk. Particularly, smaller banking institutions (e.g., community banks) argue that they use the AFS portfolio primarily to align the duration of assets with the duration of liabilities, i.e., to hedge against interest rate risk from deposit liabilities (ABA et al. 2012, p. A-6), and for liquidity management. If banks actively use AFS securities for interest rate risk and liquidity management than AFS

portfolio turnover should be high. We measure *AFS_Turnover* as the amount of proceeds from the sale of securities divided by the total amount of securities averaged for the sample period. If investors expect that the AOCI removal will incentivize bank managers to reclassify securities into the HTM portfolio, which will limit their ability of active risk management, then we should observe more pronounced market reactions for banks with high *AFS_Turnover* (i.e., a positive relation between *AFS_Turnover* and Signed abnormal returns). In addition, following Beatty et al. (1996) we include a variable capturing the sensitivity of the firm's equity value to changes in interest rates. *Exposure* is the absolute value of the coefficient on change in U.S. Federal Funds Rate in a regression of share price on market return and change in U.S. Federal Funds Rate.[11]

The expected effect of the rule change will also depend on the volatility of Tier 1 capital, *Vola_Tier1*. Banks with a greater volatility of Tier 1 capital before the rule change are expected to be affected more by the inclusion of AOCI in regulatory capital. Given that the standard deviation is a function of the mean, to be able to compare volatility across companies, *Vola_Tier1* is the standard deviation coefficient calculated as Tier 1 standard deviation over the sample period scaled by the mean Tier 1 capital. We also control for *Debt*, measured as non-deposit liabilities divided by total assets, as an additional measure of banks' riskiness.

Finally, we include *Size* measured as the logarithm of total assets. Generally, larger banks are expected to have more sophisticated risk management abilities allowing them to mitigate the impact of the regulatory change. In contrast, smaller banks have limited access to capital markets which makes it more difficult for them to raise equity and to hedge interest rate risk through the use of derivatives. However, given the huge AFS portfolios of large banks and the fact that other concurrent regulations remove the regulatory preference of large banks (i.e., of being too big to

[11] The market return used is daily CRSP equal-weighted return including dividends while the change in U.S. Federal Funds Rate is calculated as $\frac{\text{U.S.Federal Funds Rate}_t - \text{U.S.Federal Funds Rate}_{t-1}}{\text{U.S.Federal Funds Rate}_{t-1}}$

fail) market reactions might be more pronounced for large banks. Therefore, we do not make predictions on the effect of *Size*.

3.3. Changes in investment behavior

The inclusion of unrealized gains and losses from AFS debt securities might provide managers with an incentive to reduce volatility in regulatory capital. Bank representatives have argued that in order to mitigate the increase in volatility of regulatory capital they would re-classify AFS securities into the held-to-maturity category. In addition, banks could shorten the maturity of their investment portfolios to reduce their interest rate sensitivity (e.g., ABA et al. 2012).

Two earlier studies provide evidence that in response to the (potential) impact of partial fair value accounting caused by the adoption of SFAS 115 on the volatility of regulatory capital, banks altered their investment strategy. Beatty (1995) examines the change in investment behavior of bank holding companies that early adopted SFAS 115 versus those that did not early adopt. SFAS 115 required unrealized gains and losses to be recognized in equity, however, at the time of early adoption it was not yet clear whether these gains and losses would flow through regulatory capital. Yet, early adopting banks were expecting that ultimately regulatory capital would be affected. Consistent with this expectation Beatty (1995) finds a decrease in both the proportion of assets held in investment securities and the maturity of investment securities held for those that adopt early. Ultimately, regulators decided not to include unrealized gains and losses in Tier 1 capital. Following this decision, Hodder et al. (2002) find that banks altered initial portfolio allocations made in the period examined by Beatty (1995) to undo their initial over or under-classification of available-for-sale securities.

Our setting is likely to be more powerful to examine banks' investment behavior. Specifically, we can take advantage of the fact that only advanced approaches banks are subject to the Final Rule, while non-advanced approaches banks may opt-out from the inclusion of AOCI in the calculation of regulatory capital. We investigate whether banks systematically change their investment strategy in anticipation of the rule change. Based on bankers' arguments and prior empirical evidence, one might expect that banks would classify more investment securities into the HTM category. However, the Basel III liquidity framework's requirement to hold a certain level of high quality liquid assets might provide disincentives to do so, because banks are constrained to sell securities from the HTM category, i.e., the HTM portfolio is essentially illiquid. Therefore, we formulate the following hypothesis in the null form:

H3: Banks do not reclassify AFS securities into the HTM category in response to the removal of the AOCI filter.

Alternatively, banks might shorten the maturity of their investment portfolio to reduce interest rate sensitivity of regulatory capital. But this would also reduce interest rate income, which would not be in the interest of shareholders. Therefore, we formulate the next hypothesis also in the null form:

H4: Banks do not shorten the maturity of the investment portfolio in response to the removal of the AOCI filter.

Finally, we investigate whether and how banks change the composition of their AFS portfolio. On the one hand, bank representatives argue that AOCI removal will provide banks -

with disincentives to invest in high-quality liquid assets (ABA 2012). On the other hand, banks are likely to have incentives to divest illiquid assets. In particular, many banks still hold a significant amount of investments in their AFS portfolio that became troubled during the financial crisis. The fair values of these securities are often well below their amortized cost because of an illiquidity discount. In the hope of recovery of fair values banks hold such assets until maturity. As mentioned above, current accounting rules require the recognition of non-credit related OTTI to be recognized in OCI (if the entity has the intent and the ability to hold the relevant assets until maturity), but they have not been considered in the calculation regulatory capital under previous regulations. The removal of the AOCI filter would force banks to recognize all current unrealized losses and also future changes in the illiquidity discount of these instruments in regulatory capital. Therefore, banks are likely to have strong incentives to decrease the level of illiquid assets to reduce their impact on regulatory capital. Because we believe that the latter arguments have better justification than the claims of banks representatives we formulate the following related hypotheses:

H5: Banks decrease the proportion of illiquid investment securities held in the AFS portfolio in response to the removal of the AOCI filter.

4. Sample Selection

Our sample consists of 265 bank holding companies (BHCs) which are subject to the Basel III regulatory framework[12] for which return data was identified in CRSP and for which data to calculate the two variables: MovVola_Tier1 and MovVola_Tier1_Unr were identified in SNL Financial. The sample period used in this study runs from the 1st quarter of 2009 to the 4th

[12] BHCs having total assets of $500M or more are subject to the Basel III regulatory framework.

quarter of 2013. Our sample period starts in 2009, since at the beginning of 2009 the accounting for AFS securities was amended, and ends before the implementation date of the Final Rule, which is January 1st, 2014 for advanced approaches banks and January 1st, 2015 for non-advanced approaches banks. Each part of our analysis has different data requirements, and as a result in parts of the analysis, some BHCs were dropped due to limited data availability.

5. Empirical analysis

5.1. The effect of inclusion of unrealized gains and losses on regulatory capital volatility

To test our first hypothesis and analyze the impact the inclusion of fair value unrealized gains and losses would have had on the volatility of regulatory capital if it were included before the effective date of the Final Rule, we calculate two variables of rolling standard deviations. *MovVola_Tier1* is the rolling standard deviation of Tier 1 capital, while *MovVola_Tier1_Unr* is the rolling standard deviation of the sum of Tier 1 capital and net unrealized gains on AFS securities. The latter variable is intended to proxy the volatility of regulatory capital had BHCs been prohibited from applying the AOCI filter during the sample period. Both variables are calculated as the rolling standard deviation over 6 quarters consisting of the current and the prior 5 quarters. As a result of this variable construction methodology, the first 5 quarters of the sample period were dropped and the sample used to test this hypothesis essentially consists of observations taken for quarters starting from the 2nd quarter of 2010 to the 4th quarter of 2013.

The difference between the two variables of interest was calculated as the ratio of *MovVola_Tier1_Unr* to *MovVola_Tier1*. As evident from Table 2 and in line with our expectations, the inclusion of unrealized gains and losses in regulatory capital *(MovVola_Tier1_Unr)* increases the volatility of regulatory capital over the sample period. In this ambit we find that the mean *MovVola_Tier1_Unr* is around 17% larger than

MovVola_Tier1.[13] We perform a student t-test to test whether such increase is significant[14], and we find that such an increase is significant at the 1% level of significance.

<<Insert Table 2 around here>>

Given that larger BHCs may be better able to address (and possibly hedge) regulatory capital volatility we split our sample into advanced approaches and non-advanced approaches banks. The former are the larger banks having mean total assets over the same period in excess of $250B[15] while all other sample BHCs are non-advanced approaches banks. As evident from Table 2, for both groups *MovVola_Tier1_Unr* is significantly larger than *MovVola_Tier1* at the 1% level of significance.

This analysis shows that the inclusion of unrealized gains and losses in regulatory capital is not trivial and has a significant impact on bank risk. In particular, the inclusion of unrealized gains and losses is likely to result in increased risk of breaching bank regulatory capital requirements.

5.2. Capital market reactions

5.2.1. Overall capital market reactions

Given that the inclusion of unrealized gains and losses in regulatory capital is likely to significantly increase regulatory capital volatility, we expect to see significant market reactions to news about the removal of the AOCI filter. The direction of the market reaction can go both

[13] During the sample period the mean *MovVola_Tier1_Unr* is around 17% larger than *MovVola_Tier1* while median *MovVola_Tier1_Unr* is around 3.4% larger than *MovVola_Tier1*.

[14] The student t-test tests for the difference between the ratio of *MovVola_Tier1_Unr* to *MovVola_Tier1* and 1.

[15] Advanced approaches banks include State Street Corporation (Ticker: STT) which although has mean total assets <$250B over the sample period, discloses in its 10-K filings that it is advanced approaches BHC.

ways: market participants may either perceive the removal of the AOCI filter positively, in that it will give rise to greater regulatory discipline and thus constrain management risk taking, or negatively due to increased regulatory costs, in particular with respect to the increased risk of breaching regulatory capital requirements.

To be able to study the overall market reaction to the news about the AOCI filter removal we construct 3-day event windows around the events identified in Table 1. The 3-day event window covers the period starting 1 day before to 1 day after the news reaches the market. Moreover, to be better able to disentangle market reaction to news about AOCI filter removal from confounding news, we augment our sample with 82 insurance firms.[16] The AOCI filter applies to BHCs only and thus we do not expect significant market reactions (in the predicted direction) to news about the AOCI filter removal in our insurance sample.

To study the market reaction to news about the AOCI removal, similar to Beatty et al. (1996) we construct the following regression model:

$$\text{Ret}_{\text{it}} = \alpha_i + \beta_i Market\_Rtn_t + \gamma_i 5YR\_Bond\_Rtn_t + \delta_i Signed\_Event_t + \varepsilon_{it} \qquad \text{(Eq. 1)}$$

where Ret_{it} refers to the firm daily return including dividends for bank *i* and time *t;* *Market_Rtn* refers to different proxies of market return: *Value_Weighted_Rtn* or *Equal_Weighted_Rtn* which refer to the CRSP value weighted returns and CRSP equal weighted return respectively and *5YR_Bond_Rtn* refers to the return on a 5 Year Treasury Bill. *Signed_Events* is a dummy variable which takes the value of +1 when the observation is for an event that decreases the likelihood of AOCI filter removal, -1 when the observation is for an event that increases the likelihood of AOCI filter removal and 0 otherwise.

[16] Similar to BHCs we split our sample of insurance companies into 2 groups. A group consisting of insurance companies with mean total assets >$250B and a group consisting of smaller insurance companies. The former is comparable to advanced approaches BHCs, while the latter is comparable to non-advanced approaches BHCs.

<<Insert Table 3 around here>>

Table 3 provides details of the sample distribution and descriptive statistics of the variables used in this analysis.[17] Events 4 and 7, relate to delays in the promulgation of the Final Rule. Such events may be seen as either decreasing the likelihood of AOCI filter removal, in that they indicate difficulties in the preparation of the Final Rule, or increasing the likelihood of AOCI filter removal, in that they show the determination of the regulator in issuing a final rule notwithstanding the opposition to the proposed regulations. Event 13, relates to the date the final rule was implemented. While the proposed rule required AOCI filter removal for all BHCs, the final rule gave non-advanced approaches banks the option to make a one-time selection to opt-in or out of the AOCI filter removal. As the majority of BHCs in our sample are non-advanced approaches banks, we predict that on average this event decreased the likelihood of AOCI filter removal for our sampled banks.

In line with our expectations and our second hypothesis the results presented in Panel A of Table 4 indicate a significantly positive association at the 1% level of significance[18] between *Signed_Events* and *Ret*. Interestingly we do not identify such an association for insurance companies indicating that the result identified for BHCs is not due to other possible confounding news. The results of Eq.1 suggest that market participants viewed news that decrease (increased) the likelihood of AOCI filter removal positively (negatively) suggesting that the increased regulatory costs of including unrealized gains and losses in regulatory capital overrode any

[17] The sample used in studying the market reaction to news about the AOCI filter removal consisted of 265 BHCs and 82 insurance companies, which over the period 1st January 2010 to 31st December 2013 gave rise to 237,641 and 80,324 daily observations respectively.

[18] The association between *Signed_Events* and *Ret* is significant at the 1% level of significance when either *Value_Weighted_Rtn* or *Equal_Weighted_Rtn* are used as proxies for *Market_Rtn.*

possible benefits of increased regulatory discipline. Given that due to their size and importance[19] advanced approaches banks may have anticipated that AOCI filter removal will be mandatory, we re-run Eq.1 after dropping advanced approaches banks from the sample. In line with our previous results, in Panel B of Table 4 we find a statistically significant positive association between *Significant_Events* and *Ret* albeit with slightly larger t-values.

<<Insert Table 4 about here>>

The previous analysis indicates that on average there was a positive market reaction to events with news that decreased the likelihood of AOCI filter removal; however, as different events may differ in their market relevance, we run Eq. 2 where a dummy variable for each event is included in the regression.

$$\text{Ret}_{\text{it}} = \alpha_i + \beta_i Market\_Rtn_t + \gamma_i 5YR\_Bond\_Rtn_t + \sum_{k=1}^{K} \delta_{ik} Events_{kt} + \varepsilon_{it} \qquad \text{(Eq. 2)}$$

where δ_{ik} measures the effect of event k (k = 1, 2, 3, ... K) on bank i and K is the total number of events, i.e., 13.

Table 5 indicates that out of the 13 events described in Table 1, there were four events which elicited a statistically significant market reaction when either proxy[20] for market return was used in the analysis. We find a statistically significant negative association[21] between *Event_2,* which relates to the issue of the revised Basel III regulations by the Bank of

[19] Some advanced approaches banks are considered as systematically important and thus are subject to additional regulations.

[20] Two different proxies of *Market_Rtn* are used in the analysis: *Value_Weighted_Rtn*, which refers to the CRSP value weighted return and the *Equal_Weighted_Rtn*, which refers to the CRSP equally weighted return.

[21] The statistically significant negative association between *Event_2* and *Ret* is significant at the 10% level of confidence for all BHCs (Panel A Table 5) and at the 5% level of significance when advanced approaches banks are dropped from the sample.

International Settlements and thus considered to increase the likelihood of AOCI filter removal, and returns (*Ret*). Interestingly, we do not identify any statistically significant market reaction to the issue of the Proposed Rule (*Event_3)* by the Federal Reserve, suggesting that *Event_3* was anticipated by market participants as suggested by the significant result for *Event_2*.

We find three events which decrease the likelihood of AOCI removal and are statistically significantly associated with *Ret* for both *Market_Rtn* proxies. *Event_6*[22] relates to a news item published by SNL Financial which reports a speech given by the Comptroller of Currency Thomas Curry at the American Bankers Association annual convention. In his speech Curry pledges to take "a very serious look" at the way community banks will be impacted by Basel III rules; in particular rules relating to the treatment of AOCI.

A similar result was obtained for *Event_10*[23] which news event reports testimony by Federal Reserve Governor Daniel Tarullo in front of the U.S. Senate Committee on Banking, Housing and Urban Affairs. During his testimony Tarullo admits that banking agencies are aware of the strong opposition to the proposed rules; in particular the proposed treatment of unrealized gains and losses on certain debt securities. In line with our expectations the publication of the Final Rule (*Event_13*) is a market relevant event where we find a statistically significant positive association at the 1% level of significance between the event dummy and *Ret*[24]. The Final Rule gives the option to non-advanced approaches banks to make a one-time decision as to whether to opt-in or out of the AOCI filter.

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[22] We find a statistically significant positive association between *Event_6* and *Ret* at the 1% level of significance. This result is robust to the dropping of advanced approaches banks from the sample.

[23] We find a statistically significant positive association between *Event_10* and *Ret* at the 5% level of significance. This result is robust to the dropping of advanced approaches banks from the sample.

[24] This result is robust to the dropping of advanced approaches banks from the sample.

As evident from Table 5, the event returns for insurance companies contrast with that of our bank sample, which mitigate concerns that our primary findings are driven by confounding events.

<<Insert Table 5 about here>>

5.2.2. Cross-sectional analysis of abnormal returns

In the previous section we looked at the average market reaction to news events about the AOCI filter removal. However, to mitigate our concern that these market reactions are driven by other aspects of the Final Rule we examine how market reactions vary cross-sectionally. In Section 3.2.2 we discuss various AFS portfolio and bank characteristics[25] which we hypothesize influence market reaction to news and which we test in this part of the analysis. Table 6 provides descriptive statistics of the variables of interest for the 225[26] BHCs in our sample.

<<Insert Table 6 around here>>

To test the hypothesis that market reaction to news about AOCI filter removal is a function of individual AFS and bank characteristics we undertake two separate analyses. The first analysis involves a 2-stage procedure whereby in the first stage we run Eq. 1 for each individual

[25] *Turnover* is calculated as proceeds from sale of securities scaled by total securities; *Maturity* is total debt securities with maturity longer than 3 years scaled by total securities; *Capital* is total equity scaled by total assets; *Exposure* is calculated as rate sensitive assets scaled by total assets; *Debt* is non-deposit liabilities scaled by total assets; *Size* is log total assets; *AFS_Size* is the book value of AFS securities scaled by total assets; *URGL_Size* is calculated as net unrealized gains scaled by total assets while *Vola_Tier1* is the standard deviation coefficient calculated as the standard deviation of Tier1 capital over the sample period scaled by Tier1 capital.

[26] The required data to calculate the variables of interest was not available for 40 BHCs. These BHCs were dropped in this part of the analysis.

bank and in the second stage we regress the coefficient of variable *Signed_Events* (δ) for each bank (i) on bank characteristics in Eq. 3.

$$\delta_i = \alpha_0 + \beta_1 Turnover_i + \beta_2 Maturity_i + \beta_3 Capital_i + \beta_4 Exposure_i + \beta_5 Debt_i + \beta_6 Size_i + \beta_7 AFS\_Size_i + \beta_8 URGL\_Size_i + \beta_6 Vola\_Tier1_i + \varepsilon_i \quad \text{(Eq. 3)}$$

The second analysis is based on the Sefcik and Thompson (1986)[27] methodology which gives similar coefficients to the 2-stage procedure in the first analysis. The advantage of this approach is that it yields valid standard errors as it accounts for heteroskedasticity and cross-correlation of the residuals which is likely to occur when, as in our study, we have events which impact all firms in our sample at the same time. In this methodology, we create weighted-portfolio returns for each firm characteristic studied and the intercept. Thus, we create ten weighted-portfolio returns, which are then used as the dependent variables in Eq. 1. To create the weighted-portfolio of returns we create two matrices: Martix R is a t x j matrix, where t is the number of time periods in our sample period (i.e., 945 trading days) and j the number of firms (i.e., 225 BHCs) and Matrix F is a j x k matrix, where k consists of the different firm characteristics plus the intercept. Finally, the weighted-portfolio of returns is calculated as $(F`F)^{-1}F`R`$.

The results of the cross-sectional analysis are reported in Table 7. While most variables are not significant, in the results of the 2-stage cross-sectional regression (Panel A) we observe a strong positive association between the *URGL_Size* and the dependent variable (significant at the 1% level). Hence, banks with the largest amount of net unrealized gains in AOCI had the largest market reactions to news about the AOCI filter removal. These are the BHCs most affected by the inclusion of unrealized gains and losses in regulatory capital. Moreover, banks which had large net unrealized gains are likely to be the banks that have benefited most from the low

[27] See Sefcik and Thompson (1986) for a full discussion of this methodology.

interest rate environment in the past years and which are likely to be worse off in a period of increasing interest rates. Perhaps more importantly, this result suggests that the removal of the AOCI filter is a primary driver of the market reactions observed in the previous section.

We also identify statistically significant associations for *Debt* and *Size*, however such statistical significance is lost when we correct for heteroskedasticity and cross-correlation of the residuals using the Sefcik and Thompson (1986) methodology. Such a result indicates that the increasing regulatory costs in terms of the increased risk of breaching regulatory capital requirements is the overriding driver of the observed market reactions.

<<Insert Table 7 around here>>

5.3. Changes in investment behavior

In this section we study whether management changed its investment behavior to reduce anticipated increases in regulatory capital volatility following the issuance of the Proposal and Final Rule. First, we test whether banks reduce the maturity of their investment portfolio to reduce interest rate sensitivity. Second, we test whether management reclassifies AFS securities as HTM to shield regulatory capital against future changes in fair value due to changes in interest rates. Finally, we examine whether banks reduce the proportion of illiquid securities in their AFS portfolio, whose illiquidity related discounts is likely to affect regulatory capital after the removal of the AOCI filter.

To test these hypotheses we construct the following dependent variables: *AFS_Sec* is constructed as the amortized cost value of AFS securities scaled by amortized cost of total investment securities; *Weighted_Sec* is calculated as ((Debt Securities with maturity 3-5years/total securities)*3 + (Debt Securities with maturity 5-15years/total securities)*5 + (Debt Securities with maturity >15years/total securities)*15). The weightings are based on the arbitrary

assumption that the average maturity in a given maturity bucket is 3, 5, and 15 years, respectively. Our results are not sensitive to variations of these weightings. *Level3_AFS_Sec* is fair valued assets that are measured using unobservable inputs scaled by the fair value of all AFS investment securities. *Level3_AFS_Sec* captures the proportion of illiquid assets in the banks' AFS portfolio. Given that the Proposal affected all sampled BHCs, since it suggested AOCI filter removal for all banks subject to Basel III rules, while the Final Rule limited the mandatory removal of the AOCI filter to advanced approaches banks, our setting provides us with an interesting setting where we can identify the impact of particular amendments to prudential regulation on real economic decisions at different points in time. For example, to the extent that banks expected that the Proposal would be adopted in the Final Rule, we should observe changes in investment behavior for both advanced approaches and non-advanced approaches banks. In contrast, after the issuance of the Final Rule we should observe more pronounced changes in investment behavior for advanced approaches banks. To further exploit this setting, and to study the possible impact of the Proposal on the sampled banks we augment our sample with 30 BHCs[28] with total assets lower than $500M and for which Basel III does not apply. We refer to these banks as *Non-Basel* banks.

In Eq. 4 we construct two period dummies, *Proposal*, which takes the value of 1 for observations in the period between the issue of the Proposal and the publication of the Final Rule and 0 otherwise and *Final_Rule*, which takes the value of 1 for observations taken after the final rule was issued and 0 otherwise. To distinguish the impact of the Proposal and Final Rule on non-advanced approaches and advanced approaches banks separately, we construct two dummy variables: *NonAdvApproach*, which takes the value of 1 for sampled non-advanced approaches BHCs subject to the Basel III regulatory framework, and thus, which would have been affected

[28] These are BHCs for which data to calculate the required variables were available in SNL Financial.

by the AOCI filter removal after the Proposal, but not by the Final Rule; and *AdvApproach,* which takes the value of 1 for advanced approaches banks and 0 otherwise. We also include several control variables that are likely to affect banks' classification decisions. We test hypotheses 3 to 5 using the following base regression model:

$$\begin{aligned} Investment_{it} = {} & \alpha_0 + \beta_1 \text{Proposal} * \text{NonAdvApproach} + \beta_2 \text{Final\_Rule} * \text{NonAdvApproach} + \\ & + \beta_3 \text{Proposal} * \text{AdvApproach} + \beta_4 \text{Final\_Rule} * \text{AdvApproach} + \beta_5 \text{Proposal} + \beta_6 \text{Final\_Rule} + \\ & + \beta_7 \text{Basel} + \beta_8 \text{AdvApproach} + Controls + \varepsilon_{it} \end{aligned} \quad \text{(Eq. 4)}$$

where $Investment_{it}$ refers to the investment policy variables described above (i.e., *AFS_Sec, Weighted_Sec, Level3_AFS_Sec*). We include the *Controls* that have been used for the cross-sectional analysis in (Eq. 3), however, these are now calculated for the quarter.[29] We run Eq. (4) for the pooled sample of *Non-Basel*, *NonAdvApproach* and *AdvApproach* banks. In this specification *NonAdvApproach* and *AdvApproach* capture the differences in investment behavior of non-advanced approaches and advanced approaches banks, respectively, relative to *Non-Basel* banks in the period before the issuance of the Proposal. *Proposal* and *Final Rule* measure the impact of the Proposal and Final Rule, respectively, on the investment behavior of Non-Basel banks. The interaction terms capture the incremental effect of the Proposal or Final Rule on the investment behavior of *NonAdvApproach* and *AdvApproach* banks, respectively, relative to the main effect on *Non-Basel* banks.

<<Insert Table 8 around here>>

[29] In Eq.3 the control variables were calculated as the means over the sample period.

Table 8 shows descriptive statistics for the variables of interest for our pooled sample of *Non-Basel* banks, *NonAdvApproach* banks and *AdvApproach* banks, the latter two groups being subject to the Basel III regulations. The mean relative proportion of AFS securities (*AFS_Sec*) decreased from 91.4 percent to 89.8 percent in the Proposal period, and further down to 87.2 percent. Changes in the median *AFS_Sec* are only miniscule suggesting that only a subsample of banks reclassified a significant proportion of their AFS securities to the HTM category both in the Proposal and Final Rule periods. However, overall it is evident from these figures that the significance of the HTM category is only minor for most banks. The mean weighted maturity of securities (*Weighted_sec*) increased from 1.7 in the period before the Proposal date to 2 in the period after the issuance of the Final Rule. The proportion of Level 3 assets decreases first from 1.4 percent to 1.1 percent in the Proposal period, however, it increases again to 1.3 percent in the Final Rule period. Overall, these results indicate that sampled banks reduced the relative proportion of AFS securities, but not the maturity of investment securities.

Table 9 presents the results for the analysis of changes in investment behavior banks in the Proposal and Final Rule periods. If the arguments put forward by opponents of the removal of the AOCI filter are valid and banks anticipate that the Proposal would be adopted into the Final Rule, we should observe similar reactions for both non-advanced approaches (*Basel*) banks and advanced approaches (*AdvApproach*) banks in the Proposal period, i.e., a decrease in the weighted maturity of investment securities (*Weighted_Sec*) and a reduction of the AFS portfolio relative to the HTM portfolio (*AFS_Sec*). In order to make sense of the analyses presented in Table 9, the results in Panel A have to be considered in conjunction with the F-tests presented in Panel B. For example, the change in investment behavior of non-advanced approaches (*NonAdvApproach*) banks is displayed in row (1) of Panel B of Table 9. The effect of the Proposal on *NonAdvApproach* banks is calculated as the sum of the coefficients β_1 and β_5 from

Panel A Table 9. In the Proposal period *NonAdvApproach* banks appear to have increased the weighted maturity of their investment securities ($\beta_1 + \beta_5 = 0.267$ for *Weighted_Sec*, statistically significant). However, the *NonAdvApproach* banks increased maturity significantly less ($\beta_1 = -0.251$) than the benchmark group of smaller banks that are not subject to the Basel regulations (*Non-Basel* banks; $\beta_5 = +0.518$). In contrast, the *AdvApproach* banks do not seem to have significantly changed the weighted maturity of their investment portfolio ($\beta_3 + \beta_5 = 0.014$, see row (2) of Table 9 Panel B for *Weighted_Sec*). Turning to the classification of investment securities (*AFS_Sec*) we observe that while *Non-Basel* banks actually increase the proportion of investment securities classified as AFS, *NonAvdApproach* banks significantly decrease the relative proportion of AFS securities by 1.2 percent in the Proposal period. *AdvApproach* banks do not significantly reduce their AFS portfolio in the Proposal period.

Interestingly, all banks seem to have reduced the proportion of illiquid securities in their AFS portfolio in the Proposal period. Specifically, *Non-Basel* and *AdvApproach* banks reduce the proportion of Level 3 securities relative to the total AFS portfolio (*Level3_AFS_Sec*) by 1.3 percent (β_4 in Table 9 Panel A) and 1.6 percent (row (2) in Table 9 Panel B), respectively. *NonAdvApproach* decreased their illiquid securities to a far lesser extent, i.e., by 0.2 percent (row (1) in Table 9 Panel B). So far the evidence does not consistently support the arguments of the opponents of the removal of the AOCI filter, which could be either because banks did not expect that the filter removal would become part of the Final Rule given the fierce opposition following the Proposal or the filter removal does not play a significant role in banks' investment policy decisions.

In the period after the Final Rule issuance, we would expect significant changes in investment behavior only for *AdvApproach* banks, to the extent that the removal of the AOCI filter actually impacts banks' investment policy choices. Rows (3) and (4) of Table 9 Panel B

show the effect of the Final Rule on *NonAdvApproach* and *AdvApproach* banks relative to the pre-Proposal period, respectively. Rows (5) and (6) show whether banks' reactions in the two subsamples is significantly different in the Proposal period from that in the Final Rule period. Because of greater importance we focus on the discussion of the latter two rows here. Neither *NonAdvApproach* banks nor *AdvApproach* banks change the weighted maturity of their investment securities in the Final Rule relative to the Proposal period. In contrast, both *NonAdvApproach* and *AdvApproach* banks are further reducing the proportion of AFS securities (and by implication increasing the proportion of HTM securities) after the issuance of the Final Rule. Contrary to the results for *Weighted_Sec,* the results for *AFS_Sec* indicate that banks reduce the size of their AFS portfolio. Row (7) indicates whether *AdvApproach* banks' changes in investment behavior in the Final rule period relative to the pre-Proposal period are significantly from that of *NonAdvApproach* banks. While the difference for *Weighted_Sec* in row (7) is significantly negative, as discussed before, row (4) does not suggest that *AdvApproach* banks significantly reduced the maturity of their investment portfolio. The results for *AFS_Sec* indicate that both groups of banks reduce the proportion of the AFS portfolio to a similar extent, casting doubt that these reductions are driven specifically by the removal of the AOCI filter. Rather, this behavior is probably due to banks desire to lock in unrealized gains created by the past low interest rate environment and to protect against an expected future rise in interest rates.[30] Overall, the results in Table 9 do not support the concerns of bank representatives and we cannot reject hypotheses H3 and H4.

However, results suggest that *AdvApproach* banks significantly reduced the proportion of Level 3 securities in their AFS portfolio in the Final Rule period. Relative to the Proposal period, *AdvApproach* banks continue to decrease the proportion of illiquid assets by 1.3 percent (row (6)

[30] See statements made by banks in their regulatory filings, e.g., City National Corporation 2013 10K, p. A-35. See also SNL Blog from Nathan Stovall "Banks asset-liability mismatch is totally 80s" (17.03.2014).

for *Level3_AFS_Sec* in Table 9 Panel B) and they do so more significantly than *Non-Basel* banks (β_4 is negative and statistically significant) and *NonAdvApproach* banks (row (7) in Table 9 Panel B). In fact, *NonAdvApproach* banks do not reduce their *Level 3* fair value assets further following the publication of the Final Rule. Taken together, these findings support hypothesis H5 and are consistent with *AdvApproach* banks reducing their exposure to riskier illiquid assets in response to the removal of the AOCI filter.

<<Insert Table 9 around here>>

6. Conclusion

The proposal to make the inclusion of unrealized gains and losses in regulatory capital was met with significant opposition by banks. In the face of this opposition, in the Final Rule, the Federal Reserve limited the mandatory inclusion of unrealized gains and losses in regulatory capital to advanced approaches banks and gave a one-time option to non-advanced banks to either opt-in or out of the AOCI filter. This study a) analyzes the impact the inclusion of unrealized gains and losses would have had on the volatility of regulatory capital before the implementation date of the Final Rule, b) provides evidence of the market reaction to news about the removal of the AOCI filter and attempts to explain the drivers of such market reaction, and c) investigates whether these changes to prudential regulation influenced management's decisions.

We find that the inclusion of unrealized gains and losses in regulatory capital would have significantly increased the volatility of regulatory capital in the period before the actual implementation of the Final Rule. In line with the hypothesis that the inclusion of unrealized gains and losses will result in increased regulatory costs, we provide evidence of the negative (positive) association between news increasing (decreasing) the likelihood of AOCI filter

removal and returns. Further analysis shows that this market reaction is mainly driven by the relative magnitude of unrealized gains and losses. Finally, we do not find evidence that banks affected by the AOCI filter removal (i.e., advanced approaches banks) make the costly changes in their investment behavior as argued by opponents of this rule change. In particular, affected banks do not reduce the maturity of their investment portfolio. Moreover, they do not reclassify AFS securities to the held-to-maturity category more than unaffected advanced approaches banks. Interestingly, our results suggest that affected banks reduce a larger percentage of their illiquid and riskier investment securities (Level 3 fair value assets) than unaffected banks in response to the removal of the AOCI filter. Given that we observe these changes *before* the actual implementation date of the Final Rule, we believe our results speak to the *ex ante* effects of fair value accounting on banks' risk taking behavior.

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Table 1 :
Announcements concerning the removal of the AOCI filter

Event No.	Date	Source	Headline/Description of article/announcement	Incease (I)/ Decrease (D)*
1	Thursday, December 16, 2010	Bank for International Settlements	*Basel III rules text and results of the qualitative impact study issued by the Basel Committee* The Basel Committee issued details of the global regulatory standards on bank capital adequacy and liquidity.	**I**
2	Wednesday, June 01, 2011	Bank for International Settlements	*Capital treatment for bilateral counterparty credit risk finalised by the Basel Committee* The Basel Committee announced that it had completed a review and finalised the Basel III capital treatment for counterparty credit risk in bilateral trades.	**I**
3	Thursday, June 07, 2012	Federal Reserve Newswire	*Federal Reserve Board invites comment on three proposed rules intended to help ensure banks maintain strong capital positions* Issue of Notice of Proposed Rule Making to remove the AOCI filter and invitation for comment	I
4	Wednesday, August 08, 2012	Federal Reserve Newswire	*Federal Reserve Board extends comment period on three proposed capital rules rulemakings until October 22, 2012* Extension of comment period to allow interested persons more time to understand, evaluate and prepare comments on the proposals	I/D
5	Friday, August 10, 2012	SNL Financial	*Window of opportunity widens for banks to comment on Basel III* Commenting on extension of comment period and that various organisations are against removal of AOCI fitler	D
6	Wednesday, October 24, 2012	SNL Financial	*OCC will take 'very serious look' at Basel III impact on community banks* Possible exemption of community banks from Basel III proposals	D
7	Friday, November 09, 2012	Federal Reserve Newswire	*Agencies provide guidance on regulatory capital rulemakings* Delay in rule making process, which process would not be completed by 1 January 2013.	I/D
8	Tuesday, November 13, 2012	Dow Jones/Wall Street Journal`	*Ignorance isn't bliss for banks* Expressed concern by small banks about the impact of Basel III rules - Independent Community Bankers of America	D
9	Tuesday, November 20, 2012	SNL Financial	*Another insurer-owned bank seeks Shelter from oncoming regulatory storm* Impact of basel III on insurance owned banks	D
10	Monday, February 18, 2013	SNL Financial	*Tarullo to discuss proposed capital rules, shadow banking in Senate hearing* Tarullo to discuss AOCI filter in Senate hearing	D
11	Monday, March 18, 2013	SNL Financial	*ICBA's chairman-elect says community bankers are fighters, will find a way* AOCI will affect community banks badly - Independent Community Bankers of America	D
12	Wednesday, June 26, 2013	SNL Financial	*After brief stall, banks move closer to complying with Basel III* Impending final rule issue	I
13	Tuesday, July 02, 2013	Federal Reserve Newswire	*Federal Reserve Board approves final rule to help ensure banks maintain strong capital positions* Final rule issued and approved	D

* The column lists whether the news in the article/announcement increased (I) or decreased (D) the likelihood that the AOCI filter is removed.
` The same news item was identified in both the Dow Jones Newswires as well as the Wall Street Journal.

This table contains the announcement dates used in assessing the share price reaction of banks and insurance companies to news about AOCI filter removal. Event dates 1 and 2 relate to the publication of the Basel III framework while the other event dates were gathered from a search of Dow Jones Newswires, Wall Street Journal, Bloomberg, SNL Financial, Financial Times and Federal Reserve Newswire for the term 'AOCI filter' for the period 6th January 2012 to 31 July 2013. Only event dates with news that increased/decreased the probability of AOCI filter removal were kept for further analysis.

Table 2:
Descriptive statistics for *MovVola_Tier1_Unr/MovVola_Tier1*

Sample	No. banks	No. obs	25th Pctl	Mean	Median	75th Pctl	Std Dev	T-test: Mu0=1	
								t-statistic	Pr > |t|
All Sample	265	3783	0.969	1.170	1.034	1.188	0.642	16.310	<.0001
Non-Advanced approch banks	258	3678	0.969	1.169	1.032	1.182	0.649	15.794	<.0001
Advanced appraoch banks	7	105	0.975	1.220	1.141	1.335	0.358	6.307	<.0001

The table shows descriptive statistics for *MovVola_Tier1_Unr* , which is the rolling standard deviation of the sum of Tier 1 capital and Net unrealized gains and losses, scaled by *MovVola_Tier1*, which is the rolling standard deviation of Tier 1 capital. The sample period runs from 2009Q1 to 2013Q4, however given that the rolling standard deviation is calculated as the standard deviation of observations for the prior 5 quarters plus the current quarter, the first 5 quarters of the sample period were dropped from this analysis. The results of the T-test presented refer to the Student t-test and tests the null hypothesis that the mean is different from 1 (*MovVola_Tier1/MovVola_Tier1*). The sample is split into 2: advanced approaches banks consist of Bank Holding Companies with mean total assets over the sample period of >$250B while Non-advanced approaches banks consists of all other Bank Holding Companies to which Basel III applies (mean total assets >$500M).

Table 3:

Panel A: Details of the distribution of the sample used in analyzing the market reaction to AOCI filter news

Bank Holding Companies (BHCs)

Advanced Approach	No. of firms	Percent	Cumulative Frequency	Cumulative Percent
Non-Advanced approch banks	258	97.36	258	97.36
Advanced appraoch banks	7	2.64	265	100

Insurances

Total Assets	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Insurances with Total Assets <$250B	78	95.12	78	95.12
Insurances with Total Assets >$250B	4	4.88	82	100

Panel B: Details of the variables used in analyzing the market reaction to the AOCI filter news

Bank Holding Companies (BHCs)

Label	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Rtn	237641	-0.011	0.001	0.000	0.012	0.029
Value_Weighted_Rtn	237641	-0.004	0.001	0.001	0.006	0.011
Equal_Weighted_Rtn	237641	-0.004	0.001	0.001	0.006	0.010
5YR_Bond_Rtn	237641	-0.003	0.003	0.003	0.008	0.010

Insurances

Label	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Rtn	80324	-0.009	0.001	0.001	0.010	0.022
Value_Weighted_Rtn	80324	-0.004	0.001	0.001	0.006	0.011
Equal_Weighted_Rtn	80324	-0.004	0.001	0.001	0.006	0.010
5YR_Bond_Rtn	80324	-0.004	0.003	0.003	0.008	0.010

Panel A gives details of the distribution of the sample used in analyzing the market reaction to AOCI filter news. A sample of insurance companies is used as a benchmark to analyze BHCs market reaction. The sample is split into 2: advanced approaches banks consist of Bank Holding Companies with mean total assets over the sample period of >$250B while Non-advanced approaches banks consists of all other Bank Holding Companies to which Basel III applies (mean total assets >$500M). Similarly, to facilitate comparability insurance companies are split by the sample period mean total assets. Panel B gives descriptive information about the variables used in analyzing market reaction to news events about the AOCI filter removal. The *Rtn* refers to the firm daily return including dividends; *Value_Weighted_Rtn* and *Equal_Weighted_Rtn* are different measures of market return (*Market_Rtn*)and refer to the CRSP value weighted returns and CRSP equal weighted return respectively. *5YR_Bond_Rtn* refers to the return on a 5 Year Treasury Bill.

Table 4:
Analysis of market reaction to news about the AOCI removal for *Signed_Events*

$$\text{Ret}_{it} = \alpha_i + \beta_i Market\_Rtn_t + \gamma_i 5YR\_Bond\_Rtn_t + \delta_i Signed\_Event_t + \varepsilon_{it}$$

Panel A: All sample

	Value_Weighted_Rtn (BHCs)		Value_Weighted_Rtn (Insurances)		Equal_Weighted_Rtn (BHCs)		Equal_Weighted_Rtn (Insurances)	
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
Intercept	0.000	1.98 **	0.000	1.51	0.000	1.51	0.000	0.53
Market_Rtn	0.948	46.7 ***	1.163	56.62 ***	1.034	49.8 ***	1.239	58.3 ***
5YR_Bond_Rtn	-0.042	-2.46 **	-0.009	-0.63	-0.031	-1.96 *	-0.002	-0.11
Signed_Events	0.001	2.29 ***	0.000	0.04	0.001	2.84 ***	0.000	0.19
R-squared	0.130		0.338		0.137		0.337	
No. of observations	237641		80324		237641		80324	

Panel B: All sample without companies >$250B

	Value_Weighted_Rtn (BHCs)		Value_Weighted_Rtn (Insurances)		Equal_Weighted_Rtn (BHCs)		Equal_Weighted_Rtn (Insurances)	
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
Intercept	0.000	2.04 **	0.000	1.54	0.000	1.59	0.000	0.58
Market_Rtn	0.934	46.02 ***	1.137	55.37 ***	1.021	49.16 ***	1.213	57.65 ***
5YR_Bond_Rtn	-0.041	-2.39 **	-0.005	-0.34	-0.030	-1.9 *	0.003	0.17
Signed_Events	0.001	2.32 **	0.000	0.11	0.001	2.91 ***	0.000	0.28
R-squared	0.124		0.326		0.131		0.326	
No. of observations	231026		76300		231026		76300	

Panel A shows the results of the regression of company returns on market returns (*Market_Rtn*), return on 5 year Treasury bill (*5YR_Bond_Rtn*) and a dummy variable (*Signed_Events*), for all observations in the sample. Panel B shows the results of a similar regression when companies with a mean total assets larger than $250B are dropped from the sample. *Signed_Events* takes the value of 1 for event windows around events that decrease the probability of AOCI filter removal occur, takes the value of -1 for event windows around events that increase the likelihood that the AOCI filter is removed and 0 otherwise. The variable *Market_Rtn* is the *Value_Weighted_Rtn* or *Equal_Weighted_Rtn*. This analysis is carried out for Bank Holding Companies and insurance companies. Standard errors are clustered by date and *,** and *** denote a 10%, 5% and 1% level of significance respectively.

Table 5:
Analysis of market reaction to individual news about the AOCI removal

$$\mathrm{Ret}_{\mathrm{it}} = \alpha_i + \beta_i Market\_Rtn_t + \gamma_i 5YR\_Bond\_Rtn_t + \sum_{k=1}^{K} \delta_{ik} Events_{kt} + \varepsilon_{it}$$

Panel A: All BHCs

Variable	Expected sign	Value_Weighted_Rtn (BHCs)		Value_Weighted_Rtn (Insurances)		Equal_Weighted_Rtn (BHCs)		Equal_Weighted_Rtn (Insurances)	
		Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
Intercept		0.000	1.81 *	0.000	1.34	0.000	1.4	0.000	0.45
Market_Rtn		0.948	46.41 ***	1.163	56.28 ***	1.033	49.46 ***	1.239	57.88 ***
5YR_Bond_Rtn		-0.040	-2.31 **	-0.010	-0.62	-0.031	-1.92 *	-0.004	-0.24
Event_1	-	-0.001	-0.6	-0.001	-0.48	-0.002	-1.85 *	-0.003	-1.7 *
Event_2	-	-0.002	-1.87 *	0.002	2.09 **	-0.003	-1.93 *	0.001	1.29
Event_3	-	-0.002	-0.75	0.000	0.11	0.000	-0.22	0.002	0.64
Event_4	+/-	-0.001	-1.1	0.001	2.8 ***	-0.002	-1.54	0.001	0.6
Event_5	+	-0.001	-0.35	0.000	-0.06	0.000	-0.15	0.001	0.55
Event_6	+	0.004	3.29 ***	0.003	4.65 ***	0.002	8.55 ***	0.001	0.89
Event_7	+/-	0.001	1.82	0.003	2.12 **	0.001	1.11	0.003	1.88 *
Event_8	+	-0.003	-1.91 *	-0.002	-1.14	0.000	-0.35	0.000	-0.02
Event_9	+	0.000	-0.25	0.000	0.12	0.000	-0.38	0.000	0.13
Event_10	+	0.003	2.13 **	-0.001	-0.47	0.003	2.35 **	-0.001	-0.4
Event_11	+	0.001	1.86 *	0.001	6.24 ***	0.001	0.65	0.001	1.02
Event_12	-	0.000	-0.04	-0.001	-0.2	0.000	-0.32	-0.001	-0.85
Event_13	+	0.005	4.23 ***	0.000	0.02	0.005	5.37 ***	0.000	-0.12
R-squared		0.130		0.338		0.137		0.338	
No. of observations		237641		80324		237641		80324	

Panel B: All BHCs without advanced approaches banks >$250B

Variable	Expected Sign	Value_Weighted_Rtn (BHCs)		Value_Weighted_Rtn (Insurances)		Equal_Weighted_Rtn (BHCs)		Equal_Weighted_Rtn (Insurances)	
		Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
Intercept		0.000	1.87 *	0.000	1.37	0.000	1.48	0.000	0.5
Market_Rtn		0.934	45.74 ***	1.138	55.05 ***	1.020	48.83 ***	1.214	57.23 ***
5YR_Bond_Rtn		-0.039	-2.23 **	-0.005	-0.35	-0.030	-1.85 *	0.000	0.03
Event_1	-	-0.001	-0.53	-0.001	-0.55	-0.002	-1.7 *	-0.003	-1.64
Event_2	-	-0.002	-1.96 **	0.002	3.11 ***	-0.003	-2 **	0.001	1.78 *
Event_3	-	-0.002	-0.79	0.000	0.08	-0.001	-0.3	0.002	0.56
Event_4	+/-	-0.001	-1.15	0.001	2.61 ***	-0.002	-1.63	0.001	0.58
Event_5	+	-0.001	-0.34	0.000	-0.22	0.000	-0.13	0.000	0.38
Event_6	+	0.004	3.27 ***	0.003	4.07 ***	0.003	9.95 ***	0.001	0.99
Event_7	+/-	0.001	1.39	0.003	2.04 **	0.001	0.9	0.003	2.02 **
Event_8	+	-0.003	-1.87 *	-0.002	-1.18	0.000	-0.35	0.000	-0.02
Event_9	+	0.000	-0.16	0.000	0.11	0.000	-0.37	0.000	0.11
Event_10	+	0.003	2.19 **	-0.001	-0.4	0.003	2.4 **	-0.001	-0.34
Event_11	+	0.001	1.71 *	0.002	5.18 ***	0.001	0.63	0.001	1.49
Event_12	-	0.000	-0.04	-0.001	-0.24	-0.001	-0.32	-0.001	-0.93
Event_13	+	0.005	4.2 ***	0.000	0.1	0.005	5.71 ***	0.000	0.05
R-squared		0.125		0.326		0.131		0.326	
No. of observations		231026		76300		231026		76300	

Panel A shows the results of the regression of company returns on market returns (*Market_Rtn*), return on 5 year Treasury bill (*5YR_Bond_Rtn*) and a dummy variables (*Event_1 - Event_13*), for all observations in the sample. Panel B shows the results of a similar regression when companies with a mean total assets larger than $250B are dropped from the sample. *Event_1 - Event_13* refers to news events relevant to the AOCI filter removal and are described further in Table 1. *Event_1 - Event_13* take the value of 1 on the 3-day event windows around the date when the actual event takes place and 0 otherwise. The variable *Market_Rtn* is the *Value_Weighted_Rtn* or

Equal_Weighted_Rtn. Standard errors are clustered by date and *,** and *** denote a 10%, 5% and 1% level of significance respectively.

Table 6:
Descriptive statistics for all BHCs in the cross-sectional analysis

Panel A: Descriptive statistics for all BHCs in the sample

Variable	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Turnover	225	0.000	0.001	0.000	0.000	0.005
Maturity	225	0.148	0.282	0.255	0.373	0.188
Capital	225	0.090	0.104	0.102	0.119	0.025
Exposure	225	0.078	0.274	0.167	0.344	0.319
Debt	225	0.064	0.110	0.094	0.137	0.073
Size	225	13.937	15.108	14.710	15.793	1.630
AFS_Size	225	0.125	0.192	0.174	0.249	0.098
URGL_Size	225	0.000	0.002	0.002	0.003	0.002
Vola_Tier1	225	0.049	0.100	0.076	0.116	0.082

Panel B: Correlation matrix for the variables used in the cross-sectional analysis

Pearson Correlation Coefficients/ Spearman Correlation Coefficients under diagonal, N = 225 Prob > |r| under H0: Rho=0									
	Turnover	Maturity	Capital	Exposure	Debt	Size	AFS_Size	URGL_Size	Vola_Tier1
Turnover	1	-0.107	0.064	0.251	0.308	0.183	-0.036	0.114	-0.015
		0.109	0.341	0.000	<.0001	0.006	0.596	0.088	0.829
Maturity	-0.081	1	-0.096	-0.151	-0.112	-0.315	0.039	0.006	-0.023
	0.228		0.152	0.024	0.093	<.0001	0.557	0.924	0.729
Capital	0.131	-0.083	1	0.029	0.036	0.115	-0.066	0.152	-0.205
	0.050	0.215		0.668	0.594	0.085	0.326	0.023	0.002
Exposure	0.169	-0.099	-0.022	1	0.187	0.425	0.112	0.157	0.077
	0.011	0.138	0.747		0.005	<.0001	0.093	0.019	0.250
Debt	0.121	-0.144	-0.010	0.189	1	0.407	0.153	0.094	-0.064
	0.071	0.031	0.877	0.005		<.0001	0.022	0.159	0.338
Size	0.283	-0.285	0.234	0.335	0.239	1	-0.014	0.052	-0.077
	<.0001	<.0001	0.000	<.0001	0.000		0.836	0.437	0.249
AFS_Size	-0.003	0.056	-0.034	0.079	0.172	-0.036	1	0.476	-0.108
	0.968	0.401	0.616	0.237	0.010	0.586		<.0001	0.107
URGL_Size	-0.060	0.022	0.169	0.166	0.088	0.113	0.499	1	-0.067
	0.368	0.741	0.011	0.013	0.191	0.090	<.0001		0.318
Vola_Tier1	0.032	-0.021	-0.184	0.131	-0.013	-0.006	-0.104	-0.054	1
	0.637	0.756	0.006	0.050	0.844	0.933	0.118	0.423	

Panel A shows descriptive statistics for the variables used in both the 2-stage cross-sectional regression and the Sefcik and Thompson (1986) methodology. All variables are the means for the quarterly observations for each sampled firm over the sample period. *Turnover* is calculated as proceeds from sale of securities scaled by total securities; *Maturity* is total debt securities with maturity longer than 3 years scaled by total securities; *Capital* is total equity scaled by total assets; *Exposure* is the absolute value of the coefficient on change in U.S. Federal Funds Rate in a regression of share price on market return and change in U.S. Federal Funds Rate; *Debt* is non-deposit liabilities scaled by total assets; *Size* is log total assets; *AFS_Size* is the book value of AFS securities scaled by total assets; *URGL_Size* is calculated as net unrealized gains scaled by total assets while *Vola_Tier1* is the standard deviation coefficient calculated as the standard deviation of Tier1 capital over the sample period scaled by Tier1 capital. Panel B shows the correlation matrix for the variables of interest.

Table 7:
Panel A: Results of the 2-stage cross-sectional regression

	Signed_Events			
	Value - weighted (banks)		Equally - weighted (banks)	
	Estimate	t-value	Estimate	t-value
Intercept	-0.001	-0.24	-0.001	-0.21
Turnover	0.000	-0.01	0.000	0
Maturity	0.001	1.14	0.001	1.11
Capital	-0.011	-1.38	-0.011	-1.36
Exposure	-0.001	-0.78	-0.001	-0.81
Debt	-0.007	-2.18 **	-0.007	-2.21 **
Size	0.000	1.38	0.000	1.37
AFS_Size	-0.002	-0.81	-0.002	-0.8
URGL_Size	0.319	3.04 ***	0.320	3.04 ***
Vola_Tier1	0.003	1.14	0.003	1.2
R-squared	0.080		0.081	
No. of observations	225		225	

Panel B: Results of the Sefcik & Thompson (1986) methodology

Variable	Signed_Events			
	Value - weighted (banks)		Equally - weighted (banks)	
	Estimate	t-value	Estimate	t-value
Intercept	-0.001	-0.11	-0.001	-0.09
Turnover	0.000	-0.01	0.000	0.01
Maturity	0.001	0.84	0.001	0.83
Capital	-0.011	-0.76	-0.011	-0.74
Exposure	-0.001	-0.66	-0.001	-0.7
Debt	-0.007	-1.45	-0.007	-1.49
Size	0.000	0.59	0.000	0.55
AFS_Size	-0.002	-0.62	-0.002	-0.61
URGL_Size	0.319	1.91 *	0.320	1.92 *
Vola_Tier1	0.003	0.47	0.003	0.5
No. of observations	945		945	

Panel A shows the results of the 2-stage cross-sectional regression where the dependent variable is the coefficient of the firm returns on market return (*Mkt_Rtn* - where it is the *Value_Weighted_Rtn* or *Equal_Weighted_Rtn*), 5 year Treasury Bill return (*5YR_Bond_Rtn*) and a dummy variable *Signed_Events*. Panel B shows the results of the Sefcik and Thompson (1986) methodology. In Panel A we have 225 observations as we have one observation for each of the sampled firms while in Panel B we have 945 observations, since by construction the Sefcik and Thompson (1986) methodology produces weighted returns for each trading day in the sample period (i.e., 945 trading days). All variables are the means for the quarterly observations for each sampled firm over the sample period. *Turnover* is calculated as proceeds from sale of securities scaled by total securities; *Maturity* is total debt securities with maturity longer than 3 years scaled by total securities; *Capital* is total equity scaled by total assets; *Exposure* is the absolute

value of the coefficient on change in U.S. Federal Funds Rate in a regression of share price on market return and change in U.S. Federal Funds Rate; *Debt* is non-deposit liabilities scaled by total assets; *Size* is log total assets; *AFS_Size* is the book value of AFS securities scaled by total assets; *URGL_Size* is calculated as net unrealized gains scaled by total assets while *Vola_Tier1* is the standard deviation coefficient calculated as the standard deviation of Tier1 capital over the sample period scaled by Tier1 capital. *,** and *** denote a 10%, 5% and 1% level of significance respectively.

Table 8:
Descriptive statistics for the multivariate analysis of banks' investment behavior

Panel A: Observations for all BHCs for the period pre-Proposal

Variable	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Weighted_Sec	2155	0.694	1.726	1.339	2.380	1.578
AFS_Sec	2155	0.916	0.914	0.999	1.000	0.169
Level3_AFS_Sec	2155	0.000	0.014	0.000	0.007	0.045
Turnover	2155	0.000	0.002	0.000	0.000	0.012
Capital	2155	0.084	0.100	0.099	0.116	0.026
Debt	2155	0.062	0.114	0.096	0.150	0.079
Size	2155	13.771	14.925	14.540	15.678	1.672
URGL_Size	2155	0.004	0.010	0.012	0.018	0.020

Panel B: Observations for all BHCs for the period after the issue of the Proposal but before the issue of the Final Rule

Variable	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Weighted_Sec	971	0.839	1.982	1.516	2.716	1.730
AFS_Sec	971	0.852	0.898	0.999	1.000	0.181
Level3_AFS_Sec	971	0.000	0.011	0.000	0.005	0.035
Turnover	971	0.000	0.001	0.000	0.000	0.007
Capital	971	0.090	0.104	0.104	0.118	0.026
Debt	971	0.055	0.099	0.082	0.128	0.069
Size	971	13.823	14.973	14.560	15.709	1.679
URGL_Size	971	0.002	0.011	0.012	0.019	0.037

Panel C: Observations for all BHCs for the period after the issue of the Final Rule but before its implementation date

Variable	N	25th Pctl	Mean	Median	75th Pctl	Std Dev
Weighted_Sec	488	0.840	2.010	1.600	2.817	1.662
AFS_Sec	488	0.794	0.872	0.988	1.000	0.200
Level3_AFS_Sec	488	0.000	0.013	0.000	0.005	0.044
Turnover	488	0.000	0.001	0.000	0.000	0.007
Capital	488	0.090	0.104	0.105	0.118	0.024
Debt	488	0.047	0.088	0.075	0.123	0.081
Size	488	13.827	14.992	14.590	15.789	1.682
URGL_Size	488	-0.010	0.000	-0.002	0.004	0.071

Descriptive statistics for the variables used in the multivariate analysis of banks' investment behavior (Table 9). In this analysis our sample was augmented with 30 small BHCs for which Basel III does not apply. These banks are used as a benchmark group for the non-advanced approaches and advanced approaches banks. *AFS_Sec* is the amortized cost value of AFS securities scaled by the amortized cost value total investment securities; *Weighted_Sec* is calculated as ((Debt Securities with maturity 3-5years/total securities)*3 + (Debt Securities with maturity 5-15years/total securities)*5 + (Debt Securities with maturity >15years/total securities)*15); *Level3_AFS_Sec* is fair value assets that are measured using unobservable inputs scaled by AFS investment securities; *Turnover* is calculated as proceeds from sale of securities scaled by total securities; *Capital* is total equity scaled by total assets; *Exposure* is the absolute value of the coefficient on change in U.S. Federal Funds Rate in a regression of share price on market return and change in U.S. Federal Funds Rate; *Size* is log total assets; while *URGL_Size* is calculated as

net unrealized gains and losses scaled by total assets. *,** and *** denote a 10%, 5% and 1% level of significance respectively.

Table 9:
Results for Changes in Investment Behavior

Panel A: Results for Changes in Investment Behavior

Coefficient	*Variable*	**Weighted_Sec** Estimate		t-value	**AFS_Sec** Estimate		t-value	**Level3_AFS_Sec** Estimate		t-value
	Intercept	6.963	***	23.58	1.076	***	37.84	-0.058	***	-7.44
β1	Proposal*NonAdvApproach	-0.251	**	-2.56	-0.032	***	-3.24	0.012		1.72
β2	Final_Rule*NonAdvApproach	-0.240	***	-3.35	-0.045	***	-5.5	0.015	**	2.22
β3	Proposal*AdvApproach	-0.504	***	-4.63	-0.028	**	-2.45	-0.003		-0.43
β4	Final_Rule*AdvApproach	-0.564	***	-8.44	-0.045	***	-5.93	-0.012	*	-2.03
β5	Proposal	0.518	***	4.63	0.019	**	2.24	-0.013	*	-1.81
β6	Final_Rule	0.530	***	8.1	0.000		0.02	-0.017	**	-2.29
β7	Basel	0.735	***	8.69	0.028	***	3.64	-0.019	**	-2.58
β8	AdvApproach	2.036	***	13.36	0.086	***	8.42	0.009		1.15
	Controls	Yes			Yes			Yes		
	Adjusted R-squared	0.088			0.03			0.104		
	No. of observations	3614			3614			3614		

Panel B: Joint coefficient tests (F-Tests)

	F-Tests	Weighted_Sec			AFS_Sec			Level3_AFS_Sec		
		Sum of coeff.	F-stat	Prob > F	Sum of coeff.	F-stat	Prob > F	Sum of coeff.	F-stat	Prob > F
	Effect of Proposal									
(1)	NonAdvApproach Banks (H0: β1+β5=0)	0.267	46.1	0.00	-0.012	11.1	0.00	-0.002	3.7	0.07
(2)	AdvApproach Banks (H0: β3+β5=0)	0.014	0.1	0.72	-0.008	1.6	0.23	-0.016	8.6	0.01
	Effect of Final Rule									
(3)	NonAdvApproach Banks (H0: β2+β6=0)	0.290	181.4	0.00	-0.045	335.1	0.00	-0.002	3.5	0.08
(4)	AdvApproach Banks (H0: β4+β6=0)	-0.034	1.0	0.33	-0.045	145.4	0.00	-0.029	71.7	0.00
	Effect of Final Rule versus Proposal	**(3)-(1)**			**(3)-(1)**			**(3)-(1)**		
(5)	NonAdvApproach Banks (H0: β1+β5=β2+β6)	0.023	0.3	0.59	-0.032	109.3	0.00	-0.001	0.2	0.66
		(4)-(2)			**(4)-(2)**			**(4)-(2)**		
(6)	AdvApproach Banks (H0: β3+β5=β4+β6)	-0.048	2.8	0.12	-0.037	43.3	0.00	-0.013	5.7	0.03
	Effect of Final Rule NonAdvApproach versus AdvApproach Banks	**(4)-(3)**			**(4)-(3)**			**(4)-(3)**		
(7)	H0: β4=β2	-0.324	208.6	0.00	0.000	0.0	0.98	-0.026	88.3	0.00

In this analysis our sample was augmented with 30 small BHCs for which Basel III does not apply. These banks are used as a benchmark group for non-advanced and advanced approaches banks. *AFS_Sec* is the amortized cost value of AFS securities scaled by the amortized cost value total investment securities; *Weighted_Sec* is calculated as ((Debt Securities with maturity 3-5years/total securities)*3 + (Debt Securities with maturity 5-15years/total securities)*5 + (Debt Securities with maturity >15years/total securities)*15); *Level3_AFS_Sec* is fair value assets that are measured using unobservable inputs scaled by AFS investment securities; *Proposal* is a dummy variable which takes the value of 1 for quarterly observations taken after the proposal was issued but before the issue of the Final Rule, and 0 otherwise. *Final_Rule* is a dummy variable which takes the value of 1 for observations taken after the Final Rule was published and 0 otherwise. *NonAdvApproach* is a dummy variable which takes the value of 1 for firms for which Basel III is applicable and which are non-advanced approaches banks, and 0 otherwise. *AdvApproach* is a dummy variable which takes the value of 1 for advanced approaches banks, and 0 otherwise. The above analysis was undertaken with the following controls: *Maturity, Capital, Debt, Size, URGL_Size, Vola_Tier1* and *Weighted_Sec*. The latter control was substituted with *AFS_Sec* when *Weighted_Sec* was the dependent variable. The

results for these controls are not presented to facilitate readability. Panel B shows the results of joint coefficient tests from Panel A. *,** and *** denote a 10%, 5% and 1% level of significance respectively.