

Responding to Regulatory Uncertainty: Evidence from Basel III

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Abstract

This paper examines how firms respond to *proposed* regulation. Specifically, we utilize the time period over which banking authorities discussed, adopted, and implemented Basel III to examine how banks responded to the proposed regulatory framework. We find that banks were not only quick to lobby rule makers against the proposal, but that they also simultaneously altered their business models and made strategic financial reporting changes in response to it. We also provide evidence that banks were more likely to make these anticipatory changes when they: 1) benefitted more from signaling an early commitment, or 2) had less uncertainty about whether they would be subjected to the regulation. Taken together, our findings indicate that firms' incentives lead them to simultaneously respond through multiple channels when faced with regulatory uncertainty.

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1. Introduction

Prior research shows that firms immediately respond to potential regulation by lobbying rule makers in an attempt to alter the terms of the regulation toward the firm's own economic interests (Zimmerman and Watts 1978, Deakin 1989). However, little is known about whether firms take actions to implement these proposed regulatory changes or whether they wait until the regulation is implemented. In this paper, we utilize the time period over which rule makers discussed, adopted, and implemented the Third Basel Accord ("Basel III) to examine if, when, and through which channels U.S. banks responded to the proposed regulation. Our primary finding is that the banks targeted by the proposal were not only quick to lobby rule makers against it, but that they simultaneously altered their business models and made strategic financial reporting changes to comply with it. We also provide evidence that banks were more likely to make these anticipatory changes if they: 1) benefitted more from signaling an early commitment, or 2) had less uncertainty about whether they would be subjected to the regulation.

An inherent challenge of studying how firms respond to proposed regulation is identifying a setting where the proposed regulation is clearly stated, has the potential to materially impact firms' operations, and allows researchers to observe the channels through which firms may respond. The initial Basel III consultative document, released in December 2009, included a provision that targeted bank reliance on the originate-to-distribute ("OTD") lending model. This lending model was not only a significant contributor to the onset of the recent financial crisis (Acharya and Richardson 2009; Crotty 2009; Allen and Carletti 2010), it is also central to many banks' operations. The MSR provision included in Basel III called for an increase in the risk-weighting of mortgage-servicing rights ("MSRs") to 250% from their

previous 100% risk-weighting *and* to cap a bank's MSR's at 10% of its Tier 1 capital. These proposed changes threatened to increase the regulatory costs associated with holding MSR's by approximately 63% *before* taking the 10% limitation into consideration (Mortgage Bankers Association 2012). Assuming that the 10% limitation was breached, the increase in regulatory costs would be considerably higher than 63%. We utilize this 10% bright-line threshold to capture the differential costs and incentives faced by banks above and below the threshold.

Upon release of the consultative document, banks had the option to wait until the regulatory process was complete to ensure that they would not incur costs complying with an uncertain standard that was not yet effective. However, in exercising that option, these banks were also foregoing several benefits associated with early adoption. These benefits included: having additional time to make the required changes, spreading the transition costs over an extended period of time, and sending a valuable signal to regulators and investors that the firm is compliant with a more stringent set of standards (Akerlof 1970, Bernanke 1983, Dixit and Pindyck 1994).

On the other hand, banks could obtain these benefits by taking immediate actions to respond to the proposed regulatory terms but incur the risk of adopting a rule that may continue to change. In our setting, banks could do this through three primary channels: (1) slow the creation of new MSR's by reducing their use of the OTD lending model, (2) reduce the amount of existing MSR's by selling a portion of their mortgage servicing portfolio, or (3) decrease the valuation of their MSR's by using the discretion afforded to them under fair value accounting rules (Altamuro and Zhang 2013). The fact that each of these three channels is costly to firms,

and observable to researchers, makes Basel III a powerful setting to conduct a comprehensive examination of our research question.¹

We begin our empirical analysis by examining whether banks above the 10% threshold were more likely than other banks to lobby against the MSR provision. Because prior research documents that a firm's lobbying efforts are strategically aligned with its own incentives, this analysis is also useful in validating our identification strategy. That is, if the banks above the 10% threshold feel more regulatory pressure from the MSR provision then we would expect them to be more likely to lobby against the provision relative to other banks. Consistent with this expectation, we examine more than 2,800 comment letters received by the Basel Committee and the Federal Reserve during the rule-making process. We find that, relative to other banks, banks above the 10% threshold were more likely to submit comment letters that opposed the MSR provision.

We then use the 10% threshold to create a difference-in-difference research design that examines whether the banks above the threshold acted differently than other banks following the announcement of Basel III. To do so, we divide the post-announcement period into three distinct time periods, namely: 1) "Basel", 2) "FedReserve", and 3) "Adopted".² Consistent with affected banks taking a multi-faceted, simultaneous response, we find that the banks above the threshold:

¹ We refer the reader to Section 3.1 for a more detailed discussion of this setting, including a discussion of the costs associated with each of the channels available to respond to this particular provision.

² These dates are defined as follows: the Basel time period begins after the Basel Committee released the initial consultative document for Basel III (December, 2009) and ends when the details of the regulatory standards were agreed upon by the Basel Committee's oversight body (December, 2010). The FedReserve period then begins and extends through the date that the Federal Reserve approved a final rule based on the Basel Committee's proposed framework (June, 2013). The Adopted period then begins and extends through the final mandatory compliance date for FDIC-supervised banks (January 1, 2015). Table 1 provides a more detailed description of the various regulatory announcements related to Basel III.

1) reduced their use of the OTD model to a greater extent, 2) had larger declines in the amount of mortgages that they were servicing and 3) had larger declines in the valuation multiples applied to their mortgage servicing portfolios. Additionally, we find that this reaction generally intensified throughout each of the three post-announcement periods. Finally, we find that approximately 50% of banks' reduction in their MSR to Tier1 capital ratios occurred prior to the Federal Reserve officially adopting the regulation.

While our results indicate that firms quickly respond to regulatory proposals through multiple channels, it is not obvious which firms would make these costly changes to comply with regulations that have not yet been enacted. To better understand the incentives for such behavior, we reference theories related to investment under uncertainty that frame the investment timing decision as a choice between having the benefit that arises from early commitment or the benefit of having the additional information (Bernanke 1983, Dixit and Pindyck 1994). Considering this framework, we perform cross-sectional tests that exploit variation in public vs. private banks and bank size. The results of these tests suggest that the anticipatory response was concentrated in banks that: 1) benefitted more from signaling an early commitment, or 2) had less uncertainty about whether they would be subjected to the regulation.

Our study makes several contributions to the literature. First, we provide evidence that firms' incentives may lead them to respond concurrently across multiple channels when faced with regulatory uncertainty. While prior research shows that firms immediately respond to proposed regulation by lobbying rule makers to alter the terms towards the firm's own economic interests (Zimmerman and Watts 1978, Deakin 1989), our findings suggest that firms do not wait until the uncertainty is resolved before taking actions to comply with the proposal.

Second, our study highlights that the appropriate date for an event study may be the announcement of the regulation rather than its adoption or implementation. While many studies use changes in regulation as an exogenous shock in quasi-experimental research designs (Larker and Rusticus 2010), our finding that firms take immediate actions to comply with a proposed regulation indicates that such a design would understate the regulation's estimated impact. Given that economic effects are of first-order importance when examining the effects of regulation (Leuz and Wysocki 2015), our study urges researchers to carefully consider whether policymakers signaled, leaked, or otherwise released information related to the regulation in order to avoid false inferences about the significance and/or magnitude of the regulation being studied (MacKinlay 1997; McWilliams and Siegel 1997).

Third, we contribute to the fair value accounting literature by providing empirical evidence that managerial incentives can significantly influence an asset's reported fair value. Our finding that MSR valuations decreased for banks above the 10% threshold when Basel III was proposed combines with Barth et al. (2012) and Dechow et al (2009) to dispel the widespread belief that fair value accounting precludes firms from manipulating earnings and/or regulatory capital (Healy and Wahlen 1999). However, unlike those prior studies which examine total accruals, our study focuses on a specific accrual to examine accrual-based earnings management (Graham et al. 2005). By examining a specific accrual, rather than aggregate accruals, our study is better designed to identify the discretionary component (McNichols 2000).

Finally, our study joins others in providing regulators with timely information about the impact of Basel III (e.g., Angelini et al. 2011; Repullo and Saurina Salas 2011). Specifically, we show that banks responded by making significant operational and financial reporting changes well in advance of the implementation date. Further, by showing that banks used their financial

reporting discretion to lower the MSR valuations after the proposal of Basel III, our study raises concerns that banks were able to circumvent a portion of the business model changes intended by the new regulation. Given the importance of this reform, and the limited research to date, we join Beatty and Liao (2013) in calling for additional research on this topic.

2. Background

2.1 Related Research

Regulatory uncertainty arises due to the unpredictable actions of governmental agencies or regulatory bodies that create and enforce regulations (Birnbaum 1984). Prior research has generally concluded that firms lobby regulatory agencies based on their own self-interests to minimize negative economic consequences that might impact the firm if the proposed rule were to be implemented (Watts and Zimmerman 1978, Deakin 1989, Johnston and Jones 2006). While regulators commonly allow 30 to 60 days for constituents to comment on the proposals, firms face much longer periods of uncertainty while their comments are considered and debated prior to the issuance of the final rule.³

Firms faced with proposed regulation must decide how they will respond to the uncertainty that exists during the rulemaking process. In making this decision, firms weigh the benefits of an early commitment versus the benefits of waiting for additional information to be revealed (Bernanke 1983, Dixit and Pindyck 1994). Given that firms' lobbying efforts are often

³ For example, we examined all final rules issued by the SEC between 2001 – 2011 from the SEC's website and found that the average time between a rule proposal and its final date was 313 days. We also found that 29.7% of the rules issued had rule making processes in excess of one year.

able to influence regulatory outcomes (Bozanic et al., 2012), firms may rationally place significant value on the option to wait for additional information to be revealed. Consistent with firms highly valuing this option, McDonald and Siegel (1986) use simulations to show that even moderate amounts of uncertainty can double a firm's required rate of return when making investment and scrapping decisions. Bloom et al. (2007) extend this finding by providing evidence that this preference to wait for the additional information extends to instances where the costs incurred from an early response are partially reversible. Further evidence of this relation, that uncertainty sharply reduces firms' investment levels, is also found in several recent empirical papers within the economics and finance literature (e.g., Fernandez-Villaverde et al. 2015, Born and Pfeifer 2014, Fabrizio 2012, Julio and Yook 2012).

A recent paper in this literature, Baker et al., (2015), has been particularly influential in that it develops a proxy for policy-related economic uncertainty. The authors show that this measure spikes following the bankruptcy of Lehman Brothers in October 2008, and remains at an elevated level throughout much of the credit crisis that followed. Using this measure, Gulen and Ion (2015) estimate that two-thirds of the drop in corporate investments observed during the recent financial crisis can be attributed directly to policy-related uncertainty. Gissler et al. (2016) also provide evidence that regulatory uncertainty had a large impact during this time period by showing that banks facing greater regulatory uncertainty issued fewer loans (and in smaller amounts). These studies combine to indicate that the uncertainty introduced in the aftermath of the financial crisis led firms to highly value the option to postpone their investment decisions.

Firms that take a wait-and-see approach when responding to proposed regulation remove the risk that they incur unnecessary costs by complying with standards that ultimately will not apply to them. However, as noted previously, they do so at the expense of being able to realize

the benefits associated with early commitment. These benefits include, but are not limited to: having additional time to make the required changes, avoiding the scrutiny of regulators, and spreading the transition costs over an extended period of time. Further, firms responding early are able to send a valuable signal to regulators and investors that the firm is compliant with a more stringent set of regulatory standards (Akerlof 1970). Particular to the financial crisis, Ben Bernanke noted that “*out of maybe the thirteen, thirteen of the most important financial institutions in the United States, twelve were at risk of failure.*” Accordingly, in this highly uncertain environment, banks may have placed significant value on the option to send a positive signal related to their financial health and stability.

3. Research Design and Data

3.1 Research design

The objective of this paper is to examine how firms respond to proposed regulation. To answer these questions in an idealized experimental setting, we would prefer to have two randomly selected groups of firms that are identical in every respect except that one group is subject to proposed regulation (treatment group) while the other group is not (control group). Because we are unable to construct such a randomized experiment, we use a difference-in-difference research design that is less susceptible to omitted correlated variable problems than many other research designs. We also include firm fixed-effects in all regressions to further reduce the possibility that our results are driven by omitted correlated variables (Amir et al. 2015). Finally, we utilize a balanced panel of firms to avoid concerns that our results are driven by changes in the composition of the two groups (Shadish et al. 2002). The theoretical strength of our research design is that alternative explanations for our empirical findings must be that changes occurred in one group but not the other at the same time as the treatment.

Our use of this research design requires us to identify a setting in which a proposed regulation threatens to impose differing levels of costs on firms. To capture these differential costs, we utilize a single provision included in the proposal of Basel III.⁴ This provision proposed that all mortgage-servicing-rights (“MSRs”) be deducted from Tier 1 capital, with a subsequent revision proposing to limit MSRs to 10% of Tier 1 capital *and* increase their risk-weighting from 100% to 250% (Basel Committee 2009, 2010a, 2010b). These proposed changes threatened to increase the regulatory costs associated with holding MSRs by an estimated 63% *before* taking the 10% limitation into consideration (Mortgage Bankers Association 2012). Assuming the 10% limitation is breached, the increase in the new regulatory costs would be considerably higher than 63%.⁵ This provision allows us to examine our research question because it gives banks above the 10% threshold a much larger incentive to reduce their MSRs relative to other banks that are below the 10% threshold. Accordingly, we divide the value of each bank’s MSRs by an estimate of its Basel III Tier 1 capital as of December 31, 2009 and set an indicator variable (*RegPressure*) equal to one if this ratio exceeds 10%, zero otherwise.⁶

INSERT FIGURE 1

⁴ Basel III was proposed with the purpose of establishing a global regulatory framework that would strengthen the stability of the financial system by increasing bank liquidity and decreasing leverage (Wellink 2011). The magnitude of the changes included in the proposal of Basel III and the lengthy regulatory process in the United States combined create a scenario in which U.S. banks would not be required to implement Basel III until several years after the proposal. However, industry experts estimated that “*more than two-thirds of [the impact to ROE from Basel III] has already been reflected in current ROE levels, as many banks have anticipated regulatory demands and reached Basel III requirements before the deadline*” (Boston Consulting Group 2013).

⁵ Appendix B provides a simple example from the Mortgage Banking Association’s comment letter to the Federal Reserve that details how the proposed changes result in a 63% increase in the regulatory capital costs associated with holding MSRs in the proposed Basel III environment.

⁶ Because Basel III was not yet enacted for the vast majority of our study, we are unable to use the bank’s self-reported Tier 1 capital under Basel III for this calculation. Rather, we estimate this amount by using the calculation outlined in Federal Reserve testimony before the US banking committee (Gibson 2012).

Having created a variable that potentially captures the differential pressure applied to banks from the proposed regulation, we then divide Basel III's post-announcement period into three separate time periods to determine at what point during the regulatory process banks began to respond to the proposed regulation. Specifically, we use key dates in the regulatory process (selected from Table 1) to create three distinct post-announcement periods, namely: 1) "*Basel*", 2) "*FedReserve*", and 3) "*Adopted*". The *Basel* time period begins after the Basel Committee released the initial consultative document for Basel III (December, 2009) and ends when the details of the regulatory standards were agreed upon by the Basel Committee's oversight body (December, 2010). The *FedReserve* period begins immediately after the *Basel* period ends and extends until the date that the Federal Reserve approved a final rule based on the Basel Committee's proposed Basel III framework (June, 2013). The *Adopted* period begins immediately after the *FedReserve* period ends and extends through the final mandatory compliance date for FDIC-supervised banks (January 1, 2015). We then create indicator variables that take the value of one if a bank's reported financial information falls within one of these periods, zero otherwise. The interaction of any of these three time periods with the *RegPressure* variable can then be used as an independent variable in our difference-in-difference design to capture the treatment effect as of that period of time.

INSERT TABLE 1

This setting has several features that make it an attractive one to answer our research question. First, we are able to observe political, operating, and financial reporting decisions related to MSRs that banks made in the wake of the proposed regulation. Specifically, we are able to examine the content of their comment letters submitted to rule makers. We are also able to observe whether banks' business models were altered in ways that would reduce their MSRs.

Specifically, banks could: 1) reduce their use of the OTD lending model in order to allow runoff of their MSR portfolio, or 2) sell their servicing portfolios to another party.⁷ Lastly, banks may desire to maintain their existing business model but avoid their exposure to the proposed regulation. In our setting, we are able to examine whether banks pursue this behavior because MSRs are primarily accounted for as Level 3 assets and thus require management inputs to determine their valuation (Altamuro and Zhang 2013).⁸ Because these MSR valuations (a subjective amount) can be compared to the amount of loans serviced (an objective amount), we are able to make inferences about strategic financial reporting by observing whether the ratio of these two amounts exhibit unusual behavior after the announcement of Basel III.

Second, each of the operational and financial reporting responses outlined above would be expected to lower bank profitability. This is useful in our identification strategy because profit-maximizing banks would be unlikely to voluntarily take these actions in the absence of external pressure (e.g., the proposed regulation). Specifically, the OTD lending model is highly

⁷ It is important to note that a liquid secondary market for MSRs had not existed for several years leading up to Basel III's proposal (Kothari and Lester 2012). However, shortly after the announcement, non-bank servicers began to surface in response to this newly created market opportunity. For example, Nationstar, currently one of the five largest mortgage servicers in the country, had their initial public offering on March 8, 2012. On page 2 of their registration statement, they note *"In the aftermath of the U.S. financial crisis, the residential mortgage industry is undergoing major structural changes that affect the way mortgage loans are originated, owned and serviced. These changes have benefited and should continue to significantly benefit non-bank mortgage servicers. Banks currently dominate the residential mortgage servicing industry, servicing over 90% of all residential mortgage loans as of September 30, 2011...However, banks are currently under tremendous pressure to exit or reduce their exposure to the mortgage servicing business as a result of increased regulatory scrutiny and capital requirements."*

⁸ The Federal Housing Finance Association (FHFA) describes the valuation process that banks use to determine the Level 3 asset values for their MSRs. Specifically, they state: *"In estimating the fair value of MSRs, market participants generally use a Level 3 model-based fair value approach.. As a result, the valuation techniques used to estimate the fair value of Level 3 instruments involve significant unobservable inputs, which generally are more subjective and involve a high degree of management judgment and assumptions.. Market participants have a broad range of views of these assumptions resulting in fair values that have a wide range due to the lack of price transparency* (Servicing Compensation Initiative 2011). Consistent with this description, Hendricks and Shakespeare (2013) observe variation in the prepayment assumption used by large banks and Cochran et al. (2004) finds that the MSR valuation multiple ranges from 0% to 3.8% of a loan's UPB. Thus, banks have both the ability and incentive to reduce their MSR valuations following the proposal of Basel III.

profitable in that it provides banks with non-interest income in the form of origination fees. Stiroh (2004) documents that banks have increasingly pursued non-interest income since the 1980's as it provides greater profit margins than traditional lending. In regards to banks' servicing portfolios, banks highly value servicing mortgages because it allows them to use the monthly contact with customers to cross-sell other products and services offered by the bank.⁹ Further, a bank's decision to sell a portion of its servicing portfolio has a negative impact on the profitability of the retained portion since servicing is subject to significant economies of scale (Hendricks and Shakespeare 2013). Finally, reductions in MSR valuations primarily occur by writing down existing MSRs which also lowers current profitability.

Third, the proposal of Basel III occurred more than a year after the events that are most commonly associated with the onset of the financial crisis.¹⁰ This extended period between the regulation and the events that gave rise to the regulation is important in our ability to attribute any observed changes in behavior to the proposed regulation rather than the crisis (e.g., since those effects would have begun to manifest in earlier periods). Given the importance in ruling out this alternative explanation, we perform several tests to identify whether the relations predicted in this paper began prior to Basel III's proposal.¹¹

⁹ Consistent with this idea, JPMorgan Chase purchased \$70 billion of MetLife's servicing portfolio on November 6, 2012. In doing so, Eric Schuppenhauer, Head of Mortgage Servicing at Chase, noted a motivation for the deal was to "be able to provide our full range of products and services to an additional 350,000 individuals and families."

¹⁰ Specifically, the following events all took place between 12-18 months prior to Basel III's proposal: 1) The government took control of Fannie Mae and Freddie Mac on Sept 7, 2008, 2) Lehman Brothers files for bankruptcy on Sept 15, 2008, 3) The Federal Reserve extends an \$85 billion credit facility to stabilize AIG on Sept 17, 2008, 4) Congress approved a \$700 billion bank bailout plan (TARP) on Oct 3, 2008, 5) The Federal Reserve again steps in to stabilize AIG by offering an additional \$38 billion credit facility, and 6) The National Bureau of Economic Research declares the United States economy to be in recession on Dec 11, 2008.

¹¹ We refer the reader to Section 3.2 (discussion of Table 2, Panel B) and Section 5.3 (discussion of Table 10) for a full explanation of the analyses that we performed. In each test, we fail to find evidence that the relations observed in this paper began prior to Basel III's announcement.

3.2 Sample selection and descriptive statistics

As documented in Panel A of Table 2, our primary sample consists of quarterly observations of U.S. commercial bank holding companies from 2007-2014 that meet the following criteria: (1) non-missing values for each variable, (2) an MSR balance greater than zero, and (3) mortgage-servicing portfolios of at least \$1 million. We obtain our data from bank holding companies' quarterly call reports (Form Y-9C) which can be accessed from the Compustat Bank Regulatory Database or the Federal Reserve Bank of Chicago website.

INSERT TABLE 2

A subsequent analysis requires detailed disclosures about each bank's MSR portfolio. Accordingly, for these analyses, we restrict our sample to include only the publicly-traded banks that include MSR rollforwards in their Form 10-K filings. By hand-collecting this data, we are able to obtain more detailed information about the specific components of servicing portfolios. Table 2, Panel B documents the impact of these two additional restrictions on our sample.

Table 3 contains the descriptive statistics for our primary sample. Panel A includes the mean, median, interquartile range, and standard deviation for each variable while Panel B provides the correlation coefficients across each variable.¹² As documented in Panel A, 9.6% of the 5,311 sample observations are identified as *RegPressure* banks.¹³ Panel C examines the similarity between the *RegPressure* group of banks and the control banks as of December 31,

¹² The detailed descriptions for each variable in our study are provided as part of Appendix A.

¹³ 9.6% of our sample observations equates to 16 of the 166 banks in our final sample. These banks, and their state of headquarters, are: Arvest Bank Group, Inc (AR), Bank of America Corporation (NC), BB&T Corporation (NC), Central of Kansas, Inc (KS), Central Pacific Financial Corp. (HI), First Horizon National Corporation (TN), Independent Bank Corporation (MI), Independent Bankers Financial Corporation (TX), JPMorgan Chase & Co. (NY), Marine Bancorp, Inc. (IL), Merchants Financial Group, Inc. (MN), Park Bancorporation (WI), Suntrust Banks, Inc. (GA), Trinity Capital Corporation (NM), U.S. Bancorp (MN), and Wells Fargo & Company (CA).

2009. Given that a substantial portion of the MSR market has historically been held by the largest banks (Hendricks and Shakespeare, 2013), it is not surprising that Panel C reveals several differences between the two groups of banks. However, these differences (in *levels*) do not invalidate our research design because the critical assumption of the difference-in-difference approach is that of parallel trends, which posits that the average *change* in the control group represents the counterfactual change in the treatment group if there were no treatment. While the treatment prohibits this assumption from being tested directly, we conduct pretest comparisons of the dependent variables by examining the quarterly changes (i.e., trends) during the period leading up to the Basel III announcement. As documented in Panel D, we find no statistically significant differences in the average quarterly changes observed between the treatment and control banks during the pre-test period. These findings, combined with our perfectly balanced panel of banks, provide some assurance that the parallel trends assumption is met.

INSERT TABLE 3

4. Empirical results

4.1 Banks' response to the announcement of Basel III – Lobbying

We begin our empirical analysis by examining whether *RegPressure* banks lobbied Basel III rule makers (the Basel Committee and the Federal Reserve) regarding the treatment of MSRs to a greater extent than did other banks. Because the scope of the Basel III proposals was so broad, it may be that all banks had cause to lobby rule makers about some portion of the proposed regulation. Thus, it is not sufficient to simply examine whether the *RegPressure* banks were more likely to submit a comment letter, but rather whether the comment letters that they

submitted were more likely to oppose the proposed treatment of MSRs. Accordingly, we examine for this differential behavior by estimating the following linear probability model:

$$Lobby_{it} = \alpha_0 + \beta_1 RegPressure_i + \sum \beta_j Controls_{it} + \varepsilon \quad (1)$$

where *Lobby* is defined as : *Letter* or *Oppose*. *Letter* is an indicator variable that takes the value of one if the bank submitted a letter to rule makers, zero otherwise. *Oppose* is an indicator variable takes the value of one if the bank submitted a letter to rule makers that opposed the proposed treatment of MSRs, zero otherwise.¹⁴ *RegPressure* is our primary variable of interest and is as previously defined in Section 3.1.

We also include several control variables in the model to reduce concerns that our results are driven by omitted correlated variables. Specifically, we include variables in the model that capture each bank’s size (*Ln_Assets*), profitability (*ROE*), business model (*Residential*), and complexity (*RevMix*). We also include state-level macroeconomic conditions (*Unemployment*) to capture the role that the bank’s local economy plays in the manager’s decision to lobby rule makers. For this, and all subsequent specifications, standard errors are clustered by bank.

INSERT TABLE 4

The results of estimating Equation 1 are provided in Table 4. Consistent with our expectation, Column 1 indicates that the banks above the 10% threshold were *not* more likely to submit a comment letter in response to Basel III’s proposal. However, Column 2 provides

¹⁴ We took a two step process in creating this variable. First, we searched the text of all comment letters received by the Basel Committee or the Federal Reserve regarding Basel III for “MSR”, “mortgage servicing right”, “MSA”, or “mortgage servicing asset.” When identified, we read through the letter to determine whether the comment letter opposed the proposed treatment. In all cases, we found that letters referencing any of these four terms were in opposition to the proposed treatment. Appendix C includes excerpts from all nine *RegPressure* banks that submitted comment letters. Their comments reveal that MSRs played a highly valuable role in these banks’ business models.

evidence that these banks were more likely to submit a comment letter opposing the proposed treatment of MSRs. The magnitude of this finding is highly significant as the predicted probability of submitting a comment letter opposing the proposed treatment of MSRs increases by 32.41% for *RegPressure* banks. The magnitude of this result is similarly large when only considering the 58 banks in our sample that submitted comment letters during the rule making process. Specifically, Column 3 indicates that, conditional on submitting a comment letter to rule makers, the predicted probability of the comment letter opposing the proposed treatment of MSRs increases by 28.36%. Taken together, Table 4 provides strong support for our identification strategy by showing that the *RegPressure* banks lobbied rule makers against the MSR provision to a greater extent than did other banks.

4.2 Banks' response to the announcement of Basel III – Timing

Having shown that *RegPressure* banks were more likely to lobby rule makers against the proposed treatment of MSRs, we turn our focus to understanding whether they were also simultaneously responding to the proposed regulation through other channels. Section 3.1 identifies three primary channels that the *RegPressure* banks could have utilized to reduce their exposure to the proposed regulation. These channels include: reducing their use of the OTD lending model, selling a portion of their MSR holdings, and reducing the valuations applied to MSRs. Accordingly, we examine whether and when the banks above the 10% threshold began to exhibit any of these differential behaviors following Basel III's proposal.

We begin our analysis by examining the average of the treatment and control banks' quarterly MSR balance relative to their MSR balances when the initial consultative document for Basel III was released. We perform this analysis to get a better understanding of how MSRs were impacted, regardless of the channel, after the announcement of Basel III. While Figure 2 shows

that MSR balances for the treatment and control groups exhibited similar behavior *prior* to the announcement of Basel III, they began to diverge shortly after the announcement was made. Further, the divergence begins in the Basel period and grows larger as the implementation date for Basel III approaches, suggesting that the *RegPressure* banks made an initial, but not complete, response to the proposed regulation when it was first announced.

INSERT FIGURE 2

To better understand if the *RegPressure* banks took deliberate actions to reduce their MSR balances after the proposal of Basel III, we move beyond a univariate plot and use the research design outlined in Section 3.1. Specifically, we use OLS to estimate the following difference-in-difference specification:

$$\begin{aligned}
 Behavior_{it} = & \alpha_0 + \beta_1 Basel_i + \beta_2 FedReserve_i + \beta_3 Adopted_i \\
 & + \beta_4 Basel * RegPressure_i + \beta_5 FedReserve * RegPressure_i \\
 & + \beta_6 Adopted * RegPressure_i + \beta_j Controls_{it} + \varepsilon_i
 \end{aligned} \tag{2}$$

where *Behavior* is one of the three specific behaviors that bank managers could take to reduce their MSRs, namely *OTD*, *UPB*, or *MSR_UPB*. *OTD* measures the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans (Purnanandam 2011). *UPB* is the natural log of the total quarter-end unpaid principle balance of loans serviced for others and reflects the balance of loans (not on the bank's balance sheet) that the bank services on behalf of other entities that hold the loans. *MSR_UPB* is the reported value of a bank's MSRs divided by the UPB of the associated servicing portfolio. *Basel*, *FedReserve*, and *Adopted* are indicator variables that take the value of one if the bank's financial information is for a quarter ending between Jan 2010-Dec 2010, Jan 2011-Jun 2013, or Jul 2013-Dec 2014, respectively; zero otherwise. Our primary variables of interest in this equation are the interaction of *RegPressure* with each of these indicator variables. All other variables included in the model

are as previously motivated in Section 4.1, and as defined in Appendix A. We also include bank fixed effects in this, and all subsequent, specifications to create a within-bank research design.

INSERT TABLE 5

Table 5 contains the results of estimating Equation 2.¹⁵ Consistent with the *RegPressure* banks immediately altering their behavior following the proposal in ways that would reduce their exposure to the proposed regulation, the estimated coefficient for β_4 is negative and statistically significant in each of the three columns. Further, and consistent with the relationship depicted in Figure 2, the estimated coefficients for β_5 and β_6 continue to decline relative to β_4 . This pattern suggests that the banks made only a partial response when the regulation was initially proposed, perhaps waiting for uncertainty to be resolved before incurring the full amount of transition costs.

Overall, the results described above reject the null hypothesis that firms wait until the rule making process is completed before making costly operational and financial reporting changes. In addition to being statistically significant, the results are also economically significant, even in the period immediately after the initial Basel announcement (the *Basel* period in our study). For example, the difference-in-difference results in column 3 of Table 5 suggest that *RegPressure* banks reduced their OTD activity 11.5%, their UPB level 0.74%, and their MSR valuation 9.8% more than the control banks did during the *Basel* period. These results suggest that banks were more aggressive in reducing their OTD activity and their MSR valuations than they were in reducing their UPB level. The ranking of these magnitudes (OTD

¹⁵ Note that because *RegPressure* remains constant across all quarters for a given bank, it is subsumed by the bank fixed effect and is therefore not reported as a main effect in the tables.

being the largest and UPB being the smallest) is also being consistent throughout the *FedReserve* and *Adoption* periods.

4.3 Banks' response to the announcement of Basel III – Incentives

The results discussed in Section 4.2 raise the question of why banks would make costly operational and financial reporting changes in response to regulation that has not yet been adopted. To answer this question, we reference theories related to investment under uncertainty that frame the investment timing decision as a choice between having the benefit that arises from early commitment or the benefit of having the additional information (Bernanke 1983). Given this tradeoff that firms face when deciding when to respond to potential regulation, we predict that our result is primarily driven by firms that: 1) benefitted more from signaling an early commitment, or 2) had less uncertainty about whether they would be subjected to the regulation.

4.3.1 Cross-sectional variation in the benefit received from early adoption

As noted in Section 2.1, one benefit from early adoption of a proposed regulation is that the firm is able to send a valuable signal to regulators and investors about the firm (Akerlof 1970). In our setting, this signal pertains to a bank's Tier 1 capital, the core measure of its financial strength. The Basel Committee recognizes the importance that investors place on this signal as they include market discipline as one of the three pillars of the Basel framework. In doing so, they note that “market discipline imposes strong incentives on banks to conduct their business in a safe, sound and efficient manner, including an incentive to maintain a strong capital base as a cushion against potential future losses arising from risk exposures (Basel 2001).” Consistent with banks understanding the importance placed on their Tier 1 capital, Allen et al., (2011) identify market discipline as one of the forces that induce banks to hold positive capital. Given that public banks are subjected to greater market discipline than private banks (Beatty et al. 2002), we conjecture that the publicly traded banks stand to benefit more from early adoption relative to their privately held counterparts. Accordingly, we partition our sample into publicly

traded banks and privately traded banks and re-estimate Equation 2 for each of the two partitions. Our prediction is that the rapid changes in operational and financial reporting behavior documented in Table 5 are concentrated among the publicly traded banks.

INSERT TABLE 6

Table 6 contains the results of this analysis. Consistent with our prediction, the results of estimating Equation 2 within the partition of publicly traded banks (Columns 1a, 2a, and 3a) reveal that all the coefficients maintain the same sign as documented in Table 5. In fact, the results in these columns are stronger than those presented in Table 5, suggesting that the differential behavior exhibited by the privately-held *RegPressure* banks was not as pronounced as it was by the publicly traded *RegPressure* banks. Consistent with this reasoning, we observe that the interaction of *RegPressure* with the various post-announcement periods is never significantly different from zero in any of the regressions within the partition of privately traded banks (Columns 1b, 2b, and 3b) except for the Adopted period when the uncertainty has been resolved. Taken together, and to the extent that our public/private partition proxies for the differential value associated with signaling to investors, our results indicate that greater benefits associated with signaling an early commitment may entice firms to forego the sequential pecking order approach that is generally assumed when firms are faced with regulatory uncertainty.

4.3.2 Cross-sectional variation in banks' uncertainty about being subjected to the regulation.

Given that firms' lobbying efforts may influence rule makers to alter or abandon the proposed regulation, firms risk incurring unnecessary costs when they make costly operational changes to comply with proposed regulation. Accordingly, much of the value associated with waiting to respond arises because firms are able to remove this risk if they wait for the final regulatory terms to be settled. To the extent that firms have different levels of uncertainty about

eventually being subjected to the proposed regulation, firms with more uncertainty stand to benefit to a greater extent from waiting for the rulemaking process to be completed relative to firms with less uncertainty.

In our setting, the initial Basel III consultative documents indicated that the first “key element” of the new framework was to “*ensure that large, internationally active banks are in a better position to absorb losses*” (Basel Committee 2009, pp. 2). This focus on reforming the large banks was also a theme of the Dodd-Frank Act that was also introduced in December 2009. This piece of legislation proposed that all financial companies with total assets greater than \$10 billion be subject to semi-annual stress tests, which would be reported to the Federal Reserve. If this focus on large, interconnected financial institutions led smaller banks to be more uncertain that they would be subjected to the proposed Basel III reforms, then we would expect that they would not act as quickly in responding to the proposed regulation.¹⁶ To test this prediction, we partition our sample based on the \$10 billion total asset threshold and re-estimate Equation 2 for each of these partitions.¹⁷ Our prediction is that the rapid changes in operational and financial reporting behavior documented in Table 5 are concentrated among the large banks that had less uncertainty that they would ultimately be subjected to the proposed regulation.

INSERT TABLE 7

¹⁶ Note that the Federal Reserve generally regards banks below the \$10 billion asset threshold as community banks, which were believed by many in the banking industry to be beyond the scope of Basel III. However, the Federal Reserve’s proposal of Basel III in June, 2012 surprised many community banks by only excluding those banks below \$500 million of assets (Touryalai, 2012). In our review of comment letters, many institutions argued that this amount should be increased to include all banks below the Federal Reserve’s general definition of \$10 billion.

¹⁷ The correlation between this size-based indicator and the public/private indicator used in Table 6 is 0.25. This is indicative of some overlap between the partitions in both tables, but the relatively low magnitude of the correlation suggests that the size and public/private partitions are capturing different constructs.

Table 7 contains the results of this analysis. Consistent with our prediction, the results of estimating Equation 2 within the partition of large banks (Columns 1a, 2a, and 3a) are qualitatively similar to those results documented in Table 5. On the other hand, and similar to our analysis within the partition of private banks in Table 6, we observe that β_4 and β_5 are never significantly different from zero in any of the regressions within the partition of smaller banks (Columns 1b, 2b, and 3b). However, and in support of our identification strategy, we do observe that β_6 , the interaction of *Adoption* and *RegPressure*, is negative and statistically significant for the operational changes. Thus, these banks did behave differentially than their peer firms after Basel III was proposed, albeit only after the Federal Reserve had removed the uncertainty associated with the regulation. Taken together, and to the extent that our partition on firm size captures managers' uncertainty about being subjected to the proposed regulation, these results indicate that firms are less likely to make anticipatory changes to proposed regulation when they stand to benefit more from having the additional information that is set to be revealed.

5. Additional analyses and robustness tests

5.1 Banks' differential response to the announcement of Basel III—Valuation mechanisms

Our results indicate that banks promptly altered both their operational and financial reporting decisions in response to the MSR provision included in the proposal of Basel III. While regulators may have included this provision in an effort to ultimately alter firms' operational decisions, the financial reporting changes identified in this paper are perhaps both surprising and unintended. Accordingly, we further examine the financial reporting changes to better understand the mechanisms by which banks reduced their MSR valuations.

To reduce a bank’s aggregate MSR valuation, managers must either: (1) increase the amortization rate for their existing MSRs, or (2) lower the capitalization rates for new MSRs. Comparing these two mechanisms, amortization rate increases will reduce MSR holdings more quickly than lowering capitalization rates because the amortization rates can be applied to the bank’s entire portfolio of MSRs whereas the capitalization rate is only applicable to the newly created MSRs. If the *RegPressure* banks reduced the valuation of their MSRs then we should be able to see that they used either one or both of these mechanisms.

As discussed in Section 3.2, this granular information is not included in banks’ Y-9C filings, but it may be included in banks’ 10-K filings. Thus, we restrict our sample of banks to include only those banks that: (1) are publicly traded, and (2) contain a rollforward of their annual MSR activity in their 10-K filing. We then hand-collect the information about these banks’ servicing portfolios and tabulate the descriptive statistics for this reduced sample in Panel A of Table 8. Because we are restricted to using annual data for this test, a number of our observations fall into multiple periods. For example, a bank’s 2013 annual report contains information regarding both the *FedReserve* and *Adopted* time periods. Accordingly, we alter our design to only examine the pre-announcement period and the post-announcement periods. Because the initial consultative documents were released in December, 2009, we are able to use this research design without banks’ annual filings containing information from multiple periods. Using this information, we then use OLS to estimate the following model:

$$\begin{aligned}
 Mechanism_{it} = & \alpha_0 + \beta_1 Post_i + \beta_2 RegPressure_i + \beta_3 Post * RegPressure_i \\
 & + \beta_j Controls_{it} + \varepsilon_i
 \end{aligned}
 \tag{3}$$

where $Mechanism_{it}$ is either: 1) *AmortRate*, which measures the percentage change in bank i ’s MSRs that was driven by changes in the bank’s amortization rate or fair value

assumptions, or 2) *CapRate* which is the capitalization rate used to create MSR from bank *i*'s new loan originations. *Post* is an indicator variable that takes the value of one if the 10-K is filed in either the *Basel*, *FedReserve*, or *Adopted* time periods. All other variables are as previously motivated and defined.

INSERT TABLE 8

Columns 2 and 3 of Table 8, Panel B provide the results of estimating Equation 3. However, before we discuss those results, it is important for reasons of external validity to establish that the financial reporting discretion identified in Table 5 is also observed in our reduced sample of firms. Accordingly, Column 1 re-estimates Equation 2 (using *MSR_UPB* as the dependent variable) for this restricted sample of firms. Consistent with these firms utilizing their financial reporting discretion following the announcement of Basel III, the estimated coefficient on the *Post*RegPressure* variable is negative and statistically significant. The similarity of these results to those documented in Table 5 (with the full sample of firms) suggests that the analyses using the restricted sample are likely to generalize to the full sample of firms.

Columns 2 (3) of Table 8, Panel B examines whether the *RegPressure* banks increased their amortization rate (capitalization rate) to a greater extent relative to other banks after the initial consultative document for Basel III were released. Consistent with *RegPressure* banks using these two mechanisms to reduce their MSR valuations, we find that β_3 is estimated to be positive and statistically significant in both models.¹⁸ In terms of economic magnitude, our

¹⁸ It may seem counter-intuitive that a bank would prefer to writedown an asset when faced with increased regulatory capital pressure. However, in this setting, a bank's MSRs can only represent 10% of its tier 1 capital. Thus, the bank will be forced to reduce its common equity by the amount of MSR holdings that exceed 10%. The effect of this capital adjustment is equivalent to the bank writing down its MSR holdings to the 10% threshold. Further, a bank that takes the writedown will generally have a higher capital ratio in the future than it would if it

results suggest that *RegPressure* banks increased their amortization rates (capitalization rates) on average by 24.5% (5.1%) more than the control banks following the announcement of Basel III. Taken together, these results add support to our primary findings that bank managers with significant proportions of MSRs relative to Tier 1 capital engaged in strategic financial reporting to reduce the valuations of their MSRs following the announcement of Basel III.

5.2 Performance analysis

Our findings suggest that *RegPressure* banks trade off increased profitability in the current period to improve their future capital ratios. This behavior is contrary to the extensive literature suggesting that managers generally exhibit myopic behavior (Stein 1989, Bushee 1998, Graham et al. 2005). In addition to the value received from sending a positive signal to regulators and investors about their regulatory capital, one reason that managers may be willing to record current period writedowns is because they are able to offset that income with other discretionary accruals.¹⁹ One accrual that banks could use for this purpose is the loan loss provision (LLP).

The LLP is the largest accrual on a bank's balance sheet and, combined with its opacity, could provide *RegPressure* banks with an effective mechanism to offset their MSR writedowns. Consistent with this idea, prior research provides evidence that banks use their LLP to manage their regulatory capital levels (Beatty et al. 1995). In our setting, banks behaving in this manner (reducing their LLP to offset MSR writedowns) avoid the temporary reduction in operating

simply adjusted its regulatory capital because it will have lower amortization expense in future periods. This will then increase the profitability of servicing which will cause retained earnings to increase at a faster pace than it would otherwise.

¹⁹ We use the term 'writedowns' in this section to refer to the mechanisms outlined in Section 5.1; namely, increased amortization rates for existing MSRs and reduced capitalization rates for new MSRs. These mechanisms both reduce a bank's current profitability in exchange for lower risk-weighted assets and increased future profitability.

performance that they would otherwise incur. Further, the lower risk-weighting associated with a bank's outstanding loans relative to its MSRs will result in the bank having a higher tier 1 capital ratio in the current period if it were to engage in this strategic behavior. Accordingly, we estimate the following equation to examine the possibility that *RegPressure* banks reduced their LLP to a greater extent than non-*RegPressure* banks following Basel III's announcement:

$$\begin{aligned}
 LLP_{it} = & \alpha_0 + \beta_1 Basel_i + \beta_2 FedReserve_i + \beta_3 Adopted_i \\
 & + \beta_4 Basel * RegPressure_i + \beta_5 FedReserve * RegPressure_i \\
 & + \beta_6 Adopted * RegPressure_i + \beta_j Controls_{it} + \varepsilon_i
 \end{aligned} \tag{4}$$

where LLP_{it} is the loan loss provision for bank i in quarter t . Similar to our prior equations, this specification also employs a difference-in-difference research design with β_4 , β_5 , and β_6 capturing the differential behavior of the *RegPressure* banks for various time periods after Basel III was announced. We also include each bank's LLP from the prior quarter in addition to each variable suggested by Model (a) of Beatty and Liao (2013).²⁰ All variables are as defined in Appendix A.

INSERT TABLE 9

Model 1 of Table 9 provides the results of estimating Equation 4. Consistent with *RegPressure* banks using their LLP to offset some of the impact of writing down their MSRs, we observe that β_4 , β_5 , and β_6 are all estimated to be negative at statistically significant levels. While this result is consistent with *RegPressure* banks engaging in this offsetting behavior, our research design is unable to identify that the lower LLP is the direct result of increased MSR writedowns. However, if the LLP is used as a "plug" (as is frequently suggested) to achieve a

²⁰ Table 4 of Beatty and Liao (2013) examines whether the residuals from four LLP models used in prior research to examine discretionary accruals are able to predict whether a bank will either restate its financial statements or receive a comment letter from the SEC regarding its LLP. They find that their Model (a), which is based on the models of Bushman and Williams (2012) and Liu and Ryan (2006), provides the most explanatory power of the four models examined. Refer to Section 5.2 of Beatty and Liao (2013) for additional information.

certain amount of current operating income (Collins et al. 1995), then the fact that MSR writedowns are included in operating income indicates a causal relationship.

Model 1 suggests that *RegPressure* banks decreased their LLP to offset discretionary MSR writedowns following the announcement of Basel III. As noted previously, banks that engage in this offsetting behavior would seemingly be motivated by avoiding temporary declines in their operating performance. Thus, we examine how the operating performance of the *RegPressure* banks compared relative to the other banks after the announcement of Basel III:

$$\begin{aligned}
 Performance_{it} = & \alpha_0 + \beta_1 Basel_i + \beta_2 FedReserve_i + \beta_3 Adopted_i \\
 & + \beta_4 Basel * RegPressure_i + \beta_5 FedReserve * RegPressure_i \\
 & + \beta_6 Adopted * RegPressure_i + \beta_j Controls_{it} + \varepsilon_i \quad (5)
 \end{aligned}$$

where $Performance_{it}$ is either: 1) ROA_{it} , or 2) ROE_{it} . Similar to prior equations, this specification employs a difference-in-difference methodology with β_4 , β_5 , and β_6 capturing the differential behavior of the *RegPressure* banks for the time periods after Basel III was announced. We also include several control variables (as defined in Appendix A) and bank fixed effects in the model.

Models 2a and 2b of Table 9 provide the results of estimating Equation 5. In a review of our results, we fail to reject the null that *RegPressure* banks' operating performance was different than other banks following the announcement of Basel III. Specifically, β_4 , β_5 , and β_6 are never found to be statistically significant in either model. Despite the increased MSR writedowns documented in our study, these results combine with those in Table 5 to suggest that *RegPressure* banks were able to maintain their reported profitability while also reducing their risk-weighted assets.

5.3 Robustness – Financial crisis

One concern with our setting is that Basel III was introduced after the onset of the financial crisis. Thus, it is possible that the effects we're attributing to Basel III's proposal were in some way caused by the financial crisis, or one of the many programs enacted in its wake, rather than the MSR provision included in the proposal of Basel III. Our pretest comparisons in Panel D of Table 3 indicate that there were no observable differences in the dependent and independent variables during the pre-Basel III period between the two groups of banks. However, those tests are not capable of detecting trends *within* the pre-Basel III period which could have continued into the post-period and influenced our results. While Figure 2 suggests that this is not the case in regards to banks' reported MSR balances, it is far from decisive on this matter. Accordingly, we perform a more careful investigation of this possibility. Specifically, we limit the sample to the two years prior to the announcement of Basel III and re-estimate Equation 2 to determine whether the *RegPressure* banks began to display differential behavior in any of our dependent variables in the final year of the pre-Basel period.

INSERT TABLE 10

The results of this estimation are included in Table 10. Our primary variable of interest is the interaction of *RegPressure* with *Crisis*, an indicator variable that takes the value of one if the observation is in the final year of the pre-Basel period, zero otherwise. In these analyses, we find no evidence that the *RegPressure* banks acted differently in regards to *OTD*, *UPB*, or *MSR_UPB* in the period leading up to Basel III's announcement. While our tests are not able to establish causality that the results documented in our paper were driven by the Basel III provision, they do indicate that we are not simply capturing the continuation of a trend that had begun in the prior year and carried over into the post-announcement period.

5.4 Robustness – Continuous scale of regulatory pressure applied by the MSR provision

Our identification strategy is based on the provision included in the Basel III proposal that MSRs can only account for 10% of a bank's Tier 1 capital. However, as noted by the Mortgage Bankers Association's comment letter to the Federal Reserve on this issue, it is likely that banks will operate with a buffer to ensure that they do not exceed the 10% threshold (Mortgage Bankers Association 2012). Further, the proposed regulation imposes larger costs on those banks that are well above the 10% threshold relative to those banks that are only slightly above the 10% threshold. These two observations indicate that a continuous version of the *RegPressure* variable may be a more accurate representation of the pressure that each bank faces from the proposed regulation than the indicator variable used throughout our study. Based on this reasoning, we re-estimate Equation 2 using a continuous version of the *RegPressure* variable and find the inferences made in our study are unchanged when using this alternative definition. While the inferences are unchanged across all of our analyses when using the continuous variable, we present our results with the indicator variable to facilitate interpretation of the variable's interaction with the post-Basel time periods.

INSERT TABLE 11

6. Conclusion

Prior research suggests that investors immediately react to *proposed* regulatory changes (Lev, 1979). However, little is known about *when* and *how* managers respond to the uncertainty that the proposed regulation introduces into their operating environment. In this paper, provide evidence that firms' incentives may lead them to respond concurrently across multiple channels when faced with regulatory uncertainty. While prior research shows that firms immediately respond to proposed regulation by lobbying rule makers to alter the terms towards the firm's own

economic interests (Zimmerman and Watts 1978, Deakin 1989), our findings suggest that firms do not wait until the uncertainty is resolved before taking actions to comply with the proposal. Considering that economic effects are of first-order importance when examining effects of regulation (Leuz and Wysocki 2015), our findings urge researchers to carefully consider whether policymakers signaled, leaked, or otherwise released information related to the regulation in order to avoid false inferences about the significance and/or magnitude of the regulation being studied (MacKinlay 1997; McWilliams and Siegel 1997). Finally, our study provides regulators with timely information about the impact of Basel III. Considering the extreme importance of this reform, and the limited research performed to date, we join Beatty and Liao (2013) in calling for additional research in this area.

Our results are subject to some limitations. First, there is generally a tradeoff between internal and external validity. To this point, Leuz and Wysocki (2015) note that “one could argue that studying the causal effects for a particular setting often amounts to a case study, at least, as far as the magnitude of the estimated treatment effect is concerned.” Thus, while we believe that our chosen setting allows for some causal inference to be made, it is not clear to what extent the magnitude or significance of the results extend to other institutional settings. Second, Basel III was proposed in response to the financial crisis. While we have chosen features of this regulation that are useful in order to establish causality (e.g., MSR provision, public vs private banks, large vs small banks), we recognize that there were many other institutional changes occurring during our study period that may have also impacted the dependent variables of interest. However, to the extent that these changes impacted both the treatment and control group in a similar manner then our difference-in-difference research design should mitigate these concerns.

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Appendix A – Variable names and descriptions

Variable	Description
<i>Dependent Variables</i>	
<i>AmortRate</i>	Amortization (or fair value adjustment) of MSR for the quarter divided by beginning MSR balance plus newly originated MSRs and MSR purchases for the year.
<i>CapRate</i>	Estimate of the number of dollars of unpaid principal balance (UPB) per dollar of MSR for additions to the MSR balance for the quarter. Calculated as the natural log of the following: $\text{CapRate} = \frac{\text{Addition_Value} \cdot \Delta \text{UPB}_t - \frac{\text{UPB}_{t-1}}{\text{MSR}_{t-1}} (\text{MSR Purchased}_t + \text{MSR Sold}_t + \text{MSR Amortization}_t)}{\text{MSR Additions}_t}$
<i>Letter</i>	Indicator variable that takes the value of one if the bank submitted a letter to rule makers, zero otherwise.
<i>LetterMSR</i>	Indicator variable that takes the value of one if the bank submitted a letter to rule makers that opposed the proposed treatment of MSRs, zero otherwise.
<i>LLP</i>	Loan loss provision for the quarter scaled by lagged total loans.
<i>MSR_UPB</i>	MSR balance divided by unpaid principal balance (UPB), winsorized by year.
<i>OTD</i>	Measure of the extent of participation in the originate-to-distribute mortgage lending market, calculated as the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet.
<i>ROA</i>	Net income scaled by total assets as of the report date
<i>ROE</i>	Net income scaled by average total equity as of the report date
<i>UPB</i>	Natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others.
<i>Independent Variables</i>	
<i>Δ GDP</i>	Change in GDP for the quarter
<i>Δ Unemployment</i>	Change in <i>Unemployment</i> for the quarter
<i>10YrBond</i>	10-year Treasury Bond rate as of the report sheet date
<i>Adopted</i>	Indicator variable equal to 1 for report dates from July 1, 2013 through December 31, 2014, and zero otherwise
<i>Basel</i>	Indicator variable equal to 1 for report dates from January 1, 2010 through December 31, 2010, and zero otherwise
<i>CaseShiller</i>	Return on the Case Shiller Real Estate Index for the quarter
<i>Crisis</i>	Indicator variable defined only for the two years 2008 and 2009. Equal to 1 in 2009 and zero in 2008.
<i>FedReserve</i>	Indicator variable equal to 1 for report dates from January 1, 2011 through June 30, 2013, and zero otherwise

Appendix A – Variable names and descriptions (Continued)

Variable	Description
<i>Independent Variables (cont.)</i>	
<i>Ln_Assets</i>	Natural log of total assets.
<i>MSR_Tier1</i>	MSR balance divided by an estimate of the Basel III Tier 1 Capital balance. This estimate of Basel III Tier 1 Capital was calculated using the same methodology used by the Federal Reserve in its assessment of the potential impact of Basel III on bank capital adequacy ratios (Gibson, 2012).
<i>NPL</i>	Total non-performing loans scaled by lagged total loans.
<i>Post</i>	Indicator variable equal to 1 for all report dates after December 31, 2009, and zero otherwise
<i>RegPressure</i>	Equal to 1 if the bank's ratio of MSR's to estimated Basel III Tier 1 capital (<i>MSR_Tier1</i>) is greater than 10% as of December 31, 2009, and zero otherwise. This is a measure of the degree to which the bank would expect to be affected under proposed Basel III capital rules that penalize MSR's. The Basel Committee first indicated that it was seeking to penalize intangible assets, such as MSR's, in a consultative document that was released in mid-December 2009.
<i>Residential</i>	Total mortgage loans divided by total assets.
<i>RevMix</i>	Noninterest income divided by total income.
<i>Trend</i>	Trend variable that increases by one in each calendar quarter
<i>Unemployment</i>	State-level unemployment rate from the Federal Reserve website

Appendix B – Impact of MSR provision included in Basel III on regulatory capital

The following example was taken from pages 28–29 of the MBA’s 2012 comment letter to the Federal Reserve, FDIC, and OCC regarding the rules proposed for Basel III (MBA, 2012). The purpose of including this example as an appendix to our study is to illustrate how the new provisions regarding MSRs affect a bank’s regulatory capital requirement.

Existing Automatic 10 Percent Haircut

The 10 percent and 15 percent limits are in addition to the current 10 percent haircut that arose from the FDIC Improvement Act of 1991.

Under present rules the effective capital that must be retained for MSRs is 17.2 percent as follows:

- Assume 8 percent minimum capital requirement to be adequately capitalized.
- 10 percent of the value is deducted and the remaining 90 percent is risk-weighted at 100 percent.
- This equates to a minimum capital requirement for MSRs of 17.2 percent (10 percent plus (90 percent times 8 percent)).

Under the proposed rules, the required capital that would have to be maintained, not considering the 10 percent and 15 percent proposed limits, would be a whopping 28 percent as follows:

- Assume 8 percent minimum capital requirement to be adequately capitalized.
- 10 percent of the value is deducted and the remaining 90 percent is risk-weighted at 250 percent.
- This equates to a minimum capital requirement of MSRs of 28 percent (10 percent plus (90 percent times 20 percent)).

This would increase the required capital for MSRs by 63 percent, without taking into consideration the 10 percent and 15 percent limitations in the proposed rule. If the Basel III 10 percent or 15 percent thresholds are breached, the minimum capital requirements skyrocket. Since foreign banks are not subject to the 10 percent haircut, it puts U.S. banks on an unlevel playing field. This is contrary to the purpose of the Basel rules which is to put banks worldwide on a level playing field with respect to regulatory capital requirements. (MBA, 2012, pp. 28–29)

Appendix C – Comment letter excerpts that oppose MSR treatment

BB&T Corporation

“The value of MSR assets was not a significant driver of industry difficulties during the recent crisis. The proposed 250% risk weight and threshold deduction treatment for MSR significantly increases the capital costs for this line of business. In particular, it strongly discourages building mortgage servicing capabilities beyond a certain limited scale which will increase the cost of mortgage credit and drive servicing activities out of the banking industry. Banks are strongly incented to hedge the value of MSR through the accounting treatment of the asset. The risk from MSR is net of the hedged exposure. *We believe that the current treatment of MSR assets (100% risk weight and no threshold deduction) is effective and feel that a 250% risk weight is unwarranted.*”

JPMorgan Chase & Co.

“JPMC believes that adopting the proposed capital standard for MSRs is inconsistent with the economic risk associated with the MSR asset. The Agencies' proposed substantial capital impact on MSR should be supported by data accounting for increases in credit risk attributable to MSRs. In fact, to our knowledge, MSR-related weaknesses have not been a noteworthy contributor to bank credit risk or bank failures. Our experience does not support the high level of losses implied by the proposed capital requirement, nor are we aware of any model that would support such an increase in the capital associated with the MSR asset”

The proposed MSR capital treatment, by substantially increasing the costs of servicing, could potentially reduce the depth and capacity of the pool of qualified long-term servicers. Higher costs and a less stable industry outlook will reduce the incentive for servicers to adopt long term investments in the servicing business or build mortgage servicing capacity. The GSEs' ability to manage their servicing portfolios would be adversely affected by the reduction in the number of servicers capable of absorbing servicing transfers in case of servicer failures or involuntary servicer terminations.”

Arvest Bank Group, Inc.

“While MSRs are technically classified as intangible assets, they are directly related to profit producing contracts with actual value in the marketplace. There is far more similarity of MSRs to other earnings assets, such as loans, than to other intangible assets, such as a copyright on a patented process. MSRs generate specific cash flows and are subject to ongoing assessment for impairment. To exclude MSRs from capital is extraordinarily extreme and assumes there must be dollar-for-dollar capital to support MSRs to provide for a catastrophic loss. To treat MSRs as needing 100% capital essentially destroys the private involvement in mortgage servicing. While the MSR business is profitable, often times very profitable for skilled operators, profits available will not be sufficient to justify a 100% capital requirement”

Bank of America Corporation

“The cash flows associated with identifiable intangible assets, such as mortgage servicing rights, core deposits and purchased credit card receivables are well understood and predictable, so objective and supportable valuations can be established for these assets. The apparent extrapolation of the treatment of goodwill to these assets is not risk based as their value can be established without a high degree of uncertainty. Experience from the recent market turmoil demonstrates the resilience of mortgage servicing rights, for which values were maintained. The Committee's proposed treatment is disproportionate to the risk of these assets, which are typically hedged for prepayment risk, and places them in the same risk category as residual interests or sub investment grade securitization tranches. This contradicts the economic reality that payments to mortgage servicers are the highest priority claim on interest distributions in a securitization structure. Finally, full deduction of mortgage servicing rights would render the activity unprofitable for banks and drive it towards unregulated entities with less sophisticated risk management processes and weaker supervisory oversight.”

Appendix C – Comment letter excerpts that oppose MSR treatment, continued

First Horizon National Corporation

“As a result of the Capital Proposal, mortgage servicing assets includable in regulatory capital will decrease from the current 100% of Tier 1 to 10% of CET1, which would be a significant drop for those banks with large retail mortgage operations that retain servicing rights. Such banks would thus in many cases be significantly more inclined to sell loans with servicing rights released in light of the more severe limitations in the Capital Proposal. In recognition of the fact that this deduction would disproportionately affect banks with sizable retail mortgage positions that have been developed in reliance on their ability to retain servicing rights that would be fully includable in Tier 1 capital, we suggest that, at a minimum, existing MSAs should be grandfathered.”

Independent Bank Corporation

“The NPR would limit our Bank's ability to service mortgage loans for our customers by deducting any mortgage servicing rights in excess of 10% of common equity from capital. Furthermore, the punitive risk-weighting will create a strong incentive for this business to leave the banking industry.

Our customers enjoy having a local bank service their mortgage. Furthermore, this activity fits well with other retail banking strategies. We have found that servicing a customer's mortgage loan provides avenues for providing checking accounts and other banking relationships... We ask that the banking regulatory agencies significantly moderate the capital allocation for mortgage servicing rights. While mortgage servicing has a unique risk profile it is a key customer relationship for community banks.”

SunTrust Banks, Inc.

“SunTrust supports the Committee in its position that the capital base should be adjusted for any balance-sheet assets whose value(s) would be highly uncertain in times of stress or insolvency. However, SunTrust believes that mortgage servicing rights (MSR's) should not be classified as such an asset. Strong MSR markets exist and highly reliable valuation approaches supported by readily available, market-provided inputs are an industry standard. Though the pricing inputs themselves may be above or below historical averages during times of stress (as was the case recently), pricing would still be possible and, furthermore, would be possible to a relatively similar degree of certainty. SunTrust recommends MSR's not be considered in this adjustment.”

U.S. Bancorp

“The Company urges the Agencies to maintain the current risk-based capital treatment for MSAs. The proposed rules would increase the overall risk-weight for MSAs from 215% to 350%.

The Company believes that the current capital rules reflect fairly the valuation risks inherent in a bank's MSA portfolio. Mortgage servicing cash flows are contractual and have priority on GNMA and most private label residential mortgage-backed securities. FNMA and FHLMC mortgage-backed securities are paid directly to the servicers by these GSEs. The principal risks in MSA valuations are prepayment risk and increased servicing costs related to defaulted mortgages. These risks are addressed effectively in the increased sophistication of hedging programs, valuation models, improvement to model validation and review processes, and comprehensive stress testing processes which have advanced materially since the financial crisis.”

Wells Fargo & Company

“Wells Fargo is not aware of any MSA-related weaknesses that have been identified as contributing to the financial crisis and that would support a determination that such a significant increase in minimum capital requirements for MSAs is necessary. Given the increased effect of the proposed rules on the treatment of MSAs that will result from application of the BCBS Basel III standards alone, Wells Fargo urges the Agencies to determine that 100% of the fair value of MSAs may be recognized for regulatory capital purposes.”

Figure 1 – Research design using Basel III timeline

This figure depicts how we split the sample period into various sub-periods. The periods are based on the regulatory timeline detailed as part of Table 1. The sub-periods are defined as follows: the Basel period begins after the Basel Committee released the initial consultative document for Basel III (December, 2009) and ends when the details of the regulatory standards were agreed upon by the Basel Committee's oversight body (December, 2010). The FedReserve period then begins and extends through the date that the Federal Reserve approved a final rule based on the Basel Committee's proposed framework (June, 2013). The Adopted period then begins and extends through the final mandatory compliance date for FDIC-supervised banks (January 1, 2015).

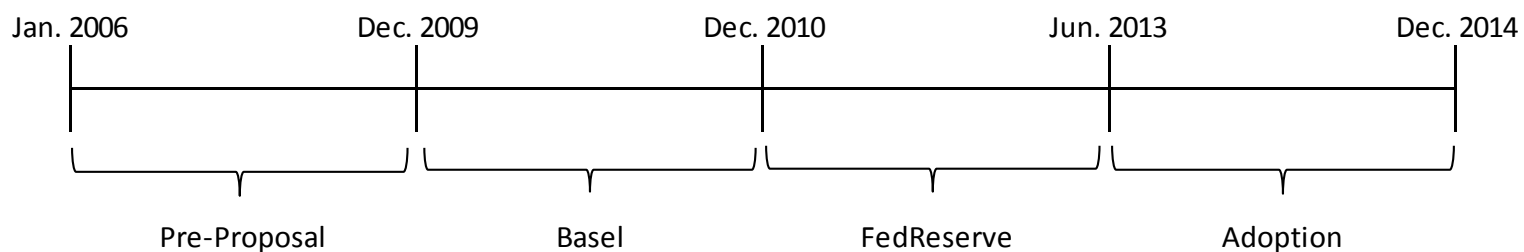


Figure 2 – Time series of MSR balances for Treatment and Control banks

This figure shows the quarterly average of MSR balances of each bank divided by the same bank’s MSR balance at the end of Q4 2009, when the Basel Committee released the initial Basel III consultative document. The graph plots these averages separately for treatment and control banks, with vertical lines dividing the post-announcement period into three distinct stages of rulemaking that are utilized in subsequent analyses.

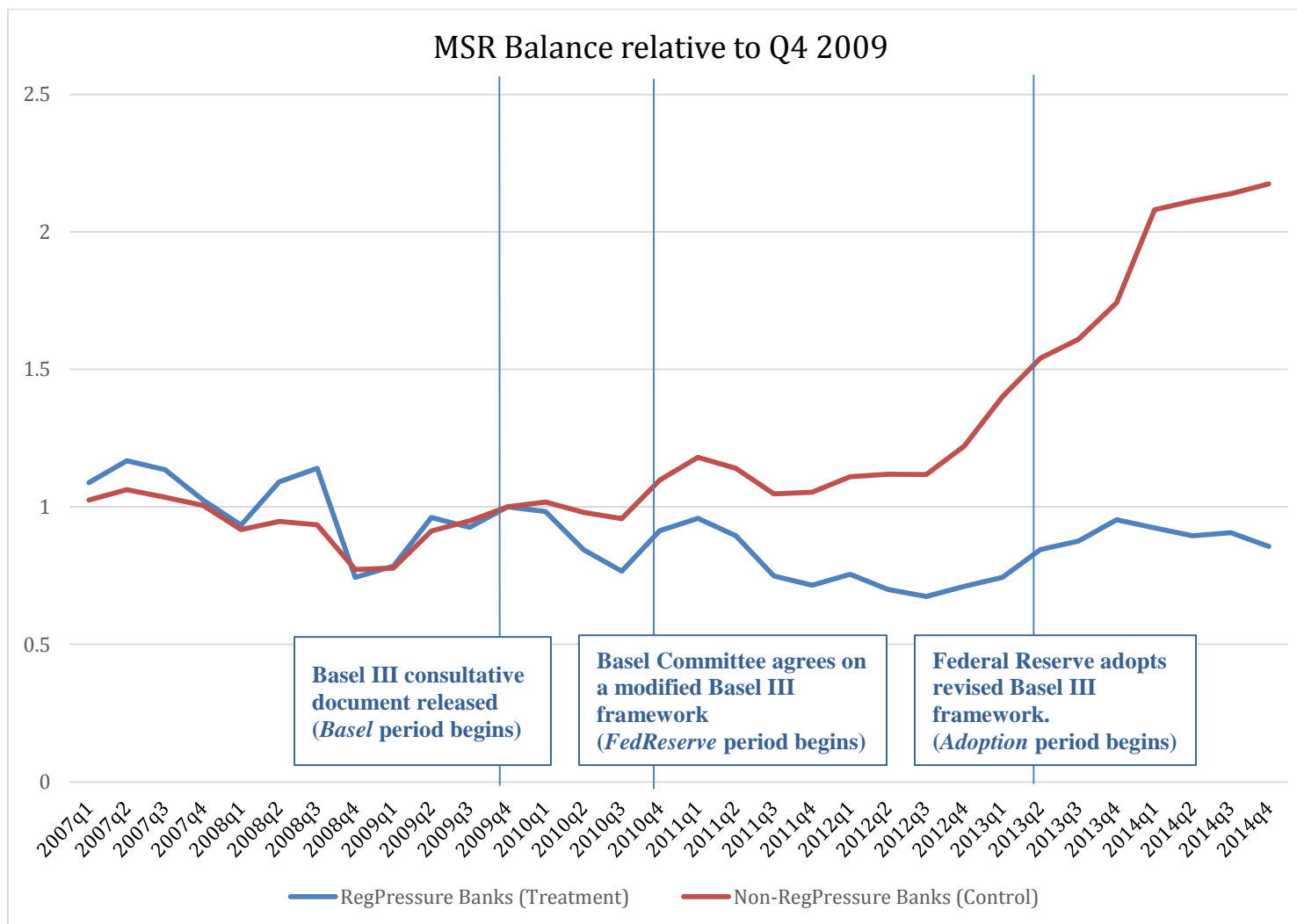


Table 1 – Timeline of the regulatory announcements related to Basel III

Event No.	Date	Regulatory Agency	Event Description
1	December 17, 2009	Bank for International Settlements	The Basel Committee issues “ <i>Strengthening the resilience of the banking sector</i> ”. This consultative document is a package of proposals aimed at promoting a more resilient banking sector. Included therein is the proposal that intangible assets (e.g., MSRs) be deducted from the equity component of Tier 1 capital. Comments invited by April 16, 2010.
2	July 26, 2010	Bank for International Settlements	The Basel Committee releases an annex that modifies several of the proposals included in the initial consultative document. One of these modifications is that MSRs receive limited recognition, capped at 10% of the equity component of Tier 1 capital, rather than being fully deducted.
3	December 16, 2010	Bank for International Settlements	The Basel Committee details the Basel III regulatory framework. The new framework reiterates the limited recognition of MSRs that was previously proposed and increases the risk-weighting of the MSRs included in the equity component of Tier 1 capital from 100% to 250%. A timeline is released that calls for banks to begin to comply with these rules in 2015.
4	April 3, 2012	Bank for International Settlements	The Basel Committee issues a progress report on members’ progress in adopting Basel III. The United States is classified as “1 – Draft regulation not published. This status corresponds to cases where no draft law, regulation, or other official document has been made public to detail the planned content of the domestic regulatory rules. This status includes cases where a jurisdiction has communicated high-level information about its implementation plans but not detailed rules.”
5	June 7, 2012	Federal Reserve Board of Governors	The Board issues three proposals that would implement both the Basel III regulatory capital reforms and the changes required by the Dodd-Frank Wall Street Reform and Consumer Protection Act. The Board proposes that the treatment of MSRs, outlined in the Basel III regulatory framework, be adopted. The Board proposes that this treatment be in addition to the current rules that only allow 90% of MSRs to be included in the common equity component of Tier 1 capital. The Federal Reserve specifically solicits comments on the treatment of MSRs in Question 35 of the proposed regulation. The Board invites comments by September 7, 2012.

Table 1 – Timeline of the regulatory announcements related to Basel III, continued

Event No.	Date	Regulatory Agency	Event Description
6	October 8, 2012	Bank for International Settlements	The Basel Committee issues a progress report on members’ progress in adopting Basel III. The United States is now classified as “2 – draft regulation published. This status corresponds to cases where a draft law, regulation, or other official document is already publicly available, for example for public consultation or legislative deliberations. The content of the document has to be specific enough to be implemented when adopted.”
7	April 12, 2013	Bank for International Settlements	The Basel Committee issues a progress report on members’ progress in adopting Basel III. The United States is still classified as ‘2 – draft regulation published.’
8	July 2, 2013	Federal Reserve Board of Governors	The Board approves the final Basel III rule with only minimal changes to the proposed treatment of MSRs. Specifically, the previous limitation that only 90% of MSRs be included in the common equity component of Tier 1 capital was removed in favor of the Basel Committee’s more stringent requirements. Implementation to begin on Jan 1, 2014 (Jan 1, 2015) for Advanced Approaches (non-Advanced Approaches) institutions.
9	October 1, 2013	Bank for International Settlements	The Basel Committee issues a progress report on members’ progress in adopting Basel III. The United States is now classified as “3 – final rule published. This status corresponds to cases where the domestic legal or regulatory framework has been finalized and approved but is still not applicable to banks.”
10	April 1, 2014	Bank for International Settlements	The Basel Committee issues a progress report on members’ progress in adopting Basel III. The United States is now classified as “4 - final rule in force. This status corresponds to cases where the domestic legal and regulatory framework is already applied to banks.

Table 2 – Sample Selection

<i>Panel A - U.S. commercial bank holding companies (quarterly observations)</i>	
Details	No. of Observations
Quarterly observations (Q1 2007 - Q4 2014) of banks that have an MSR balance for all quarters (including 2006 lagged values)	7,360
Less: Observations with Unpaid Principal Balance < \$1 million	(600)
Less: Observations with missing data in the variables used	(1,449)
Final sample	5,311
<i>Panel B - Public U.S. commercial bank holding companies (annual observations)</i>	
Details	No. of Observations
Final sample from Panel A	5,311
Less: Observations with no Permco or market price in CRSP. Permco's were used to identify banks that would be required to file Form 10-K with the SEC	(2,857)
Less: Observations from 2014, and Quarters 1 - 3 for all years because the 10-Q often does not contain a rollforward of the MSR balance	(1,464)
Less: Observations that are missing information necessary to roll forward the MSR balance	(510)
Final sample	480

Table 3 – Descriptive Statistics*Panel A: Full Sample*

Variables	N	mean	p25	p50	p75	sd
<i>Dependent Variables</i>						
<i>OTD</i>	5,311	11.152	0.429	5.177	14.728	15.935
<i>UPB</i>	5,311	13.067	11.791	12.597	13.798	2.080
<i>MSR_UPB (%)</i>	5,311	0.779	0.591	0.774	0.942	0.321
<i>Independent Variables</i>						
<i>Ln_Assets</i>	5,311	14.965	13.683	14.360	15.668	1.783
<i>Residential (%)</i>	5,311	20.081	14.713	19.779	24.810	7.413
<i>ROE (%)</i>	5,311	1.403	0.992	1.891	2.699	6.628
<i>10YrBond (%)</i>	5,311	2.990	2.230	2.730	3.530	0.906
<i>Unemployment (%)</i>	5,311	7.283	5.700	7.300	8.700	2.210
<i>RevMix (%)</i>	5,311	21.613	14.706	20.563	26.912	9.631
<i>RegPressure</i>	5,311	0.096	0.000	0.000	0.000	0.295
<i>MSR_Tier1 (%)</i>	5,311	3.257	0.648	1.738	3.696	4.913
<i>Letter</i>	166	0.349	0.000	0.000	1.000	0.477
<i>Oppose</i>	166	0.096	0.000	0.000	0.000	0.295

Table 3, continued – Correlations

Panel B: Correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>1 OTD</i>	1	0.50	0.18	0.26	-0.30	-0.06	-0.15	0.09	0.35	0.47	0.31	0.15	0.19
<i>2 UPB</i>	0.27	1	0.37	0.65	-0.17	-0.10	-0.08	0.05	0.42	0.63	0.40	0.23	0.43
<i>3 MSR_UPB (%)</i>	0.07	0.39	1	0.25	-0.17	0.00	0.20	-0.14	0.10	0.53	0.21	0.08	0.19
<i>4 Ln_Assets</i>	0.03	0.81	0.32	1	-0.11	-0.02	-0.06	0.02	0.38	0.02	0.19	0.21	0.43
<i>5 Residential (%)</i>	-0.27	-0.12	-0.18	-0.11	1	-0.07	0.09	0.07	-0.07	-0.10	-0.01	-0.01	0.05
<i>6 ROE (%)</i>	-0.03	-0.05	-0.01	-0.04	-0.03	1	0.01	-0.24	0.05	-0.06	-0.09	-0.01	-0.05
<i>7 10YrBond (%)</i>	-0.12	-0.06	0.19	-0.04	0.10	0.00	1	-0.22	-0.26	0.05	0.00	0.00	0.00
<i>8 Unemployment (%)</i>	0.05	0.02	-0.13	0.00	0.07	-0.06	-0.23	1	0.11	0.03	-0.03	0.09	0.06
<i>9 RevMix (%)</i>	0.31	0.50	0.12	0.42	-0.09	0.09	-0.24	0.08	1	0.25	0.26	0.20	0.37
<i>10 MSR_Tier1 (%)</i>	0.41	0.53	0.37	0.22	-0.04	-0.11	0.10	0.01	0.30	1	0.46	0.20	0.32
<i>11 RegPressure</i>	0.35	0.50	0.21	0.31	-0.02	-0.05	0.00	-0.04	0.35	0.64	1	0.15	0.52
<i>12 Letter</i>	0.07	0.31	0.08	0.27	0.01	0.00	0.00	0.11	0.22	0.18	0.15	1	0.45
<i>13 Oppose</i>	0.12	0.64	0.20	0.58	0.05	-0.01	0.00	0.07	0.44	0.44	0.52	0.45	1

Pearson pairwise correlations are in the lower left and Spearman correlations are in the upper right

Correlations that are statistically significant at the 10% level or lower are in bold

Table 3, continued – Descriptive Statistics of Treatment vs. Control banks

Panel C: Treatment vs. Control Banks, comparison of means as of Q4 2009

Variables	Levels - Q4 2009							
	Treatment (RegPressure) Banks - Q4 2009			Control Banks			=Diff in Mean (Treat-Cont)	
	N	mean	sd	N	mean	sd	Diff	t-stat
<i>Dependent Variables</i>								
OTD	16	32.467	28.651	150	10.353	15.463	22.114	4.92
UPB	16	16.436	2.672	150	12.713	1.658	3.723	7.97
MSR_UPB (%)	16	1.050	0.236	150	0.757	0.296	0.292	3.82
<i>Independent Variables</i>								
Ln_Assets	16	16.698	2.900	150	14.765	1.532	1.934	4.32
Residential (%)	16	19.945	7.706	150	20.424	7.253	-0.479	0.25
ROE (%)	16	-4.889	12.903	150	0.194	4.336	-5.082	-3.40
10YrBond (%)	16	3.850	0.000	150	3.850	0.000	0.000	0.00
Unemployment (%)	16	8.863	3.057	150	9.395	1.915	-0.533	-0.99
RevMix (%)	16	32.481	13.232	150	20.097	9.290	12.383	4.85
RegPressure	16	1.000	0.000	150	0.000	0.000	1.000	-
MSR_Tier1 (%)	16	16.987	5.659	150	2.312	2.213	14.675	20.54
Letter	16	0.563	0.512	150	0.327	0.471	0.236	1.89
Oppose	16	0.563	0.512	150	0.047	0.212	0.516	7.71

Panel D: Treatment vs. Control Banks, comparison of pre-announcement changes

Variables	Average quarterly change (trend) - 2007-2009							
	Treatment (RegPressure) Banks - Q4 2009			Control Banks			=Diff in Mean (Treat-Cont)	
	N	mean	sd	N	mean	sd	Diff	t-stat
<i>Dependent Variables</i>								
OTD	192	0.140	0.703	1,799	0.211	0.924	-0.071	-1.03
UPB	192	0.002	0.004	1,799	0.002	0.006	0.000	-0.03
MSR_UPB (%)	192	0.004	0.164	1,799	0.000	0.154	0.004	0.30
<i>Independent Variables</i>								
Ln_Assets	192	0.001	0.003	1,799	0.001	0.002	0.000	-1.49
Residential (%)	192	-0.002	0.056	1,799	-0.004	0.042	0.002	0.53
ROE (%)	192	-0.517	2.773	1,799	-0.333	2.147	-0.184	-1.09
10YrBond (%)	192	0.002	0.186	1,799	0.002	0.186	0.000	0.00
Unemployment (%)	192	0.069	0.114	1,799	0.071	0.121	-0.002	-0.20
RevMix (%)	192	0.030	0.320	1,799	0.030	0.238	0.000	0.00
RegPressure	192	0.000	0.000	1,799	0.000	0.000	0.000	0.00
MSR_Tier1 (%)	192	0.038	0.224	1,799	0.022	0.210	0.017	1.03
Letter	192	0.000	0.000	1,799	0.000	0.000	0.000	0.00
Oppose	192	0.000	0.000	1,799	0.000	0.000	0.000	0.00

Table 4 – Lobbying

Below are presented the results from OLS regression of *Letter* and *Oppose* on *RegPressure* and controls. *Letter* is an indicator variable that takes the value of one if the bank submitted a letter to rule makers, zero otherwise. *Oppose* is an indicator variable that takes the value of one if the bank submitted a letter to rule makers that opposed the proposed treatment of MSRs, zero otherwise. *RegPressure* is an indicator variable equal to 1 if the bank's ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise.

Variables	Dependent Variable			
	<i>Letter</i> (1)	Pred	<i>Oppose</i> (2)	<i>Oppose</i> (<i>Letter</i> =1) (3)
<i>RegPressure</i>	0.0568 (0.601)	+	0.3241*** (0.001)	0.2836* (0.091)
<i>Residential</i> _{<i>t</i>-1}	0.0008 (0.866)		0.0045* (0.067)	0.0032 (0.628)
<i>ROE</i>	-0.0057 (0.296)		-0.0030 (0.418)	-0.0142*** (0.003)
<i>Unemployment</i>	0.0396** (0.011)		0.0183** (0.014)	-0.0116 (0.542)
<i>RevMix</i>	0.0048 (0.228)		0.0041 (0.156)	0.0138** (0.050)
<i>Ln_Assets</i> _{<i>t</i>-1}	0.0573*** (0.009)		0.0702*** (0.000)	0.0730** (0.040)
Observations	166		166	58
R-squared	0.117		0.505	0.665

Robust standard errors; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 5 – Timing of changes in operational behavior and valuation

Below are presented the results from OLS regression of *OTD*, *UPB*, and *MSR_UPB* on *RegPressure* and controls (with the Basel III post-announcement period split into three periods – *Basel*, *FedReserve*, and *Adopted*). *OTD* is the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet. *UPB* is the natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others. *MSR_UPB* is the MSR balance divided by unpaid principal balance (UPB). *RegPressure* is an indicator variable equal to 1 if the bank's ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Pred	Dependent Variable		
		<i>OTD</i> (1)	<i>UPB</i> (2)	<i>MSR_UPB</i> (3)
<i>Basel*RegPressure</i>	-	-3.4700* (0.098)	-0.1203* (0.097)	-0.1124** (0.018)
<i>FedReserve*RegPressure</i>	-	-7.1519** (0.015)	-0.2835** (0.019)	-0.1755*** (0.002)
<i>Adoption*RegPressure</i>	-	-11.5202*** (0.001)	-0.6228** (0.025)	-0.1050* (0.073)
<i>Basel</i>		-2.6960*** (0.000)	0.0727*** (0.003)	0.0099 (0.445)
<i>FedReserve</i>		-5.6868*** (0.000)	0.0867* (0.059)	0.0228 (0.181)
<i>Adoption</i>		-12.9292*** (0.000)	0.0613 (0.351)	0.0680*** (0.004)
<i>Residential_{t-1}</i>		0.0817 (0.530)	-0.0047 (0.661)	-0.0092*** (0.007)
<i>ROE</i>		-0.0688*** (0.000)	-0.0007 (0.278)	-0.0001 (0.808)
<i>10yrBond</i>		-1.0720*** (0.000)	0.0222*** (0.000)	0.0883*** (0.000)
<i>Trend</i>		0.3828*** (0.000)	0.0112** (0.011)	0.0012 (0.444)
<i>Unemployment</i>		0.2971 (0.103)	0.0163*** (0.004)	-0.0137*** (0.000)
<i>RevMix</i>		0.3770*** (0.000)	0.0051* (0.077)	0.0006 (0.599)
<i>Ln_Assets_{t-1}</i>		0.7030 (0.735)		
<i>Ln_Assets</i>			0.3714** (0.041)	0.0450 (0.395)
Bank Fixed Effects		Included	Included	Included
Observations		5,311	5,311	5,311
R-squared		0.739	0.967	0.761

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 6 – The influence of market discipline on banks’ response to Basel III

Below are presented the results from OLS regression of *OTD*, *UPB*, and *MSR_UPB* on *RegPressure* and controls (with the Basel III post-announcement period split into three periods – *Basel*, *FedReserve*, and *Adopted*). *OTD* is the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet. *UPB* is the natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others. *MSR_UPB* is the MSR balance divided by unpaid principal balance (UPB). *RegPressure* is an indicator variable equal to 1 if the bank’s ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Pred	Dependent Variable					
		<i>OTD</i>	<i>OTD</i>	<i>UPB</i>	<i>UPB</i>	<i>MSR_UPB</i>	<i>MSR_UPB</i>
		<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>
		(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
<i>Basel*RegPressure</i>	-	-7.7519** (0.014)	2.4792 (0.804)	-0.2360* (0.053)	-0.0398 (0.397)	-0.1245*** (0.005)	-0.0793 (0.224)
<i>FedReserve*RegPressure</i>	-	-9.6025** (0.006)	-3.9668 (0.234)	-0.4715** (0.012)	-0.0984 (0.239)	-0.2132*** (0.000)	-0.1158 (0.117)
<i>Adoption*RegPressure</i>	-	-13.4454*** (0.000)	-8.9055* (0.097)	-1.0503** (0.024)	-0.1344 (0.176)	-0.1906** (0.015)	0.0068 (0.526)
<i>Basel</i>		-1.2571 (0.108)	-3.9105*** (0.000)	0.1406*** (0.003)	0.0195 (0.413)	0.0079 (0.722)	0.0103 (0.514)
<i>FedReserve</i>		-4.4853*** (0.000)	-6.5204*** (0.000)	0.1860** (0.033)	-0.0015 (0.968)	0.0339 (0.145)	0.0142 (0.565)
<i>Adoption</i>		-12.8701*** (0.000)	-12.5832*** (0.000)	0.1811 (0.151)	-0.0378 (0.479)	0.0953*** (0.003)	0.0488 (0.142)
<i>ResidentialL.</i>		0.2114 (0.410)	0.0048 (0.971)	0.0080 (0.748)	-0.0150* (0.052)	-0.0088 (0.117)	-0.0087* (0.052)
<i>ROE</i>		-0.0584 (0.142)	-0.0811*** (0.000)	-0.0021 (0.254)	0.0002 (0.674)	0.0004 (0.583)	-0.0003 (0.262)
<i>10yrBond</i>		-0.5428* (0.059)	-1.5716*** (0.000)	0.0151 (0.127)	0.0243*** (0.000)	0.1190*** (0.000)	0.0632*** (0.000)
<i>Trend</i>		0.4340*** (0.001)	0.3145*** (0.000)	0.0109 (0.224)	0.0115*** (0.003)	0.0035* (0.068)	-0.0008 (0.721)
<i>Unemployment</i>		-0.3462 (0.111)	0.8962*** (0.002)	0.0142* (0.100)	0.0188*** (0.003)	-0.0141*** (0.000)	-0.0128*** (0.001)
<i>RevMix</i>		0.3192*** (0.001)	0.4378*** (0.000)	0.0097* (0.082)	0.0020 (0.389)	-0.0012 (0.436)	0.0023 (0.158)
<i>Ln_AssetsL.</i>		1.6495 (0.616)	0.1625 (0.942)				
<i>Ln_Assets</i>				0.3664 (0.249)	0.3175* (0.057)	-0.0259 (0.673)	0.1287 (0.130)
Bank Fixed Effects		Included	Included	Included	Included	Included	Included
Observations		2,454	2,857	2,454	2,857	2,454	2,857
R-squared		0.692	0.773	0.966	0.967	0.759	0.767

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 7 – The influence of uncertainty on banks’ response to Basel III

Below are presented the results from OLS regression of *OTD*, *UPB*, and *MSR_UPB* on *RegPressure* and controls (with the Basel III post-announcement period split into three periods – *Basel*, *FedReserve*, and *Adopted*). *OTD* is the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet. *UPB* is the natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others. *MSR_UPB* is the MSR balance divided by unpaid principal balance (UPB). *RegPressure* is an indicator variable equal to 1 if the bank’s ratio of MSR’s to estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Pred	Dependent Variables					
		OTD		UPB		MSR_UPB	
		>\$10Bln (1a)	<\$10Bln (1b)	>\$10Bln (2a)	<\$10Bln (2b)	>\$10Bln (3a)	<\$10Bln (3b)
<i>Basel*RegPressure</i>	-	-8.7312** (0.030)	0.9510 (0.651)	-0.2625 (0.141)	-0.0551 (0.281)	-0.1310** (0.018)	-0.0673 (0.209)
<i>FedReserve*RegPressure</i>	-	-8.4802*** (0.035)	-5.3444 (0.119)	-0.4757** (0.046)	-0.1213 (0.169)	-0.1755*** (0.008)	-0.0956 (0.118)
<i>Adoption*RegPressure</i>	-	-12.3593*** (0.001)	-10.3978** (0.035)	-1.0168* (0.076)	-0.1864* (0.078)	-0.1719* (0.074)	-0.0118 (0.447)
<i>Basel</i>		-0.3449 (0.844)	-3.2369*** (0.000)	0.1285 (0.291)	0.0600*** (0.000)	0.0125 (0.662)	0.0083 (0.560)
<i>FedReserve</i>		-2.5188 (0.305)	-6.3799*** (0.000)	0.1562 (0.445)	0.0587* (0.058)	0.0299 (0.478)	0.0167 (0.358)
<i>Adoption</i>		-8.9195** (0.014)	-13.3454*** (0.000)	0.1651 (0.556)	0.0359 (0.474)	0.1088* (0.073)	0.0581** (0.022)
<i>Residential_{t-1}</i>		0.7092 (0.167)	-0.0247 (0.846)	0.0873** (0.011)	-0.0190** (0.045)	0.0013 (0.926)	-0.0103*** (0.002)
<i>ROE</i>		-0.0054 (0.913)	-0.0796*** (0.000)	-0.0044 (0.583)	-0.0005 (0.317)	-0.0006 (0.595)	-0.0002 (0.352)
<i>10yrBond</i>		0.1473 (0.747)	-1.3019*** (0.000)	-0.0083 (0.560)	0.0288*** (0.000)	0.1886*** (0.000)	0.0682*** (0.000)
<i>Trend</i>		0.3395* (0.089)	0.3693*** (0.000)	0.0156 (0.295)	0.0104** (0.014)	0.0080** (0.019)	-0.0007 (0.693)
<i>Unemployment</i>		-0.2553 (0.550)	0.4733** (0.014)	0.0239 (0.311)	0.0156*** (0.002)	-0.0110* (0.095)	-0.0146*** (0.000)
<i>RevMix</i>		0.1187 (0.143)	0.4802*** (0.000)	-0.0015 (0.730)	0.0080** (0.026)	-0.0022 (0.133)	0.0017 (0.248)
<i>Ln_Assets_{t-1}</i>		5.7265 (0.266)	-0.4207 (0.818)				
<i>Ln_Assets</i>				0.4385 (0.273)	0.3851* (0.056)	-0.0734 (0.352)	0.1226** (0.034)
Bank Fixed Effects		Included	Included	Included	Included	Included	Included
Observations		928	4,383	928	4,383	928	4,383
R-squared		0.650	0.759	0.952	0.933	0.675	0.771

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 8 – Changes in MSR valuations: an analysis of amortization and capitalization rates

Below are the descriptive statistics (Panel A) and the results from OLS regression of *MSR_UPB*, *AmortRate*, and *CapRate* on *RegPressure* and control variables (Panel B). *MSR_UPB* is MSR balance divided by unpaid principal balance (UPB). *AmortRate* is the amortization (or fair value adjustment) of MSR for the quarter divided by beginning MSR balance plus newly originated MSRs and MSR purchases for the year. *CapRate* is the number of dollars of unpaid principal balance (UPB) per dollar of MSR for additions to the MSR balance for the quarter. *Post* is an indicator variable that takes the value of one if the annual filing falls in the Basel, FedReserve, or Adopted time periods, zero otherwise. *RegPressure* is an indicator variable equal to 1 if the bank's ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Panel A: Descriptive Statistics

Variable	N	mean	p25	p50	p75	sd
<i>MSR_UPB</i>	480	0.789	0.615	0.752	0.941	0.298
<i>AmortRate (%)</i>	480	21.346	14.997	21.086	28.790	12.204
<i>CapRate</i>	426	4.913	4.583	4.895	5.259	0.811
<i>Ln_Assets</i>	480	15.878	14.515	15.292	16.680	2.077
<i>Residential (%)</i>	480	20.801	16.270	20.371	25.351	7.167
<i>ROE (%)</i>	480	0.624	1.066	1.895	2.678	6.743
<i>10YrBond (%)</i>	480	3.108	2.070	3.170	3.945	1.002
<i>Unemployment (%)</i>	480	7.079	5.400	7.300	8.650	2.392
<i>RevMix (%)</i>	480	23.307	15.927	22.551	29.239	9.206
<i>UPB</i>	480	14.192	12.439	13.248	15.414	2.541
<i>RegPressure</i>	480	0.150	0.000	0.000	0.000	0.357

Table 8, continued – Changes in MSR valuations

Panel B: Valuation Mechanisms Regression Analysis

Variable	Pred	Dependent Variable			
		MSR_UPB (1)	Pred	AmortRate (2)	CapRate (3)
<i>Post*RegPressure</i>	-	-0.1543*** (0.008)	+	4.2586** (0.019)	0.2268** (0.035)
<i>Post</i>		0.0492** (0.025)		5.5965*** (0.001)	0.1274 (0.263)
<i>Residential_{t-1}</i>		-0.0063 (0.118)		0.0287 (0.873)	.0215* (0.082)
<i>ROE</i>		0.0004 (0.609)		0.0824 (0.201)	0.0021 (0.557)
<i>10yrBond</i>		0.1050*** (0.000)		-8.6792*** (0.000)	-0.3909*** (0.000)
<i>Trend</i>		0.0031 (0.731)		-4.1027*** (0.000)	-0.1973*** (0.000)
<i>Unemployment</i>		-0.0038 (0.493)		1.1680*** (0.000)	-0.0227 (0.260)
<i>RevMix</i>		0.0020 (0.501)		-0.1580 (0.425)	-0.0043 (0.600)
<i>Ln_Assets_{t-1}</i>		-0.0206 (0.822)			0.5961** (0.026)
<i>Ln_Assets</i>				0.5328 (0.873)	
<i>UPB</i>					0.1841 (0.108)
Bank Fixed Effects		Included		Included	Included
Observations		480		480	426
R-squared		0.802		0.442	0.696

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 9 – Performance analysis

Below are presented the results from OLS regression of *LLP*, *ROA*, and *ROE* on *RegPressure* and controls. *LLP* is defined as the loan loss provision for the quarter, scaled by lagged total loans. *ROA* is net income divided by total assets. *ROE* is net income divided by total equity. *RegPressure* is an indicator variable equal to 1 if the bank's ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Dependent Variable				
	Pred	<i>LLP</i> (1)	Pred	<i>ROA</i> (2a)	<i>ROE</i> (2b)
<i>Basel*RegPressure</i>	-	-0.0431* (0.052)	+/-	-0.0004 (0.263)	-1.4558 (0.352)
<i>FedReserve*RegPressure</i>	-	-0.0834*** (0.004)	+/-	0.0008 (0.302)	0.6831 (0.487)
<i>Adoption*RegPressure</i>	-	-0.1026*** (0.000)	+/-	0.0002 (0.689)	-0.0029 (0.997)
<i>Basel</i>		-0.0198** (0.037)		0.0015*** (0.000)	1.5813*** (0.000)
<i>FedReserve</i>		-0.0525*** (0.000)		0.0026*** (0.000)	3.5775*** (0.000)
<i>Adoption</i>		-0.0936*** (0.000)		0.0028*** (0.000)	4.2914*** (0.000)
<i>LLP_{t-1}</i>		0.5228*** (0.000)			
<i>NPL_{t+1}</i>		0.0157*** (0.006)			
<i>NPL</i>		0.0362*** (0.000)			
<i>NPL_{t-1}</i>		0.0234*** (0.001)			
<i>NPL_{t-2}</i>		0.0209*** (0.000)			
<i>ΔLOANS</i>		-0.0060*** (0.000)			
<i>ΔGDP</i>		-0.0308 (0.759)			
<i>CaseShiller</i>		-0.2673** (0.015)			
<i>ΔUnemployment</i>		-0.0106** (0.021)			
<i>Ln_Assets_{t-1}</i>		0.1210*** (0.000)		-0.0013** (0.011)	-1.9268*** (0.005)
<i>10YrBond</i>				0.0005*** (0.000)	0.4941*** (0.008)
<i>Trend</i>				-0.0001*** (0.001)	-0.1711** (0.020)
<i>Unemployment</i>				-0.0002*** (0.000)	-0.2434*** (0.010)
<i>RevMix</i>				0.0001*** (0.000)	0.2382** (0.021)
Bank Fixed Effects		Included		Included	Included
Observations		5,092		5,092	5,092
R-squared		0.592		0.241	0.126

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 10 – Robustness test examining trends prior to the announcement of Basel III

Below are presented the results from OLS regression of *OTD*, *UPB*, and *MSR_UPB* on *RegPressure* and controls for 2008-2009 (the two years leading up to the release of the initial Basel III consultative document). *Crisis* is an indicator equal to 1 for the year 2009 and zero for the year 2008. This test is intended to identify the presence of non-parallel trends in the relations of interest between treatment and control banks in the time period preceding the initial Basel III announcement. *OTD* is the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet. *UPB* is the natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others. *MSR_UPB* is the MSR balance divided by unpaid principal balance (UPB). *RegPressure* is an indicator variable equal to 1 if the bank's ratio of MSRs to its estimated Basel III Tier 1 capital is greater than 10% as of December 31, 2009, and zero otherwise. The models omit the *RegPressure* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Pred	Dependent Variable		
		<i>OTD</i> (1)	<i>UPB</i> (2)	<i>MSR_UPB</i> (3)
<i>Crisis*RegPressure</i>	+/-	5.0970 (0.407)	-0.0874 (0.280)	-0.0594 (0.369)
<i>Crisis</i>		11.5562*** (0.000)	0.0988** (0.027)	-0.0194 (0.438)
<i>Residential_{t-1}</i>		0.3836 (0.315)	-0.0192* (0.083)	-0.0046 (0.489)
<i>ROE</i>		-0.0665 (0.102)	-0.0005 (0.472)	0.0003 (0.712)
<i>10yrBond</i>		-0.1269 (0.758)	0.0090 (0.381)	0.0881*** (0.000)
<i>Trend</i>		-2.0906*** (0.000)	0.0352*** (0.000)	0.0022 (0.663)
<i>Unemployment</i>		1.2807** (0.022)	-0.0260 (0.186)	-0.0134 (0.152)
<i>RevMix</i>		0.4125*** (0.009)	0.0016 (0.302)	0.0032** (0.014)
<i>Ln Assets_{t-1}</i>		-3.3637 (0.742)		
<i>Ln_Assets</i>			0.1410 (0.359)	-0.1098 (0.149)
Bank Fixed Effects		Included	Included	Included
Observations		1,328	1,328	1,328
R-squared		0.759	0.993	0.868

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.

Table 11 – Robustness test using continuous version of *RegPressure* variable

Below are presented the results from OLS regression of *OTD*, *UPB*, and *MSR_UPB* on *MSR_Tier1* and controls (with the Basel III post-announcement period split into three periods – *Basel*, *FedReserve*, and *Adopted*). *OTD* is the ratio of loans originated for resale during the quarter scaled by the beginning of the quarter mortgage loans on the balance sheet. *UPB* is the natural log of total quarter-end unpaid principle balance (UPB) on loans serviced for others. *MSR_UPB* is the MSR balance divided by unpaid principal balance (UPB). *MSR_Tier1* is the bank's ratio of MSR's to estimated Basel III Tier 1 capital as of December 31, 2009 (see additional details in Appendix A). The models omit the *MSR_Tier1* main effect as an independent variable since it remains constant across all quarters for a given bank. All other variables are defined in Appendix A. Standard errors are clustered by firm.

Variable	Pred	Dependent Variable		
		<i>OTD</i> (1)	<i>UPB</i> (2)	<i>MSR_UPB</i> (3)
<i>Basel*MSR_Tier1</i>	-	-0.2761** (0.014)	-0.0084* (0.062)	-0.0061** (0.013)
<i>FedReserve*MSR_Tier1</i>	-	-0.3408** (0.017)	-0.0163** (0.022)	-0.0145*** (0.000)
<i>Adoption*MSR_Tier1</i>	-	-0.8018*** (0.000)	-0.0349** (0.010)	-0.0093** (0.011)
<i>Basel</i>		-2.0543*** (0.007)	0.0916** (0.016)	0.0228 (0.128)
<i>FedReserve</i>		-0.4659 (0.652)	0.0960 (0.141)	0.0437* (0.074)
<i>Adoption</i>		-4.6438*** (0.000)	0.1029 (0.231)	0.0718*** (0.007)
<i>Residential_{t-1}</i>		0.1195 (0.354)	-0.0034 (0.755)	-0.0084** (0.013)
<i>ROE</i>		-0.0813*** (0.000)	-0.0005 (0.390)	0.0001 (0.789)
<i>10yrBond</i>		-0.9109*** (0.001)	0.0183** (0.029)	0.0867*** (0.000)
<i>Trend</i>		0.1113* (0.079)	0.0122*** (0.004)	0.0020 (0.165)
<i>Unemployment</i>		0.6342*** (0.001)	0.0137** (0.022)	-0.0154*** (0.000)
<i>RevMix</i>		0.4012*** (0.000)	0.0057* (0.054)	0.0010 (0.368)
<i>Ln_Assets_{t-1}</i>		0.9468 (0.651)		
<i>Ln_Assets</i>			0.3727** (0.043)	0.0434 (0.398)
Bank Fixed Effects		Included	Included	Included
Observations		5,311	5,311	5,311
R-squared		0.741	0.967	0.764

Standard errors clustered by firm; p-values in parentheses

***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 level, respectively. Where we have a predicted sign for the coefficient, significance levels are one-tailed.