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ABSTRACT

We estimate holdings of highly-rated tranches of mortgage securitizations of American deposit-taking banks ahead of the credit crisis and evaluate hypotheses that have been advanced to explain these holdings. We find that holdings of highly-rated tranches were economically trivial for the typical bank, but banks with greater holdings performed more poorly during the crisis. Though univariate comparisons show that banks with large trading books had greater holdings, the holdings of highly-rated tranches are not higher for banks with large trading books in regressions that control for bank size. The ratio of highly-rated tranches holdings to assets increases with bank assets, but not for banks with more than $50 billion of assets. This evidence is inconsistent with explanations for holdings of highly-rated tranches that emphasize the incentives of banks deemed "too-big-to-fail". Further, the evidence does not provide support for "bad incentives" theories of holdings of highly-rated tranches. We find, however, that banks active in securitization held more highly-rated tranches. Such a result can be consistent with regulatory arbitrage as well as with securitizing banks holding highly-rated tranches to convince investors of the quality of these securities. Our evidence supports the latter hypothesis.

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So-called toxic assets held by U.S. financial institutions were at the heart of the recent financial crisis. A mainstream view of the role of these assets is that their loss in value led financial institutions to have low capital, which forced them to raise more capital, to cut back on making loans, and to engage in fire sales (see Brunnermeier (2009)). The most visible and controversial policy initiative of the U.S. Treasury to deal with the crisis, TARP, started as an attempt to fund the purchase of toxic assets from banks. Though a vigorous debate has been taking place on why banks held these assets, to our knowledge, there is no systematic investigation of the various theories that have been advanced to explain these holdings. In this paper, we estimate bank holdings of assets that became toxic and investigate which of the various theories advanced to explain these holdings are consistent with the empirical evidence.

At least in the early phases of the crisis, the bulk of the assets that are considered to have become toxic were highly-rated securities issued in securitizations involving subprime and alt-A mortgages. This definition includes AAA, AA, and A tranches of ABSs as well as CDOs. For short, we will call these securities highly-rated securitization tranches. Banks made other losses; in particular, they made losses on non-prime mortgages and on highly levered loans held on their books. However, early on, the largest write-downs came from mark-to-market losses on highly-rated securitization tranches. For instance, in Q4 2007 Citibank had write-downs of $18 billion. All but $1 billion of these write-downs came directly or indirectly from highly-rated tranches of securitizations.[1]

Traditionally, banks were institutions that made loans financed by deposits. More recently, banks have been implementing an originate-to-distribute model, where they originate loans and sell them through securitizations. Before the crisis, it was widely believed that the originate-to-distribute model would make banks safer and reduce systemic risk (e.g., Greenspan (2004)). However, a substantial fraction of securities issued through securitizations did not leave the banking system and eventually became the banks' most notorious toxic assets. In trying to understand why the subprime losses were followed by a long-lasting financial crisis while stock market losses from the crash of 1987 that were of roughly similar magnitude were not, economists have argued that the key difference between the

[1] Bloomberg reports the dollar amount of write-downs by quarter and security type for large financial institutions.

subprime crisis and the stock market crash is that the subprime crisis led to large bank losses through the securities that they retained from securitizations while the crash of 1987 did not lead to significant bank losses (see Brunnermeier and Pedersen (2009) for this comparison). For instance, Acharya, Schnabl, and Suarez (2010) summarize their view of the origin of the crisis by stating that "banks increasingly devised securitization methods that allowed them to concentrate risks on their balance sheets which eventually led to the largest banking crisis since the Great Depression."

Though investment banks eventually reported information on their holdings of highly-rated tranches, they did not have reporting requirements that make it possible to consistently identify such holdings before the crisis. It is possible to estimate subsets of holdings of highly-rated tranches for individual investment banks that are not part of bank holding companies for 2006 or 2007 based on their disclosures. We provide such estimates in a separate section and discuss their implications for our analysis. For bank holding companies, we are able to construct estimates of holdings of such securities from 2002 to 2008. These estimates involve some crucial assumptions. However, our various approaches to estimate these holdings give similar overall results. Strikingly, there is large variation in holdings of highly-rated tranches across banks. The median holdings of highly-rated tranches normalized by total assets are less than 0.2%. Obviously, for the typical bank, these holdings were not material. The mean across banks was about 1.3% in 2006. Again, average holdings of highly-rated tranches across banks were not threatening. Banks with large trading portfolios (more than $1 billion of trading assets and trading assets representing more than 10% of total assets) had higher holdings, as the average for these banks represented about 5% of assets as of 2006. We would expect holdings of highly-rated tranches to be negatively related to bank performance during the crisis. We find that this is the case.

We identify a number of possible determinants of the holdings of highly-rated tranches from the ongoing debate as to why banks held these tranches. These determinants are not mutually exclusive. All determinants could affect the holdings of a particular bank. The most important determinants that have been discussed are:

A) Securitization business by-products. Banks engaged in securitization hold some of the securities they create through the process of creating and marketing these securities. In addition, banks had to have skin in the game (Shleifer and Vishny (2010), Gennaioli, Shleifer, and Vishny (2011)).

B) Regulatory arbitrage. Banks could hold the highest-rated tranches of securitizations with lower regulatory capital than the underlying loans, making it advantageous for them to hold loans in the form of securitizations (see Acharya and Richardson (2009) among others). They could also hold these tranches in off-balance sheet conduits and structured investment vehicles (SIVs), where the capital requirements were even less (Acharya, Schnabl, and Suarez (2010)). However, as the value of these tranches held in SIVs fell, some banks had to take them on their balance sheet.[2]

C) Bad incentives within the firm. The argument made is that banks had inappropriate incentive systems that made it advantageous for managers and/or traders to take excessive risks (e.g., Rajan (2010)), such as investing in assets that subsequently became toxic. This argument is summed up by Blinder as follows: "Give smart people go-for-broke incentives and they will go for broke. Duh."[3] In some cases, these bad incentives might have been the result of internal accounting mechanisms and/or economic capital attribution that did not properly account for the cost of holding these highly-rated tranches (see UBS (2008)). These securities had a higher yield than other highly-rated securities such as Treasuries or agency MBSs, which made their holdings advantageous, at least in the short term, for some types of bonus schemes. In addition, some argue that fees generated through the securitization activities created incentives for executives to securitize too many assets. According to this view, executives involved in these securitizations benefited from making deals rather than from placing them, in which case the bank would be stuck with tranches that could not be sold.

[2] See, for instance, "Citi finalizes SIV wind-down by agreeing to purchase all remaining assets," Citigroup Inc., November 19, 2008. In that release, Citi announced that "it has committed to acquire the remaining assets of the SIVs at their current fair value, estimated to be approximately $17.4 billion."

[3] See Alan S. Blinder, Crazy compensation and the crisis, The Wall Street Journal, May 28, 2009. Fahlenbrach and Stulz (2011) show, however, that banks whose CEOs had incentives better aligned with those of the other shareholders did not perform better during the crisis.

D) Good deals. The yields of highly-rated tranches of securitizations were higher than the yields of comparably rated securities. Consequently, it is possible that managers held these securities because they thought they were good deals. A related hypothesis is the hypothesis that market participants did not, in general, assess risks correctly because of biases (see Gennaioli, Shleifer, and Vishny (2011) for a model) or for other reasons, such as models that turned out to be flawed even though at the time they were believed to be valid.

E) Too big to fail. The argument is that banks that are assessed to be too big to fail have a lower cost of funds for risky assets because the market does not expect them to be allowed to fail (Carbo-Valverde, Kane, and Rodriguez-Fernandez (2010)). Therefore, these banks can make profits from investing in risky assets as doing so does not increase their cost of funding to the same extent it would for a bank that is not too big to fail. From this perspective, highly-rated tranches of securitizations would have been risky securities that such banks would have found to be profitable to hold. Because of how they are engineered, these securities pay off fully in most states of the world, but pay the least in states of the world where public support of financial institutions is most likely, namely in systemic crises.

These various explanations for holdings of highly-rated securitization tranches advanced in the finance literature as well as by observers in general are not mutually exclusive. It could be that for each explanation there is a subset of banks for which the explanation is the main reason these banks held highly-rated tranches. In this paper, we investigate whether any of these explanations helps explain the cross-sectional distribution of holdings of highly-rated tranches across banks just before the crisis.

In the next section, we develop these possible explanations for banks' holdings of highly-rated tranches and develop the testable implications of each theory. In Section 2, we explain how we construct our estimates for highly-rated tranches for depository banks and summarize these estimates. In Section 3, we investigate whether the performance of banks during the credit crisis is related to our estimates of their holdings of highly-rated tranches. We test the implications of the various theories in Section 4. In Section

5, we provide estimates of highly-rated tranches in 2006 or 2007 for the four large investment banks that were not bank holding companies. We conclude in Section 6.

Section 1. Theories of Holdings of Highly-Rated Tranches.

In Fama (1985), banks' cost of funding is a market cost of funding, but banks face a cost of doing business, the cost of the reserves they have to maintain, which means that to remain in business they have to charge an above-market rate to their lenders. This well-known result poses a paradox when considering banks' holdings of highly-rated tranches. If banks pay a market rate of return on their sources of finance and earn a market rate of return on their investments in securities, how can it be a positive NPV project for banks to hold securities? Whereas it is intuitive that a bank might monitor lenders and that this monitoring could create value, there is nothing intuitive about the notion that securities are more efficiently held by banks than by investors.

In the context of Fama (1985), if a bank believes that securities are properly priced, we would only expect it to hold securities to address unexpected liquidity demands from depositors and borrowers or as part of an inventory if it makes a market in these securities. However, the value of securities held as a liquidity buffer should be positively correlated with liquidity shocks rather than negatively. As a result, we would expect banks to hold safe securities for liquidity purposes or even, if possible, securities that have high payoffs in states of the world with a systemic liquidity shock. From this perspective, holdings of highly-rated tranches for liquidity purposes makes sense only if these securities were viewed as safe assets robust to systemic liquidity shocks. We would expect there to be economies of scale in the size of the liquidity buffer as liquidity demands on a large bank would be more predictable than on a small bank. Banks without a trading book would not make a market in these securities and hence would be expected to have smaller holdings of such assets.

We now consider the five groups of determinants of holdings of highly-rated tranches discussed in the introduction and derive testable hypotheses.

1.A. Securitization by-product.

Investors in securitization tranches know that the issuer has better information about the assets securitized than they do. This information asymmetry leads to discounting of the tranches. To reduce this discounting, the issuer can signal the quality of the assets by holding some of the securities issued alongside outside investors. In general, we would expect that it would be most efficient for issuers to have skin in the game in the form of the riskiest tranches, so that they would be the first to bear losses. However, holding the riskiest tranches is extremely expensive in terms of capital requirements. Therefore, banks that do not have slack in regulatory capital are more likely to hold highly-rated tranches. Further, the fraction of tranches that were highly rated in securitizations was extremely large (typically more than 70%), so that holding such tranches was a way for banks to convince investors that these tranches were good investments. Highest-rated tranches were also purchased by different sets of institutional investors (e.g., pension funds) than the lowest-rated tranches were (e.g., hedge funds). Though banks held securitization tranches voluntarily, the Dodd-Frank Act, Section 939A, mandates regulations that oblige issuers to have "skin-in-the-game." A bank that is active in the securitization market as an issuer has a pipeline of deals. If it produces CDOs, it will have an inventory of ABSs. As it issues ABSs and CDOs, it will have tranches that it sells immediately and others that it does not. It may make a market for tranches. Consequently, we would expect holdings of highly-rated tranches to increase over time as securitization activity increases. However, banks may also be stuck with highly-rated tranches that they cannot sell. As securitization activity slowed in 2007, holdings of highly-rated tranches should have increased to the extent that banks found it difficult to sell these tranches but failed to stop their production quickly enough. Therefore, we have the following predictions:

(Securitization H1; activity) Holdings of highly-rated tranches as a fraction of a bank's assets were higher for banks engaged in securitization activity.

(Securitization H2; cumulative activity) Holdings of highly-rated tranches for banks active in securitization increased over time as each securitization would require skin in the game.

(Securitization H3; end-of-game) Holdings of highly-rated tranches for banks active in securitization increased in 2007 to the extent that securitization activity did not slow down fast enough and banks were stuck with highly-rated tranches that they intended to sell.

1.B. Regulatory arbitrage.

Banks that do not have regulatory capital slack will always choose to organize their activities in a way that, everything else equal, minimizes the use of regulatory capital. U.S. capital regulations, starting in 2002, reduced the capital requirement for banks holding highly-rated tranches. Before the change in regulation, banks holding highly-rated tranches had to set aside 8% regulatory capital if these securities were not held in the bank's trading book. The trading book was subject to different regulatory capital requirements and these capital requirements were less onerous. Strikingly, with the regulations introduced in 2002, a bank that made subprime loans was better off to hold them on its books as securities issued against the subprime loans as collateral than holding the loans directly.[4] Further, the bank was even better off holding the securities in an off-balance sheet conduit or SIV. It is important to note, however, that regulatory arbitrage made it advantageous for banks to hold highly-rated tranches of securitizations if they benefitted from making the loans used as collateral in the first place since, otherwise, the more advantageous treatment of highly-rated tranches did not make them positive NPV projects. These regulatory capital benefits would not have been consequential for banks with a large excess amount of regulatory capital. In addition, small banks would not have found it beneficial to use securitization to reduce regulatory capital charges because of the fixed costs of securitization. Finally, with the start of the financial crisis, conduits and SIVs ran into trouble and some of their assets came back on the balance sheets of the bank sponsors.

Banks differ in the extent to which they optimize their use of regulatory capital. While some banks have large amounts of excess regulatory capital, others do not. Their business model makes it optimal for some banks to have more economic capital than regulatory capital. However, it is also possible that some

[4] See Goldman Sachs, Global Markets Institute, Effective Regulation: Part 1, March 2009, for an example.

banks are more intent in maximizing the size of their balance sheet for a given amount of regulatory capital. For assets with low capital charges, the highly-rated tranches were attractive because they had a higher yield than other assets with similar capital charges as they had more systematic risk (see Iannotta and Pennacchi (2011)). We would expect banks that were more intent on taking advantage of regulatory arbitrage opportunities to have grown their balance sheet when capital requirements for highly-rated tranches changed in 2002.

It follows that:

(Regulatory Arbitrage H1) Banks that are more constrained in regulatory capital and larger banks have greater holdings of highly-rated tranches as a fraction of assets.

(Regulatory Arbitrage H2) Banks that engage in more regulatory arbitrage activities have more highly-rated tranches.

1.C. Bad incentives.

Rajan (2006) raised concerns about the incentives in place in the financial industry and how they might lead to excessive risk-taking even before the crisis. A key characteristic of highly-rated tranches before the financial crisis is that they had a higher yield than similar highly-rated assets. Such a difference can arise in efficient markets simply because some assets have more systematic risk than others. For instance, these assets might have poor returns when the economy performs particularly poorly (see Coval and Stafford (2009)). If incentives are set properly, executives or traders should not benefit from investing in correctly priced assets that have a higher return only because they have more systematic risk. However, if incentives are set improperly, it is possible for executives or traders to benefit from profits generated by investing in such assets. First, traders whose performance is judged on P&L taking into account regulatory capital used and the cost of funds of the bank have incentives to invest in highly-rated tranches since their P&L increases by the positive carry of these assets and charges for regulatory capital are low. Second, executives whose performance is assessed by the ROE of their bank also benefit from investing

in highly-rated tranches as long as the yield on these securities exceeds the cost of holding these assets. Therefore, we have the following predictions:

(Bad incentives H1) Banks with trading operations and poor incentives have more highly-rated tranches.

(Bad incentives H2) Banks more focused on ROE hold more highly-rated tranches.

1.D. Good deals.

A possible explanation for holdings of highly-rated tranches is that bank managers thought that they were good deals in the sense that they were investments with high risk-adjusted expected returns. They could have thought that the higher yield of these securities compared to securities of similar rating was due to market mispricing, that the higher yield was compensation for the complexity of the securities, or that compensation for systematic risk that they felt was overstated. Managers could have believed that they were well-equipped to assess these securities, so that they did not have to be compensated to hold them. Irrespective of why the banks felt that investing in these securities created value for shareholders, we would expect that managers with stronger incentives to create value for shareholders would hold more of these securities if they were generally perceived to be priced inefficiently and if investing in these securities required more effort than investing in more standard securities. With this view, we have the following hypothesis:

(Good deal H1) Managers of banks that invest more in highly-rated tranches of securitizations have stronger incentives to maximize shareholder wealth.

1.E. Too-big-to-fail.

To the extent that a bank is viewed as too-big-to-fail, its cost of funds does not reflect the full extent of the risks it takes. The proponents of the too-big-to-fail view argue that, since a too-big-to-fail bank

does not pay for some of the risks it takes, the bank has incentives to take more of the risks it does not fully pay for. If a bank that is viewed as too-big-to-fail is expected to be bailed out whenever it makes large losses, the bank can increase its value by generally taking more total risk. If, instead, such a bank is likely to be bailed out only in systemic crises, it has incentives to take on more risks that have poor payoffs in systemic crises. Highly-rated tranches of securitizations were not risky securities that banks would have used to increase their overall riskiness since these securities were designed to pay off fully in most states of the world. As a result, too-big-to-fail banks would have had incentives to hold highly-rated tranches only if too-big-to-fail is believed to imply a greater probability of being bailed out in a systemic crisis but not otherwise:

(Too-big-to-fail H1) Banks deemed too-big-to-fail invested more in highly-rated tranches of securitizations than other banks.

The too-big-to-fail hypothesis ignores the possibility that a too-big-to-fail bank could be subject to more regulatory scrutiny, so that it might be limited in its risk taking. Further, such a bank can have high franchise value, which also would limit its risk taking.

Section 2. Estimated holdings of highly-rated tranches.

In this section, we explain first how we estimate holdings of highly-rated tranches and then provide data on our estimates.

2.1. Methods to estimate holdings of highly-rated tranches.

Our primary data source is the Consolidated Financial Statements for Bank Holding Companies (BHCs), form FR Y-9C, published quarterly by the Board of Governors of the Federal Reserve System. We focus on the cross-section of BHCs that are publicly traded in the United States and have data as of December 31, 2006. We drop all BHCs with missing data on total assets or with total assets less than $1

billion and end with a final sample of 231 banks as of December 31, 2006, the period we focus on in the majority of our estimations.[5] The total sample period over which we calculate holdings of highly-rated tranches covers March 2002 through December 2008. It starts in 2002 because this is the first year that capital requirements on securitization tranches were calculated based on credit ratings.

Our variable of interest is designed to measure holdings of what we call highly-rated tranches, which are highly-rated non-government and non-agency securities issued in securitizations and held on BHC balance sheets. Examples include highly-rated tranches of subprime RMBSs, CMBSs, CLOs, CBOs and CDOs. Bank holding companies did not explicitly report holdings of these securities in their consolidated financial statements during our sample period. Our approach is to "back out" the amount of highly-rated tranches banks held on their balance sheets using data from the regulatory-capital portion of the consolidated financial statements (schedule HC-R of the form FR Y-9C). Under risk-based capital guidelines, BHCs are required to hold regulatory capital against each asset, including securities, with the amount of capital determined by the type of the asset and/or the riskiness of the asset in the case of the securitization tranches. For example, government securities usually require zero risk-weighting while agency-sponsored securities are generally assigned a 20% risk weight by virtue of their implicit government guarantees. Securitization tranches with a credit rating of AA or AAA are assigned a 20% capital charge while tranches with credit ratings of A require a 50% capital charge.

Our approach is to identify the amount of securities in the 20% and 50% risk-weight categories that are not government or agency-affiliated. Reporting guidelines name the specific types of securities that are to be included in each risk weight category and instruct BHCs to account for securities at historical cost, as opposed to fair value. For example, the total amount of held-to-maturity securities (line item 35 in Schedule HC-R) in the 20% risk-weight category contains various securities issued or guaranteed by the

[5] We drop BHCs that are not in the top tier of the multi-tiered BHCs to avoid double counting. We also drop 3 BHCs that are insurance companies, 2 BHCs that are mortgage brokers, 2 BHCs that are credit card companies and one asset-management BHC that is an outlier in our sample.

government or government-sponsored agencies and reported in Schedule HC-B.[6] The key to our measure of highly-rated tranches is that BHCs are instructed to also include, "all other residential MBS," "commercial mortgage pass-through securities," "other commercial MBS," "asset-backed securities," and "structured financial products" that represent the amortized cost of securities rated AAA or AA in this 20% risk category. Thus, the residual amount of securities included in the 20% risk category that are not affiliated with the government or government-sponsored agencies represent the amount of AAA or AA-rated private-label structured debt held by BHCs. The instructions for assets to be included in the 50% risk category are similar but for A-rated securities. Taken together, the 20% risk-weighted residual and the 50% risk-weighted residual represent the portion of highly-rated (AAA, AA, or A rated) non-government, non-agency securities held on BHC balance sheets. In other words, they represent the holdings of highly-rated tranches that we seek to measure. We provide the details of the construction of the residual measures, including the relevant FRY9-C codes, in data Appendix 1.

Many of the highly-rated tranches with 20% or 50% risk weights are accounted for as available-for-sale (AFS) or held-to-maturity (HTM) securities. However, some highly-rated tranches, especially in the case of the largest banks, are held separately in a BHC's trading account. Identifying these securities in the trading accounts is difficult because, for regulatory-capital purposes, banks with large trading operations do not report individual risk-weighted trading assets.[7] Rather, they compute a value-at-risk (VaR) for their entire trading operation. For the banks that are subject to the market risk capital guidelines, we are unable to use the residual approach to back out holdings of highly-rated tranches in trading books. To capture holdings of securitization tranches, we use the total amount of line items that are recorded as trading assets (in Schedule HC-D) and represent non-government, non-agency mortgage-backed securities. This approach captures the private-label securitization tranches with mortgage

[6] These securities are securities issued by government-sponsored agencies (line item 2b), residential mortgage pass-through securities issued by FNMA and FHLMC (line item 4a2), securities issued by states or political subdivisions in the U.S. (Item 3), and other MBSs (collateralized by MBSs) issued or guaranteed by agencies (line items 4b1 (line item 4b2)).

[7] Bank holding companies are subject to "market risk capital" guidelines if their trading assets exceed 10% of total assets or if their trading assets exceed $1 Billion.

collateral in a BHC's trading account, but without differentiating the credit quality of these securitization tranches.[8] Adding the securitization tranches from the trading account to the 20% and 50% AFS and HTM residual results in our primary measure of highly-rated tranches, which we refer to as the "Highly-Rated Residual" hereafter. This measure overstates holdings of highly-rated tranches of MBSs because it includes lower-rated tranches held in the trading book, but it understates holdings of highly-rated tranches because the data available from the trading book does not include CDOs.

Our primary analysis investigates the holdings of highly-rated tranches before the crisis started. We therefore focus on holdings as of December 31, 2006. Beginning in June 2008, BHCs have been required to explicitly report the amount of CDOs held in their trading accounts if the BHC reported a quarterly average for trading assets of $1 billion or more in any of the four preceding quarterly reports. We supplement our December 2006 estimates of highly-rated tranches by adding the amount of CDOs reported in June 2008 to our first measure, "Highly-Rated Residual," as of December 2006.[9] It is likely that the June 2008 values of CDOs under-report the value of CDOs held on BHCs' balance sheets as of 2006 because the value of CDOs were written down in the fall of 2007 and early 2008. To account for this possibility, we create another measure by adding the amount of CDO write-downs (downloaded from Bloomberg) for the time period December 31, 2006 through the June 30, 2008 to the June 2008 CDO totals for each of the relevant banks.

In summary, our residual approach yields three separate measures of highly-rated tranches. The first is the "Highly-Rated Residual," which includes 20% and 50% residuals as well as MBS Trading. The second measure, constructed to account for the CDOs held in trading assets, adds 2008 CDOs to our first measure ("Highly-Rated Residual + CDOs" hereafter). The third one, which also adds the CDO write-downs, is named the "Highly-Rated Residual + CDOs and Writedowns."

[8] Nadauld and Sherlund (2010) show that over 80% of the value-weighted bonds in subprime RMBS deals received a AAA rating, with close to 90% rated at least A. Although we cannot use the residual approach to identify the holdings of highly-rated tranches in trading assets, it is likely that these securities were highly rated. This is especially true in light of the fact that correlation traders in hedge funds were frequent purchasers of the lowest rated (residual) tranches in securitization deals.

[9] Only four banks in our final sample held enough CDOs in their trading portfolio to warrant explicit reporting of the amount in the June 2008 FR-Y9C.

Our final measure of highly-rated tranches holdings, which we call the "Bottom-up Highly-Rated Tranches" measure, is borrowed from Cheng, Hong, and Scheinkman (2010). This measure is basically the sum of each line item from the AFS, HTM, and trading asset accounts that corresponds to non-government, non-agency sponsored securities. It includes "other mortgage-backed securities" and "asset-backed securities" from the AFS and HTM securities (Schedule HC-B). Non-government, non-agency mortgage-backed securities from trading assets (Schedule HC-D) are also added. Data Appendix 1 provides the detailed data fields associated with the construction of this bottom-up measure. While the measure explicitly assesses the amount of non-government, non-agency securities held on BHCs' balance sheets, it does not capture the credit quality of these assets. Like our first measure, the bottom-up measure is constructed using data reported at the end of 2006 and therefore does not include CDO holdings in trading accounts.

2.2. Estimates of holdings of highly-rated tranches.

Our analysis in this paper focuses on the holdings of highly-rated tranches at the bank level. We always normalize the holdings by bank assets. However, before turning to normalized holdings, it is useful to briefly discuss the dollar amount of holdings within our sample. Figure 1 shows the evolution of total holdings of highly-rated tranches using our primary "highly-rated residual" measure. At the end of 2006, the last year before the crisis, the banks in our sample held $228 billion of highly-rated tranches. The holdings of these tranches increased dramatically since the start of our sample in 2002. In 2002, the total holdings of highly-rated tranches were $64 billion. The total holdings keep increasing after the end of 2006, experiencing an especially sharp increase in the last quarter of 2007.

Table 1 shows data on our estimates of holdings of highly-rated tranches by BHCs. We first show summary statistics for our primary "highly-rated residual" measure (see Panel A). Although this measure is available from 2002 onwards, we specifically focus on 2006. We have data for 231 BHCs. The median holdings of highly-rated tranches (as a ratio of total assets) are 0.15%. Such a holding is of trivial importance for a bank. So, for the typical bank, holdings of highly-rated tranches were not a material

concern.[10] However, the mean holdings of highly-rated tranches are 1.13%, almost ten times the median. Such a result implies that some banks have large holdings of highly-rated tranches compared to the typical bank. We show the 90th percentile of holdings of highly-rated tranches, which is 3.13%.

In 2006, only 54 of the BHCs in our sample reported trading assets. Of these banks, 14 had trading assets in excess of $1 billion and in excess of 10% of the bank's assets. These "large trading banks" had holdings of highly-rated tranches averaging to 4.75%. One way to understand the economic importance of such holdings is that the Basel I accord required banks to have capital equal to 8% of risk-weighted assets, half of it in Tier 1 capital. Banks usually hold more regulatory capital than required, but an 80% loss on highly-rated tranches would almost wipe out a bank's Tier 1 required capital for a large trading bank. In contrast, the mean of the holdings of highly-rated tranches for the banks that did not report trading assets was 0.78%. We also reproduce the holdings of the three largest banks. While these holdings are large for Citibank at 4.78%, they are below the mean for both Bank of America (1.04%) and JP Morgan Chase (0.63%).

Panel A also reports information on holdings of highly-rated tranches for other years, from 2002 to 2008. Neither the mean nor the median changes noticeably during that period of time. The mean increases from 1.29% in 2002 to 1.50% in 2005. After 2005, the mean falls, reaching 1.13% in 2008. For the large trading banks, the mean increases more noticeably and drops more sharply after peaking in 2006. However, there are only 14 large trading banks in 2006. The number of large trading banks falls to 12 by the end of 2007. The large decrease in highly-rated tranches for large trading banks in 2007 is due to the merger of the Bank of New York and Mellon. Both banks have high holdings, but the resulting entity is not in our sample for 2007 as it is not alive at the end of 2006. If we look instead at the holdings of banks alive both at the end of 2006 and of 2007, the mean holdings of highly-rated tranches is 2.94% at the end of 2006 and 3.07% at the end of 2007. The three largest banks have a different pattern. Citibank's holdings more than double over time and reach a peak in 2007. In contrast, neither Bank of America nor

[10] Note that the typical bank does not have a trading book. Consequently, for the typical bank, our estimate of highly-rated tranches is unbiased.

JP Morgan Chase exhibits much of an increase in holdings until 2007 and 2008. The holdings of JP Morgan Chase increase from 1.06% in 2006 to 2.55% in 2008. We are unable to ascertain the extent to which this increase results from the acquisitions of Bear Stearns and Washington Mutual.

The next panel of Table 1 uses information on CDO holdings. CDO holdings do not affect the median and have a trivial effect on the mean because only six banks report holdings of CDOs in excess of $1 billion, the reporting threshold. The holdings of highly-rated tranches for the banks with large trading books increase only by 0.01%. Panel C adds information on write-downs. Taking into account write-downs has no impact on most banks. However, the holdings of highly-rated tranches for Citibank increase further to 5.68%. The holdings of Bank of America increase to 1.88%. Finally, the holdings of JP Morgan Chase remain under 1%.

The final panel of Table 1 shows our estimates using the bottom-up approach. There is no meaningful difference between these estimates and the estimates using our preferred approach for most banks. When we turn to the large trading banks, the bottom-up measure has a mean that is higher by 0.29% in 2006. The two methods yield different estimates for Citibank and Bank of America. For Citibank, the bottom-up method has an estimate that is lower by 0.89%. For Bank of America, the difference of 0.79% is in the opposite direction.

In summary, for most banks, holdings of highly-rated tranches as a proportion of assets were less than 1% of assets. These holdings were small for some large banks – such as JP Morgan – but the banks with large trading assets had on average holdings that were roughly 30 times greater than the holdings relative to assets of the typical bank. The average securities holdings of banks with large trading assets are only 24% higher than the average securities holdings of the banks without large trading assets. Consequently, it is quite clear that banks with large trading assets allocate much more of their securities holdings to highly-rated tranches.

Section 3. Stock Returns and Highly-Rated Tranches.

To examine the validity of our measures of highly-rated tranches, we test whether they explain stock returns of bank holding companies during the financial crisis. We calculate each bank's buy-and-hold excess return over the equally-weighted market return for the time period from July 1, 2007 through December 31, 2008. We then regress these buy-and-hold returns on the four different BHC-specific measures of highly-rated tranches holdings as of December 31, 2006. To account for potential nonlinearities in the relation between these holdings and returns, we sort firms into quintiles based on their holdings and construct dummy variables for banks in each quintile. The quintile with the lowest amount of highly-rated holdings serves as the omitted group. We expect banks in the highest quintiles of highly-rated tranches holdings as of December 2006 to be associated with lower returns during the subsequent financial crisis.

We control for some bank attributes, such as the bank's market capitalization, prior returns, market-to-book, and Tier 1 leverage, which are likely to influence stock returns. The size of a bank's other securities holdings is also expected to affect the returns over the period of the financial crisis. Therefore, we control for "other" securities' holdings of held-to-maturity and available-for-sale securities and "other" trading securities in all regressions.[11] We control for banks' real estate as well as commercial and industrial (C&I) loan exposure in the form of mortgage and C&I loans, scaled by total assets. Banks also had unused commitments to make residential and commercial real-estate loans. Following Loutskina and Strahan (2011), we control explicitly for such unused loan commitments.

We present the results in Table 2. Firms in the top quintile of highly-rated tranches holdings are associated with about 14% lower returns, on average. For banks in the top quintile, the average of the ratio of holdings of highly-rated tranches to equity market capitalization at the end of 2006 is 29.63% (the median is 17.02%). The lower returns we document are therefore consistent with the size of the holdings and the magnitude of losses on highly-rated tranches that have been documented. The negative coefficient

[11] The term "other" securities generally refers to holdings of government, agency, and non-highly-rated private-label securities. The appendix contains a precise description of securities included in our measures of "other" H.T.M. and A.F.S. securities and "other" Trading securities.

on the top quintile is statistically significant for all measures of highly-rated tranches except for the bottom-up measure. The impact of highly-rated tranches holdings on returns is lower for banks that have low holdings. Banks in the 2nd lowest quintile of holdings are associated with an estimate of 5% lower returns, which is statistically insignificant. As in Loutskina and Strahan (2011), unused loan commitments have a significantly negative impact on returns. As expected, banks with higher exposures to real estate through mortgage and C&I loans had significantly negative returns. Other HTM and AFS securities are associated with larger returns, as are firms with higher market-to-book ratios. Prior returns, market capitalization, and Tier 1 do not have significant coefficients explaining returns. Taken together, these results provide evidence that our constructed measures of highly-rated tranches holdings predict bank stock return performance, which is what one would expect if the poor performance of these highly-rated tranches was unexpected.

Section 4. Why Did Banks Hold Highly-Rated Tranches?

In this section, we test the hypotheses developed in Section 2 using the estimates of highly-rated tranches presented in Section 3. We test each hypothesis in turn. We estimate regressions where the dependent variable is the fraction of highly-rated tranches held by a bank, normalized by its assets. In all regressions, we control for the returns of the bank in 2005-2006, the market-to-book ratio, Tier 1 leverage, and the holdings of other securities as of 2006. For the holdings of other securities, we consider separately other securities held to maturity and available for sale as well as other trading securities. Since these holdings exclude the highly-rated tranches, there is no mechanical relation between these holdings and holdings of highly-rated tranches. Panel B of Appendix 1 provides the details of the construction of the explanatory variables used in this section.

We also control for bank asset size. The impact of BHC asset size on highly-rated tranches is likely to be nonlinear. Therefore, we construct a piece-wise linear specification which breaks up the impact of asset size into two separate variables. We allow for a possible change in the relation between asset size and holdings of highly-rated tranches at $50 billion because banks with assets in excess of $50 billion are

more likely to be systemically important.[12] The first variable, named "$0-50 Billion," captures the impact of the first $50 billion worth of assets on holdings of highly-rated tranches. All BHCs with less than $50 billion in assets take the value of their asset size while BHCs with assets greater than $50 billion take the value of $50 billion. The second variable, which is named ">$50 Billion," takes a value of 0 for all BHCs with less than $50 billion in assets while it takes the actual asset size minus $50 billion for BHCs with greater than $50 billion worth of assets. In this way, the estimated coefficients on the piece-wise specification are additive and hence the sum of the two coefficients estimates the relation between asset size and holdings of highly-rated tranches.

The regressions in Table 3 show estimates of the regressions using these variables only. We see that banks' holdings of highly-rated tranches increase as their size grows, but only up to $50 billion. For banks that have more assets than $50 billion, the fraction of assets held in highly-rated tranches does not increase with size. As discussed in Section 2, such an increase would be expected with the too-big-to-fail hypothesis. Consequently, the evidence in Table 3 is inconsistent with the hypothesis that too-big-to-fail was a factor influencing holdings of highly-rated tranches (Too-big-to-fail H1). More formally, we can reject the hypothesis that too-big-to-fail banks invested more of their assets in highly-rated tranches at the 5% level. We therefore conclude that the too-big-to-fail hypothesis is not supported by the data. There is also no evidence that banks that held larger portfolios of trading securities other than highly-rated tranches held more securities in the form of highly-rated tranches. Finally, none of the remaining control variables are significant. Importantly, the results are the same irrespective of the estimate of highly-rated tranches we use.

We investigate extensively the robustness of the results in Table 3 concerning the relation between highly-rated tranches holdings and bank size. In particular, we use different piece-wise linear specifications. With the first one, we allow for different slopes for banks with assets below $50 billion, between $50 and $250 billion, and above $250 billion. Again, we find no evidence that the largest banks hold more highly-rated tranches. In another specification, we consider separately banks with assets below

[12] Institutions with more than $50 billion in assets are treated differently in the Dodd-Frank Act.

$100 billion and assets above $100 billion. With this latter specification, the coefficient on the largest banks is negative (the coefficient is -0.072) and significant at the 10% level. The largest banks do not hold more highly-rated tranches with that specification either.

4.1. Securitization by-product hypothesis.

As argued by Shleifer and Vishny (2010), in the presence of asymmetric information regarding the quality of the loans, banks must retain some portion of the loans securitized.[13] Traditional signaling theories further conclude that, in the presence of asymmetric information regarding asset quality, agents with an information advantage must retain assets of the lowest quality if the signal is to be viewed as credible.

In a credit-tranched securitization context (non-agency RMBS and CDO's), such theories predict that BHCs underwriting securitization deals hold the equity tranche and lower-rated junior tranches as a credible signal of deal quality. Our data does not capture the holdings of equity tranches and other low-rated tranches. But "skin-in-the-game" as an explanation for the retention of the AAA, AA, and A-rated assets that we measure can be motivated through a catering argument. That is, BHC's originate securitizations which contain tranches with payoff structures which cater to specific investor preferences. For example, junior tranches cater to correlation traders betting on the survival or default of a junior tranche as a function of collateral correlation (see Nadauld, Sherlund, and Vorkink (2011)). Senior tranches cater to institutional investors with a mandate to invest in high credit-quality assets. If BHCs are indeed catering to the high credit-quality demands of institutional investors, signaling might still be required. So, BHCs could retain even the highly-rated portions of the resultant securities in order to signal the quality of a securitization deal to the institutional investors.

[13] The requirement that securitizing banks retain a portion of the securitization is not derived explicitly in Shleifer and Vishny (2010). Rather, they rely on a prior literature in making this assumption. Prior literature proves theoretically the "skin-in-the-game result" in the presence of asymmetric information and provides empirical evidence in support of the result (see Gorton and Pennacchi (1995), Sufi (2007), and Holmstrom and Tirole (1997)).

We test whether securitization-active banks held more highly-rated tranches as of December 31, 2006. We define a BHC as being securitization-active if the outstanding principal balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is non-zero in any of the years 2003, 2004, 2005, or 2006. According to this definition, 49 BHCs in our sample are active in securitization. We estimate highly-rated tranches as a function of the securitization-active indicator, the piece-wise size variables, and the standard set of controls employed in previous tables. Results are presented in Table 4.

We produce results for the "highly-rated residual" and "highly-rated residual + CDOs" measures of highly-rated tranches and report them in columns (1) and (2). We find that securitization active banks hold more highly-rated tranches. The coefficient on the indicator variable is 0.015 in both specifications, indicating that these banks hold 1.5% more of their assets in the form of highly-rated tranches. Such an effect is economically significant since the standard deviation of highly-rated tranches holdings is 3.1%. The estimated coefficients on the step-wise size variables are diminished but not wholly subsumed by the presence of the securitization-active indicator, suggesting that securitization activity is not a manifestation of asset size alone. Though we do not report the results for the "bottom-up highly-rated tranches" and "highly-rated residual + CDOs and Writedowns" measures, the regression estimates are very similar to those reported in columns (1) and (2). In regressions (3) and (4), we use the change in the securitization activity of a bank four quarters apart. We see that holdings of highly-rated tranches increase with the change in securitization activity. We interpret the results as being consistent with a "skin-in-the-game" hypothesis. However, it is important to stress a limitation of our data. We cannot tell whether a bank holds highly-rated tranches from its own securitizations or from securitizations produced by other banks. The "skin-in-the-game" hypothesis would suggest that the bank retains its own securitizations. Yet, there could be signaling value to a firm from holding securitization tranches even if they are not its own if the intent is to demonstrate the value of securitization tranches.

The measure of securitization we use is a measure based on a bank's own securitization activities. Alternatively, we could use a measure of participation of banks in the underwriting of securitizations. To

do so, we create an indicator variable for any BHC, which shows up in the League Tables of RMBS, CLO, CBO, or CDO securitization activity ("Securitization-league-table Indicator").[14] Out of 231 banks in our December-2006 sample, 12 banks meet the criterion. We show the regression estimates with this measure in columns (5) and (6) of Table 4. We find that these estimates are positive but not significant.

We saw in Figure 1 that the aggregate dollar amount of highly-rated tranches holdings increased through time. The increase is supportive of the role of securitization as a determinant of holdings of highly-rated tranches. To check this hypothesis further, regressions (5) and (6) of Table 4 use an estimate of a bank's loan pipeline. Our "loan pipeline" measure calculates the average amount of retail and wholesale closed-end first and junior lien loans made on 1-4 family residential properties that were for sale during the year 2006, scaled by total assets. In regressions utilizing the loan-pipeline measure, we estimate our dependent variable, highly-rated tranches, as of 2007. This measure is not significant in explaining banks' holdings of highly-rated tranches.

Figure 1 shows that the aggregate dollar of highly-rated tranches experienced an especially sharp increase from the last quarter of 2006 to the last quarter of 2007. This increase is supportive of the hypothesis that banks accumulated highly-rated tranches rapidly as the market turned because they had trouble selling these tranches. However, even though the aggregate amount of highly-rated tranches increased the most from 2006 to 2007, total assets increased as well, so that the large dollar increase is not accompanied by a noticeable increase in percentage holdings. Consequently, the evidence on percentage holdings does not support the view that banks accumulated holdings at a rapid pace in 2007. Their behavior is consistent with having kept their allocation to highly-rated tranches roughly constant.

Next we explore whether highly-rated tranches increased over time as a result of the increase in securitization activities further. For that purpose, we run regressions of the year-over-year change in holdings of these tranches on the year-over-year changes in the outstanding principal balance of assets sold or securitized (with servicing retained or with recourse). We use quarterly data from the first quarter

[14] Data source is Moody's eMaxx Data Services.

of 2002 to the last quarter of 2006 and normalize the change in the highly-rated holdings or outstanding balance of securitizations from t-4 to t using assets as of t-4. Results are reported in column (7) of Table 4. The coefficient on the ratio of the change in securitization over lagged assets is a positive and significant at the 10% level. In the last column of table 4, we focus on outstanding principal balance of only mortgages sold or securitized and find similar results.

Finally, the increase in holdings of highly-rated tranches should be concentrated among securitization-active banks. In Figure 2, we plot the holdings of highly-rated tranches through time separately for securitization-active banks and non-securitization active banks. In 2006, securitization active banks had highly-rated tranches holdings of 3.1% in comparison to holdings of 0.8% for other banks. For the securitization-active banks, holdings of highly-rated tranches increased from 2.1% of total assets in Q1 2002 to 3.3% in Q1 2007, while highly-rated holdings for the non-active banks remained virtually unchanged over the same period. A formal test of the 1.2% difference in highly-rated holdings between Q1 2002 and Q1 2007 for securitization-active banks yields a t-statistic of 1.30.

Our analysis is strongly supportive of the hypothesis that banks engaged in securitization held more highly-rated tranches (Securitization H1) and the hypothesis that holdings of highly-rated tranches increased over time (Securitization H2). We also find weak evidence that holdings of highly-rated tranches for firms active in securitization increased more in 2007 (Securitization H3).

4.2. Regulatory arbitrage.

Acharya and Richardson (2009) argue that BHCs find it advantageous to hold highly-rated assets as a form of regulatory capital arbitrage. Regulatory arbitrage occurs because banks have to hold less regulatory capital if, for example, mortgage loans on the balance sheet are transformed into AAA-rated bonds via securitization. Transforming mortgages into highly-rated securities can also result in a cheaper source of funding for BHCs through asset-backed commercial (ABCP) programs, where commercial paper is issued at a lower cost since it is collateralized by highly-rated securities (see Acharya, Schnabl, and Suarez (2010)). Finally, Acharya, Schnabl, and Suarez (2010) show that structured investment

vehicles (SIVs) were a form of regulatory arbitrage that enabled banks to hold various assets, including highly-rated tranches, with almost no regulatory capital. To implement this regulatory arbitrage, banks did not have to hold highly-rated tranches on their balance sheet. Consequently, our approach has nothing to say about regulatory arbitrage that involves holdings of highly-rated tranches in bank off-balance sheet vehicles. It might be, however, that banks that engaged in regulatory arbitrage through SIVs held more highly-rated tranches as an inventory available for their SIVs. Too few banks in our sample sponsored SIVs for us to test that hypothesis reliably.[15]

To test the regulatory-arbitrage hypothesis, we examine whether BHCs' issuance or sponsoring of asset-backed commercial paper can explain their holdings of highly-rated tranches. We construct an indicator variable for all BHCs active in the ABCP market, either through direct issuance or through sponsoring credit enhancements in the ABCP issuance. We estimate regressions that explain holdings of highly-rated tranches as a function of this indicator variable ("ABCP Activity Indicator"), the piece-wise asset size variables, and a set of other controls. In this test, we estimate highly-rated holdings as of December 2007 and explain holdings using a 2006 ABCP indicator variable., which is equal to one if the BHC engaged in any ABCP activity in years 2003-2006.

The results presented in the first two regressions of Table 5 provide little support for the regulatory-arbitrage hypothesis through ABCP issuance. The coefficients on the ABCP indicator variable are negative, though they lack statistical significance, and are of little magnitude economically. The remaining control variables are mostly consistent with results in previous tables. Estimates on the impact of the first $50 billion of asset size remain quantitatively similar to previous tables but are not significant in the ABCP specification. This evidence is therefore not supportive of the theory that banks held highly-rated tranches as a form of regulatory arbitrage.

[15] Only 12 bank holding companies in our sample sponsored off-balance sheet conduits in general, and only one, Citigroup, was affiliated with SIV's as a specific type of conduit. The 12 banks that sponsored off-balance sheet conduits are also the banks with ABCP programs, so that we cannot distinguish between banks with ABCP programs and banks with conduits.

We develop an alternative measure of a BHC's propensity to engage in regulatory arbitrage that does not rely on ABCP activity. In March 2001, the Federal Reserve allowed BHCs to incorporate credit ratings in calculating regulatory capital for holdings of securities. Prior to the rule change, capital charges on securities were dictated by asset type rather than credit quality. For example, mortgage-backed securities issued or guaranteed by Fannie Mae carried a 20% risk-weighting (so that the capital set aside was 20% of 8%, or 1.6%, in comparison with 8% for corporate loans) capital charge, but non-agency mortgage-backed securities that were viewed as having similar risk carried a greater capital charge. Following the rule change, the regulatory capital charge became a function of the securities' credit rating rather than asset class. AAA-rated and AA-rated securitizations became associated with a 20% risk-weighting, A-rated securitizations a 50% risk-weighting, BBB-rated securitizations a 100% risk-weighting, and BB-rated securitizations a 150% risk-weighting. Thus, following the rule change, poor credit-quality securitized assets became more expensive from a regulatory standpoint.

The rule change provides an opportunity to identify BHCs with a propensity to engage in regulatory arbitrage. We consider whether a BHC's use of regulatory-capital arbitrage opportunities arising from the ratings-based capital change has any power in predicting its holdings of highly-rated tranches in subsequent years. To do so, we calculate the change in leverage for each BHC in our sample from the fourth quarter of 2000 to the fourth quarter of 2002 and hypothesize that BHCs with the largest change in leverage surrounding the event are those with a higher propensity to engage in regulatory capital arbitrage.

Columns (3) and (4) of Table 5 regress the holdings of highly-rated tranches in December 2006 as a function of the change in leverage from 2000 Q4 to 2002 Q4. If banks that took advantage of the change to increase their leverage are those that engage in regulatory arbitrage, we should see a positive relation between holdings of highly-rated tranches and the change in leverage around the regulatory change. The change-in-leverage variable is positively related to holdings of highly-rated tranches, but the coefficient is not statistically significant.

There has been much discussion that the market risk amendment to the Basel accord allows banks to hold highly-rated tranches in their trading book with very little regulatory capital compared to banks that can only hold the tranches in their banking book. However, as discussed earlier, banks with a trading book could hold more highly-rated tranches to have an inventory for market-making purposes. The final two regressions of Table 5 use an indicator variable ("Market Risk Equivalent Bank Indicator") for banks that had the right to use their own value-at-risk model to satisfy capital requirements on their trading book.[16] We find no evidence that these banks held more highly-rated tranches. We estimate (but do not tabulate) the same regression without the size variables. Without the size variables, the indicator variable is significant. However, the R-squared of the regression drops by half. The significance of the size variables is not affected by the presence of the market risk indicator and the inclusion of the market risk indicator has only a trivial impact on the R-squared.

With the regulatory arbitrage hypothesis, we would expect banks with higher leverage to have larger holdings of highly-rated tranches as such banks would be expected to take more advantage of investments that economize regulatory capital. However, as seen in Tables 4 and 5, Tier I leverage does not have a significant coefficient, which implies that banks that are more constrained in regulatory capital do not seem to be holding more highly-rated tranches (Regulatory Arbitrage H1). Overall, there is no evidence for the hypothesis that banks that engage in more regulatory arbitrage activities have larger holdings of highly-rated tranches (Regulatory Arbitrage H2). Again, it is important to mention that our study is focused on explaining holdings of highly-rated tranches on banks' balance sheets. Hence, our analysis does not address off-balance sheet regulatory arbitrage.

Finally, we consider the possibility of BHCs having engaged in regulatory arbitrage through the securitization channel itself. From a regulatory capital standpoint, it is cheaper for banks to hold a portfolio of mortgages in the form of highly-rated securitizations than to hold an unsecuritized portfolio

[16] A BHC is subject to the market risk capital guidelines, and thus able to use its own estimates of value-at- risk in calculating capital requirements, if it's consolidated trading activity, defined as the sum of trading assets and liabilities for the previous quarter, equals: (1) 10% or more of the BHCs total assets for the previous quarter, or (2) $1 billion or more. The Federal Reserve may include or exempt a BHC where it feels appropriate. Our Dec. 2006 sample of 231 BHCs includes 14 BHCs that meet the market risk capital guidelines.

of mortgages. This is because AAA-rated securitizations, for example, carry a 20% risk-weighting while unsecuritized subprime mortgages carry a much larger risk weight. As such, it could be that securitization activity is an efficient mechanism to transform an expensive portfolio, from a regulatory standpoint, into a cheaper portfolio.

We provide two pieces of evidence that indicate that banks engaged in securitization did not engage in regulatory arbitrage on their balance sheet (as opposed to the off-balance sheet ABCP mechanism documented by Acharya, Schnabl, and Suarez (2010)) so that they could hold less regulatory capital than other banks. First, we examine whether levels of regulatory capital were overly aggressive among securitization-active banks. For each BHC, we calculate the regulatory "cushion," which is the ratio of tier 1 capital to risk-weighted assets, minus the tier 1 requirement of 4%. We plot the results in Figure 2. While securitization-active BHCs do, on average, exhibit a lower regulatory capital cushion, the cushion is not close to the regulatory boundary, nor does it change through time as would be expected of a BHC wanting to push the boundaries of regulatory capital through increased securitization activity.

A second piece of evidence comes from examining the ratio of total assets to risk-weighted assets. In order to control for bank size, we create a size-based matched sample of securitization-active and non-securitization active banks and plot the ratio of total assets to risk-weighted assets in Figure 3. A securitization-driven regulatory arbitrage hypothesis predicts that securitization-active banks would amass more total assets for a given level of risk-weighted assets than non-securitization active banks. Figure 3 demonstrates that the data do not support this view. Rather, securitization active banks have a lower ratio of total assets to risk-weighted assets than their counterparts of roughly equal size. Taken together, we interpret the results as being consistent with the view that regulatory capital arbitrage was not the primary driver of securitization activity.

4.3. Bad incentives.

There are two distinct "bad incentives" hypotheses. The poor-incentives hypothesis argues that banks had compensation plans that made it advantageous for managers and traders to play the carry trade,

holding positions in highly-rated tranches while borrowing at the firm's cost of funds. Consequently, the incentives can be bad at lower levels of a bank – say at the trader level. It is also possible for incentives to be poor at the top. We examine both possibilities.

We would expect that poor incentives are more likely to exist in banks with poor governance. Consequently, banks with poor governance would be more likely to be banks with greater holdings of highly-rated tranches. To test this hypothesis, the first regression of Table 6 uses a "Governance Index" that contains 41 firm-level attributes from RiskMetrics and that increases with the protection of minority shareholders (see Aggarwal, Erel, Ferreira, and Matos (2011) for a detailed explanation of the index). We find no relation between holdings of highly-rated tranches and a bank's governance index.

The data on compensation contracts below the top five officers of banks is not available. However, it is often argued that there is an incentive problem with traders' compensation, since generally they receive a share of the profits they generate but do not have to pay for losses they generate. Consequently, if the hypothesis is correct, we would expect the problems to arise in banks that have trading operations. Table 5 shows, however, that there is no evidence that banks with larger trading portfolios have more highly-rated tranches.[17] In unreported results, we also re-estimated the regressions of Table 5 with an indicator variable for any bank with non-zero trading assets and still find that the trading asset indicator variable is not significant.

We construct several measures of CEO compensation and test whether these measures can explain differences in holdings of highly-rated tranches (see Panel B of Appendix 1 for a detailed description of the managerial-compensation measures). Our first measure calculates the elasticity of total managerial compensation to a BHC's return on equity (ROE), where the ROE is calculated as net income divided by total common equity as of fiscal year end.[18] ROE is a performance measure that is not risk adjusted and does not account for the cost of equity. Therefore, a bank's ROE can be increased through carry-trade

[17] Columns (3) and (4) in Table 5 estimate the relationship between holdings of highly-rated tranches and BHCs with large trading portfolios.

[18] The numerator of the compensation-ROE elasticity is calculated as the change in compensation from 2001-2005 divided by 2001 levels of compensation. The denominator is calculated as the change in ROE from 2001-2005 divided by 2001. ROE Details are provided in the data appendix.

positions and through increases in leverage. This elasticity measure is designed to capture the relationship between total managerial compensation and firm performance. To the extent that highly-rated tranches bolster non-risk-adjusted firm performance because they have a higher yield than other similarly rated securities, managers with a higher elasticity of compensation to non-risk-adjusted performance would find it advantageous to hold more highly-rated tranches relative to managers whose compensation is less sensitive to non-risk-adjusted performance.

The second regression of Table 6 reports estimates of a regression of holdings of highly-rated tranches on measures of the elasticity of managerial compensation to performance. The elasticity variable named "High-Compensation Elasticity" is equal to one for firms with above-median elasticity of the CEOs total compensation to changes in bank ROE. The sample is limited to 51 BHCs on account of limited availability of the compensation data. The relationship between holdings of highly-rated tranches and compensation elasticity is positive, as expected, but the estimates lack statistical significance. Lack of significance may be due to the limited sample size, given that the coefficient on the $50-billion size variable, which was significant in previous estimates, also lacks significance in this small sample.

We also consider alternative measures of managerial compensation. Column (3) in Table 6 regresses holdings of highly-rated tranches on managers' "Compensation Residual" (see Cheng, Hong, and Sheinkmann (2010)) and control variables. Compensation residual, a measure of excess compensation, is constructed by computing the natural logarithm (log) of average total compensation from 2003 to 2005. This log average compensation is then regressed on the log of the firm's 2005 market cap. The residual from this regression, estimated in 2005, serves as the compensation residual variable in our cross-sectional regressions of highly-rated holdings in 2006. The coefficient on the residual is positive but insignificant. With residual compensation data on only 67 CEOs, the limited sample size may continue to limit the power of the tests.[19]

[19] Although we have compensation data on as many as 89 CEOs as of 2006, the compensation residual regressions require data on compensation from 2003-2005, which limits our sample to 67.

Finally, regression (4) in Table 6 uses another measure of managerial compensation, the bonus-to-salary ratio. This "Bonus-per-Salary" variable is calculated as the ratio of the CEO's total bonus to his base salary. It affords the largest sample size of any of the compensation regressions, though the sample is still limited to 89 observations. The results presented in Table 6 indicate virtually no statistical relationship exists between "bonus-per-salary" and holdings of highly-rated tranches. The standard set of control variables exhibits their usual signs, magnitudes, and significance in all specifications.

There has been much criticism of the impact of options on risk-taking incentives (see, for instance, Bebchuck and Spamman (2010)). We test whether banks where the CEO's compensation exhibited more option-like features (more sensitivity to volatility) held more highly-rated tranches. The coefficient on "Equity Risk" is negative with a t-statistic of -1.34. There is therefore no evidence supporting the view that option-like compensation led to more risk taking through holdings of highly-rated tranches.

In summary, we find no support for the hypothesis advanced by various observers that "bad incentives" explain holdings of more highly-rated tranches.

4.4. Good deals.

The last two regressions of Table 6 investigate the relation between holdings of highly-rated tranches and equity incentives of CEOs. The coefficients on our estimates of equity incentives of CEOs are insignificant. In other words, the banks of CEOs with more incentives to maximize shareholder wealth did not hold more or fewer highly-rated tranches than other banks. Such a result would be consistent with the model of Gennaioli, Shleifer and Vishny (2011) where investors in general ignore some possible adverse outcomes in making their investment decisions. Such failure to account for some possible adverse outcomes in their model is pervasive and hence does not directly offer a prediction on which banks held more highly-rated tranches for investment purposes. Their model does predict greater holdings of securitized securities to show skin-in-the-game. We found support for that prediction earlier.

Section 5. Investment banks.

As discussed in the introduction, stand-alone investment banks did not have to report the information that we use in this paper to estimate holdings of highly-rated tranches by banks. Investment banks did report information about exposures to securitizations and to subprime mortgages. However, the reporting format was specific to each bank. We collected information for 2006. Some of that information was only made available in filings for the 2007 reporting year. A brief summary of available information on holdings of highly-rated tranches is as follows:

1) Bear Stearns. Bear Stearns reports data on retained interests in its own securitizations. It states that "Retained interests in securitizations are generally not held to maturity and typically are sold shortly after the settlement of a securitization." (2007 10-K). On November 30, 2006, Bear Stearns had AAA-rated retained interests in non-agency securitizations of $1.5 billion. In addition, it had $2.6 billion on non-AAA rated non-agency retained interests. The 10-K also reported AAA-rated CDO exposure as $755 million. Separately, it reported subprime mortgage exposure for November 30, 2007. It had $1 billion of subprime investment-grade securitizations. But, Bear Stearns' overall subprime exposure was negative $582 million because it had a short position in ABS CDSs. Finally, it reported securitizations that did not qualify for sale treatment and hence were on its balance sheet. The total for mortgage securitizations and CDOs as of November 30, 2006 was $30 billion, but its exposure to loss was $800 million.
2) Goldman Sachs. In the 2007 10-K, the bank said that the fair value of retained interests from mortgage-backed securities, as of 2006, was $4 billion. It had another $2 billion of retained interests in CDOs and CLOs. In addition, the firm had purchased interests in residential mortgage securitizations of $8 billion "purchased in connection with secondary market-making activities." It also had holdings that were not consolidated in the balance sheet for mortgage CDOs of $26 billion and of corporate CDOs and CLOs of $11 billion. However, the purchased and retained interests associated with these securitizations were only $2 billion. Further, it had exposure through derivatives on these securitizations of $10 billion. The bank also reported its subprime

exposure for November 2007, which was $2 billion. Its Alt-A exposure was around $6 billion. Furthermore, the bank reported amounts held in securities that may be more difficult to fund on a secured basis in times of stress in its 2007 10-K. For example, it held $41 billion of mortgage and other asset-backed loans and securities as of November 2006. As of November 2007, it reported level 3 "loans and securities backed by residential estate" for $2 billion.

3) Lehman Brothers. In its 2007 10-K, Lehman provided an estimate of its holdings of mortgage and asset-backed securities as of November 30, 2006. The total amount, which included whole loans and servicing, was $52 billion. Securities amounted to $10 billion. Investment-grade retained interests in securitizations were $5.3 billion for residential and asset backed while they were for $0.6 billion for commercial mortgage loans and CMBSs. Using data on agency securitizations, it follows that holdings of private-label investment-grade securitizations were $3.4 billion. A separate table provides exposure to subprime mortgages. The total was $6.9 billion, of which $1.8 billion corresponds to retained interests in securitizations. In its fair value table for 2007, Lehman reports holdings of $89 billion of mortgage and asset-backed securities. These holdings include holdings of agency mortgage-backed securities.

4) Merrill Lynch. It reported total U.S. subprime exposures of $2.7 billion at the end of 2007, but it also made losses in 2007 of $3.1 billion on subprime exposures. In addition, it had Alt-A exposures of $2.7 billion. The bank had retained interests on residential mortgage loans of $2.8 billion at the end of 2007. Its exposure to securitizations that were consolidated on its balance sheet for real estate was $4.3 billion in 2006 and $16.3 billion in 2007, but investors had no recourse to Merrill. It reports a long exposure in super-senior CDOs of $30.4 billion and a short exposure of $23.6 billion as of 2007. However, in addition, it made losses of $14.6 billion on CDOs in 2007, so that an estimate of its end of 2006 exposure is $21 billion.

5) Morgan Stanley. It showed retained interests from private label residential mortgage securitizations of $3.2 billion at the end of November 2007. Of these, $1.2 billion were non-investment grade. Securitizations that were consolidated in the balance sheet are for $5.9 billion,

with an exposure of $1.75 billion. In a conference presentation, Morgan Stanley showed net subprime exposure of $10.4 billion at the end of the third quarter of 2007, most of which was written down the next quarter. Further, it had $14 billion of other mortgage net exposure and $36 billion of net CMBS exposure. Based on one of the tables in 2007 10-K, the bank's net subprime exposure was $6.1 billion as of November 30, 2007. It had a long exposure of $11.1 subprime exposure in loans, total return swaps, and CDS, but most of that exposure was from $7.8 billion in ABS CDS. It reported CDO subprime exposure of negative $5 billion. Its holdings of CDOs amounted to $1 billion, but it had a net short derivatives position of $6 billion. In another table, however, it reports that the net total U.S. subprime trading exposure was $1.8 billion.

Three of the investment banks, Goldman Sachs, Merrill Lynch, and Morgan Stanley, had assets in excess of $1 trillion at the end of 2007. The assets of Bear Stearns were $395 billion and those of Lehman Brothers were $691 billion. Our estimates of the non-agency securitization exposures of the investment banks are not equivalent to those of the bank holding companies. Nevertheless, three facts are worth noting. First, the net exposures to securitizations are not higher than the holdings of bank holding companies with large trading assets. Second, the investment banks focus much more on net exposures, so that long holdings are likely to be substantially larger than the long holdings of bank holding companies. Third, derivatives play a large role in the exposures of investment banks.

Section 6. Conclusion.

In this paper, we estimate holdings of highly-rated tranches of American banks. We use four different approaches to estimate these holdings and the different approaches lead to similar conclusions. Using a sample of 231 publicly-traded U.S. bank holding companies, we find that holdings of highly-rated tranches were economically trivial for the typical bank before the credit crisis. The average of the holdings across the banking sector was only 1.3% of assets, but the average of the holdings for the banks with large trading positions was almost 5%. Yet, even among these banks, there was wide dispersion in

holdings. For instance, our estimate of holdings for JP Morgan Chase is less than 1% of assets, but Citigroup had holdings in excess of 5%. Though the data we use for bank holding companies is not available for investment banks, we show that investment banks did not have net exposures to securitizations that were systematically greater than the holdings we measure for bank holding companies.

We investigate many of the hypotheses that have been advanced to explain holdings of highly-rated tranches by banks. The large dispersion of holdings across the largest banks explains why there is no support for the arguments that banks that are viewed as too-big-to-fail had incentives to have large holdings of such assets. In regressions, we find that bank holdings of highly-rated tranches increase with their asset size, but only up to $50 billion. For banks that have more than $50 billion in assets, those deemed "too-big-to-fail," their holdings of highly-rated tranches do not significantly increase with asset size. The securitization by-product hypothesis argues that holding tranches of originated securitization deals serves as a credible signal of deal quality to potential investors. As such, we would expect banks that are active in securitization to hold a larger amount of highly-rated tranches as a fraction of their assets. Consistent with this hypothesis, we find that banks that were active in securitization between 2003 and 2006, either through origination or in the providing of credit enhancements, held 1.5% larger amounts of highly-rated tranches as a fraction of total assets as of December 31, 2006 than the other banks.

We find no evidence in support of regulatory capital arbitrage hypotheses. In particular, there is no evidence that banks with ABCP programs held more highly-rated tranches. If banks that engage the most in regulatory arbitrage are banks that have less slack in terms of regulatory capital than other banks, we show that banks that engaged in securitization do not meet that criterion. It is often argued that banks used the more advantageous capital requirements of the trading book for the purpose of regulatory arbitrage. However, controlling for size, we do not find that these banks held more highly-rated tranches of securitizations. An important caveat is that in our assessment of regulatory arbitrage we focus on the assets held by banks on their balance sheets. Acharya, Schnabl, and Suarez (2010) show that off-balance sheet vehicles enabled banks to engage in regulatory arbitrage. While these vehicles were important for

some banks, the fact that only one bank in our sample sponsored SIVs makes it impossible for us to reliably determine the relation between SIV holdings and holdings of highly-rated tranches.

Lastly, we explore "bad incentives" explanations for holdings of highly-rated tranches. We find that holdings of highly-rated tranches are unrelated to an index of governance quality of banks. Further, there is no evidence that banks where compensation was more focused on ROE, where bonuses were high relative to salary, where option compensation was more important, and where unexplained compensation was high held more highly- rated tranches. Finally, CEO equity incentives do not appear to be related to holdings of highly-rated tranches. Consequently, it is not the case that banks where CEOs had greater incentives to maximize shareholder wealth differed in their holdings of highly-rated tranches.

Banks are highly levered. Because of their high leverage, banks become distressed if they make large losses on any material asset class that they invest in. With a large adverse shock to the economy, it is ineluctable that banks will make large losses on some asset classes. Our evidence shows that the evidence is fully consistent with the view that banks that invested more in highly-rated tranches did so as a normal outcome of being active in the securitization business.

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Appendix 1 – Panel A: Dependent Variables

Our main data source is the Consolidated Financial Statements for Bank Holding Companies, the form FR Y-9C. We focus on Schedules HC-B (Securities), HC-D (Trading Assets), and HC-R (Regulatory Capital) to construct our main variables of interest. Below we list their definitions with references to schedules and data mnemonics in the form FR Y-9C.

Variable Name	*Schedule*	*Data Mnemonic*
Highly-Rated Residual: Summation of non-government or non-agency mortgage-backed securities (MBSs) as well as asset-backed securities (ABSs) that are rated in the highest three investment-grade (e.g., AAA, AA, or A) categories and non-government, non-agency MBSs in trading securities. The measure includes held-to-maturity (HTM) and available-for-sale (AFS) securities with 20% or 50% risk weight minus securities in 20% or 50% risk-weight category that are issued or guaranteed by the government or government-sponsored agencies. All values are at amortized costs, except for MBSs from trading assets that are recorded at fair values.	Schedules from Form FR Y-9C as of December 2006: HC-R Item 35 (Column D) + Item 35 (Column E) + Item 36 (Column D) + Item 36 (Column E) - HC-B Item 2b (Columns A+C) – Item 4a2 (Columns A+C) – Item 4b1 (Columns A+C) – Item 4b2 (Columns A+C) - Item 3 (Columns A+C) + HC-D Item 4c	bhc21754+bhc51754 bhc21773+bhc51773 -bhck1294-bhck1297 -bhck1703-bhck1706 -bhck1714-bhck1716 -bhck1718-bhck1731 -bhck8496-bhck8498 +bhck3536
Highly-Rated Residual + CDOs: Summation of the "Highly-Rated Residual" and the CDO amounts reported under trading assets in June 2008.	Highly-Rated Residual + Schedule HC-D (from Form FR Y-9C as of June 2008) Item 5a+ Item 5b	Highly-Rated Residual + bhckf649 + bhckf650
Highly-Rated Residual + CDOs and Writedowns: Summation of "Highly-Rated Residual + CDOs" and the writedowns on CDOs between December 2006 and June 2008.	Highly-Rated Residual + CDOs +CDO Writedowns from Bloomberg	Highly-Rated Residual + CDOs + CDO Writedowns from Bloomberg
Bottom-up Highly-Rated Tranches: Total value of MBSs that are not issued or guaranteed by the government or government-sponsored agencies plus ABSs, using HTM securities at amortized costs and AFS and trading securities at fair values. Note that there is no ABS data for trading securities so ABS part includes only HTM and AFS securities.	Schedules from Form FR Y-9C as of December 2006: HC-B Items 4a3 (Columns A+D) + 4b3 (Columns A+D) + Item 5 (Column A+D) + HC-D Item 4c	bhck1709+bhck1713 +bhck1733+bhck1736 +bhckC026+bhckC027 +bhck3536

Appendix 1 – Panel B: Independent Variables

Variable Name	*Data Source and Algebraic Expression or Data Mnemonic*
$0-50 Billion and > $50 Billion: We construct a piece-wise linear specification which breaks up the impact of asset size into two separate variables. The "$0-50 Billion" variable captures the impact of the first $50 Billion worth of assets on holdings of highly-rated tranches. In constructing this variable, each BHC in our sample takes the value Min{BHC asset size, $50 Billion}. The ">$50 Billion" variable captures the impact on highly-rated holdings of assets in excess of $50 Billion. In constructing this variable, each BHC in our sample takes the value Min{0, BHC asset size - $50 Billion}.	Schedule HC: bhck2170
ABCP Activity Indicator: It is an indicator variable that is equal to one if a bank has any Asset Backed Commercial Paper (ABCP) activity during the years 2003-2006. A bank is ABCP active if the maximum amount of its credit exposure arising from credit enhancements provided to asset-backed commercial paper conduit structures in the form of standby letters of credit, subordinated securities and other credit enhancements is not zero. Note that we also include the amount of unused commitments to provide liquidity to conduit structures.	Schedule HC-S: Variable equal to 1 if bhck806 + bhck808 > 0 in any year 2003-2006
Bonus-per-Salary: This variable is calculated as the ratio of total managerial bonuses divided by total managerial salary.	Execucomp
C&I Loans: Commercial and industrial loans, scaled by total assets.	Schedule HC-C: (bhck1763+bhck1764)/bhck2170
CEO Ownership %: This variable is calculated as total CEO ownership divided by total shares outstanding as of year-end 2006. Total ownership is calculated as the sum of delta weighted options and shares owned (both unrestricted and unvested restricted stock).	Execucomp and Compustat
Change in Leverage, 2000 Q4 – 2002 Q4: This variable is calculated as the change in Tier 1 leverage from 2000 Q4 to 2002 Q4. In March 2001 banks began incorporating a loan's credit rating into calculations of risk-based capital. Prior to the rule change, risk-based capital was calculated based on asset type rather than explicit asset risk, as measured by credit ratings. Firms experiencing the largest increase in leverage surrounding the ratings-based rule change are identified as firms likely to have been engaging in regulatory capital arbitrage.	As of 2002 Q4: (bhck2170/bhck8274)/(bhck2170(t-8)/bhck8274(t-8))

Compensation Residual: This variable is constructed by computing the log of average total executive compensation from 2003-2005, which is regressed on the log of firms' 2005 market cap. The residual from this regression, estimated in 2005, serves as the compensation residual variable in the cross-sectional regressions estimated in 2006.	Execucomp and Compustat
Dollar Gain from +1%: This variable calculates the change in CEO wealth per 1% increase in shareholder wealth. It is calculated as market cap * .01 * delta-weighted ownership.	Execucomp and Compustat
Equity Risk (%): This variable represents the percent change in CEO wealth that results given a change in volatility of 1%. The variable is created by calculating the change in option value given a 1% change in volatility. The change in option value for a given change in volatility is then divided by the sum of the value of the delta-weighted option portfolio, stock holdings, and preferred share holdings of the CEO.	Execucomp and Compustat
Governance Index: Index of 41 firm-level attributes from RiskMetrics. The index increases with the protection of minority shareholders and incorporates measures of board structure, anti-takeover provisions, auditor selection as well as compensation and ownership structure.	RiskMetrics: Governance index from Aggarwal, Erel, Ferreira, and Matos (2011)
High-Compensation Elasticity: This variable measures the elasticity of the CEO's total compensation to changes in bank ROE Total compensation comprised of the following: Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted (using Black-Scholes), Long-Term Incentive Payouts, and All Other Total. Return on Equity is calculated as: Net Income / Common Equity Total as of Fiscal Year End. Bonus elasticity is computed using only the total dollar amount of bonuses paid to the CEO. In our regression framework, we create an indicator variable equal to one for BHCs with above-median levels of comp/ROE elasticity.	Execucomp and Compustat
Loan Pipeline: This variable calculates the total amount of retail and wholesale closed-end first and junior lien loans made on 1-4 family residential properties that were for sale during 2006. The total dollar amount of loans for sale is scaled by total assets.	Schedule HC-P: (bhckf066 + bhckf067 + bhckf068 + bhckf069)/bhck2170
Log Market Cap: Log of December 2006 market capitalization.	CRSP: Market price * shares outstanding
Log Market-to-Book: Log of the ratio of December 2006 market capitalization to 2006 fiscal year-end book value of equity.	CRSP and Compustat: (Market price*shares outstanding)/book value of equity, fiscal year end.

Market Risk Equivalent Bank Indicator: This variable is equal to one for any BHC that is subject to the market risk capital guidelines. A BHC is subject to the market risk capital guidelines, and thus able to use estimates of V.A.R. in calculating capital requirements, if it's consolidated trading activity, defined as the sum of trading assets and liabilities for the previous quarter, equals: (1) 10% or more of the BHCs total assets for the previous quarter, or (2) $1 Billion or more.	Schedule HC-R: Variable equal to 1 if bhck1651 > 0 as of December 31, 2006.
(Mortgage Sec. $$_t$$ - Mortgage Sec. $$_{t-4}$$)/Assets$$_{t-4}$$: Year-over-year change (sampled quarterly) in the total amount of the outstanding principle balance of 1-4 family residential loans and home equity loans sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements.	Schedule HC-S: The $ amount of mortgage securitization activity is calculated as (bhckb705 + bhckb706).
Mortgage Loans: Sum of all loans secured by real estate, scaled by total assets.	Schedule HC-C: bhck1410/bhck2170.
"Other" H.T.M. and A.F.S. Securities (Gov., Agency, & Lower-rated Private-Label H.T.M. and A.F.S. Securities): This variable captures the portion of Held-to-Maturity and Available-for-Sale securities held on BHC balance sheets that are government or agency securities. This variable also captures the portion of non-highly rated non-agency, non-government (private-label) securities. It is calculated as the difference between the total HTM and AFS securities on BHCs balance sheet and the total "highly-rated residual" HTM and AFS securities on BHCs balance sheet.	HC-B item 8 (column A and D) – Highly-Rated Residual (see construction in Appendix A) + HC-D item 4c: (bhck1754+bhck1773) – Highly-Rated Residual (see Appendix A) – bhck3536.
"Other" Trading Securities (Gov., Agency, & Lower-Rated Private Label Trading Securities): This variable captures the portion of trading assets on BHCs balance sheet that are not included in the highly-rated residual. This includes all government and agency securities as well as non-highly rated private-label securities held on the trading book. It is calculated as the difference between total BHC trading assets and the "all other MBS" portion of trading assets.	HC-D item 12 (Column A) – item 4c (Column A): bhck3545 – bhck3536.
Prior Returns: BHC buy-and-hold returns calculated from January 2005- January 2006.	CRSP
(Sec. $$_t$$ – Sec. $$_{t-4}$$)/Assets$$_{t-4}$$: Year-over-year (sampled quarterly) change in the total amount of the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements.	Schedule HC-S: The $ amount of securitization activity is calculated as (bhckb705 + bhckb706 + bhckb707 + bhckb708 + bhckb709 + bhckb710 + bhckb711).

Securitization-active Indicator: This variable measures the total outstanding principal balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements. The securitization active dummy variable is equal to one for banks that have any positive amount of securitization activity in the years 2003-2006.	Schedule HC-S: Variable equal to 1 if (bhckb705 + bhckb706 + bhckb707 + bhckb708 + bhckb709 + bhckb710 + bhckb711) > 0 in any year 2003-2006.
Securitization-league-table Indicator: This variable is equal to one for any BHC that was involved in the underwriting of any type of securitization, including subprime RMBS, CLOs, CBOs, and CDOs.	Moody's eMaxx Data Services
Tier 1 Leverage: BHC Tier 1 capital divided by average total assets for leverage capital purposes.	HC-R item 31: bhck7204
Unused Loan Commitments: Unused portion of residential and commercial real estate loan commitments.	Schedule HC-L: (bhck3814+bhck3816)/bhck2170.

Figure 1. Dollar Amounts of Holdings of Highly-Rated Tranches.

This figure plots the aggregate, nominal U.S. dollar amount of holdings of highly-rated tranches through time. Our sample runs from 2002-2008 and includes all U.S. publicly-traded bank holding companies (BHCs). The plot is created using the "Highly-Rated Residual" measure of highly-rated holdings. See Appendix 1-Panel A for a description of this variable.

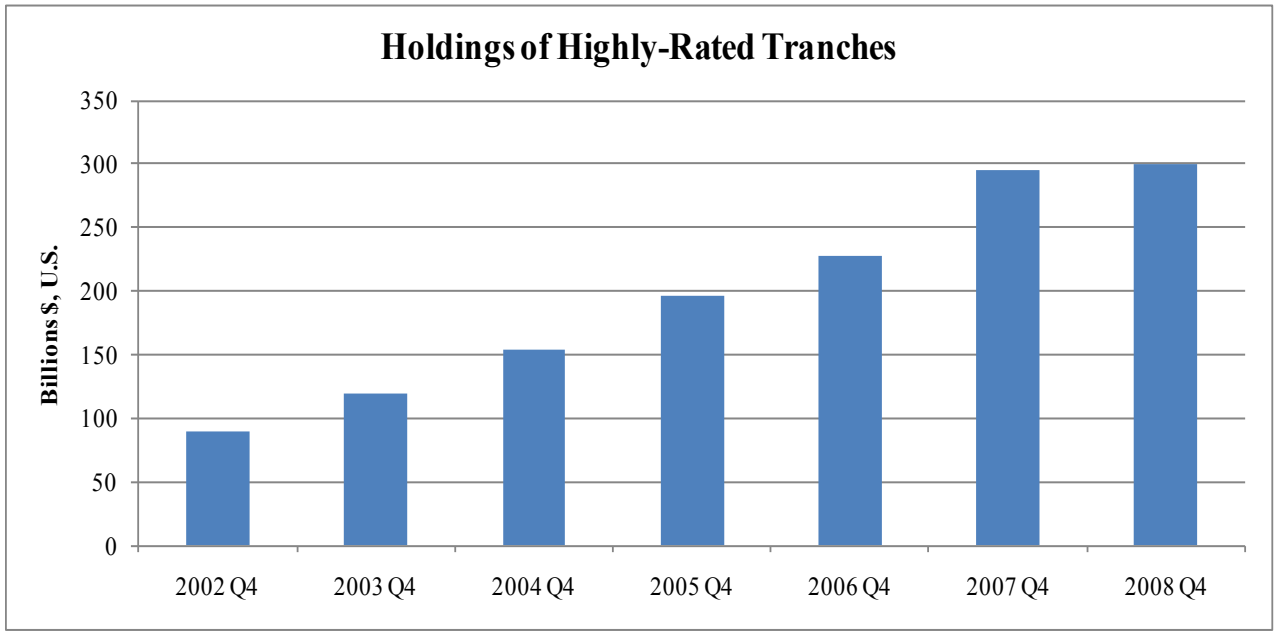

Figure 2. Time Series Plot of Holdings of Highly-Rated Tranches as a Percent of Total Assets.

This figure plots the holdings of highly-rated tranches as a percent of total assets through time. The sample includes all U.S. publicly-traded bank holding companies (BHCs). Banks are deemed "securitization-active" if the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is greater than zero in any quarter between the years 2003-2006. Forty-six banks meet this criterion as of January 2002. The remaining banks are characterized as "Non-securitization active."

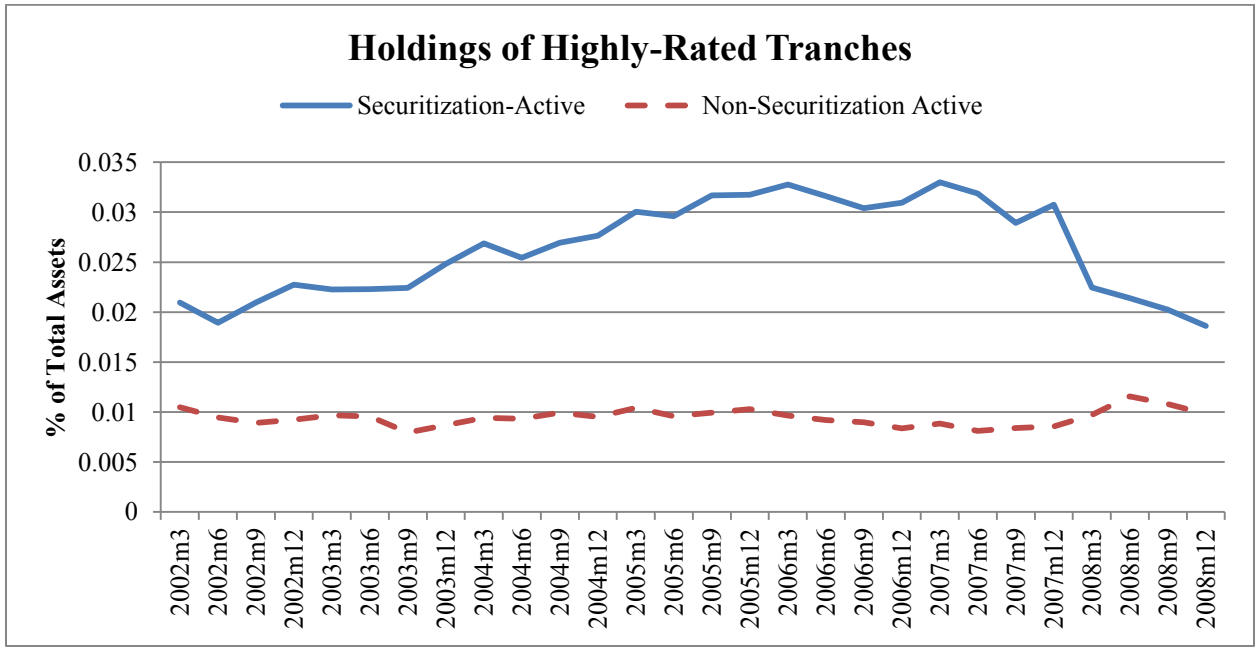

Figure 3. Time Series Plot of Regulatory "Cushion."

This figure plots the regulatory "cushion" of all U.S. publicly-traded bank holding companies (BHCs). The regulatory cushion is calculated as the ratio of Tier 1 capital to risk-weighted assets, minus 4%. Banks are deemed "securitization-active" if the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is greater than zero in any quarter between the years 2003-2006. Forty-six banks meet this criterion as of January 2002. The remaining banks are characterized as "Non-securitization active."

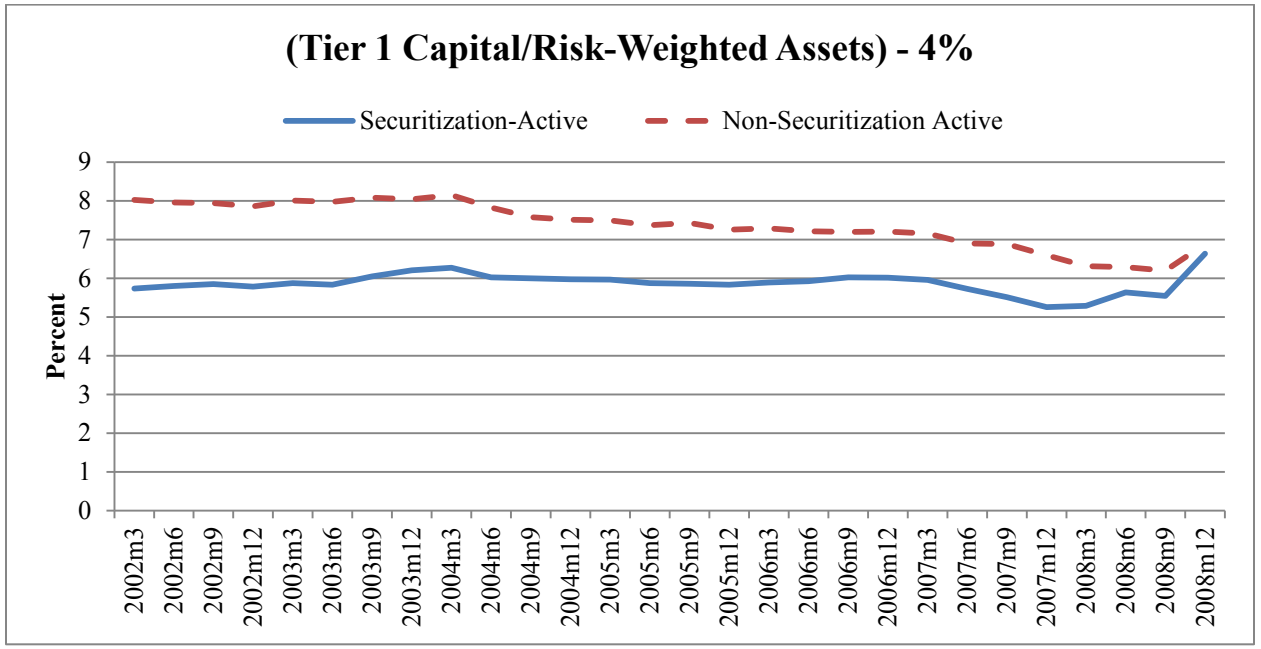

Figure 4. Time Series Plot of Total Assets to Risk-Weighted Assets.

This figure plots the ratio of total assets to risk-weighted assets using a sample of U.S. publicly-traded bank holding companies (BHCs). The sample includes all securitization-active BHCs and a size-based matched sample of non-securitization active BHCs. Banks are deemed "securitization-active" if the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is greater than zero in any quarter between the years 2003-2006.

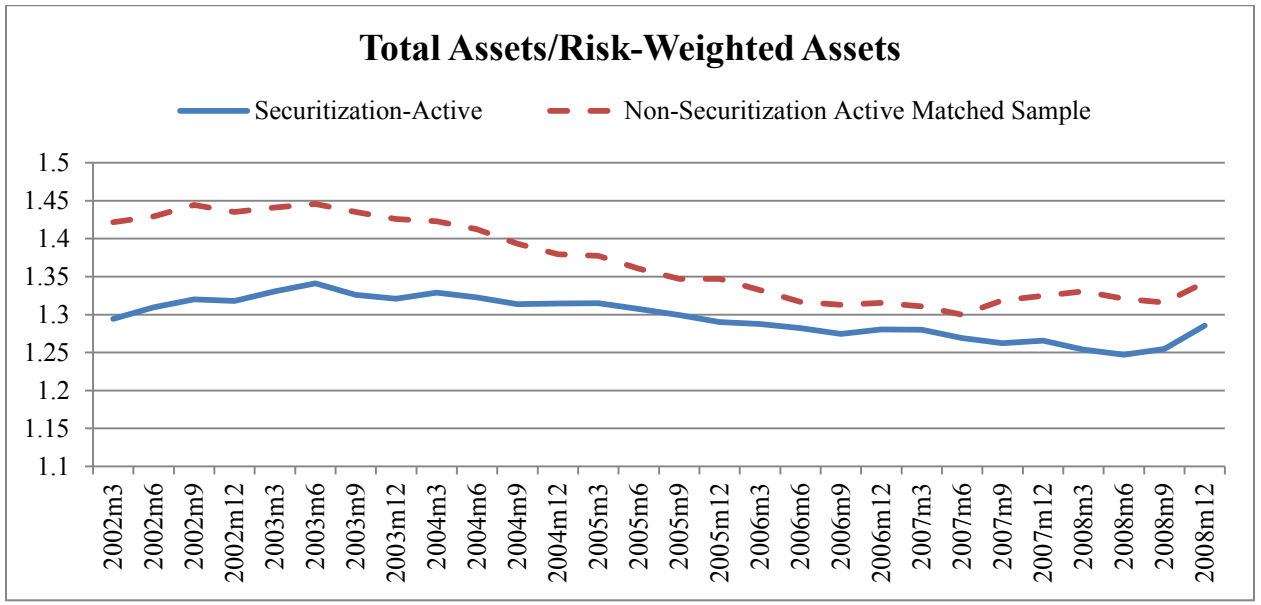

Table 1. Documenting the Holdings of Highly-Rated Tranches Among U.S. Bank Holding Companies.

This table reports summary statistics of some measures of holdings of highly-rated tranches: Highly-Rated Residual, Highly-Rated Residual + CDOs, Highly-Rated Residual + CDOs and Writedowns, and Bottom-up Highly-Rated Tranches. See Appendix 1 for the definition of the variables. Full sample includes all U.S. publicly-traded bank holding companies (BHCs). Large trading-asset banks are defined as BHCs with trading assets in excess of $1 Billion or BHCs whose trading assets represent greater than 10% of total assets. Non-zero trading asset banks are defined as banks with trading assets greater than $0 and less than $1 Billion (or with trading assets representing less than 10% of total assets). Non-trading asset banks are defined as banks with no trading assets. Beginning in the second quarter of 2008, BHCs with trading assets in excess of $1 Billion have been required to report the amount of CDOs and ABSs held in their trading portfolio. Panel C reports statistics for the residual measure plus these CDOs and ABSs as in 2008. In Panel D, we also include write-downs on CDOs from Bloomberg covering 2006 onwards.

	Full Sample				Large Trading-Asset Banks		Non-Zero Trading Asset Banks		Non Trading-Asset Banks		Citigroup	B of A	JPMorgan Chase
Year	Obs	Mean	Med	90th %tile	Obs	Mean	Obs	Mean	Obs	Mean			
Panel A: "Highly-Rated Residual"													
2002	169	1.29%	0.10%	3.59%	13	3.05%	35	1.68%	121	0.99%	1.96%	1.29%	0.00%
2003	184	1.27%	0.06%	3.40%	13	3.77%	37	1.71%	134	0.91%	2.26%	0.79%	0.20%
2004	205	1.37%	0.02%	3.85%	14	3.76%	36	2.38%	155	0.92%	2.74%	0.94%	0.88%
2005	218	1.50%	0.10%	4.48%	14	4.70%	37	3.11%	167	0.88%	3.54%	1.43%	0.80%
2006	231	1.31%	0.15%	3.13%	14	4.75%	40	2.49%	177	0.78%	4.78%	1.04%	0.63%
2007	224	1.27%	0.20%	3.04%	12	3.18%	47	2.26%	165	0.85%	5.06%	1.73%	1.57%
2008	220	1.13%	0.11%	3.12%	11	2.42%	47	1.52%	162	0.93%	4.39%	2.55%	2.03%
Panel B: "Highly-Rated Residual + CDOs"													
2006	231	1.31%	0.15%	3.13%	14	4.76%	40	2.49%	177	0.78%	4.79%	1.05%	0.67%
Panel C: "Highly-Rated Residual + CDOs and Writedowns"													
2006	231	1.33%	0.15%	3.14%	14	4.90%	40	2.52%	177	0.78%	5.68%	1.88%	0.69%
Panel D: "Bottom-Up Highly-Rated Tranches"													
2002	169	1.11%	0.04%	3.49%	13	2.01%	35	1.56%	121	0.89%	1.18%	1.37%	0.18%
2003	184	1.01%	0.01%	3.15%	13	2.95%	37	1.53%	134	0.67%	1.04%	0.84%	0.26%
2004	205	1.14%	0.01%	2.64%	14	3.09%	36	2.31%	155	0.69%	1.25%	0.52%	0.35%
2005	218	1.26%	0.01%	3.26%	14	4.14%	37	2.80%	167	0.68%	1.85%	1.18%	0.78%
2006	231	1.28%	0.09%	3.17%	14	5.04%	40	2.47%	177	0.72%	3.89%	1.83%	0.64%
2007	224	1.23%	0.14%	3.15%	12	3.56%	47	2.13%	165	0.80%	4.69%	2.56%	1.51%
2008	220	1.03%	0.17%	3.24%	11	2.37%	47	1.32%	162	0.85%	3.89%	3.19%	2.40%

Table 2. Holdings of Highly-Rated Tranches and Bank Holding Company Stock Returns.

This table documents the relationship between BHC stock returns and holdings of highly-rated tranches as of Dec 2006. The dependent variable is buy-and-hold excess return over the equally-weighted market return from July 1, 2007 through December 31, 2008. Each regression uses a different measure of highly-rated holdings. Appendix 1 outlines the construction of the measures of highly-rated holdings as well as the definitions of the main explanatory variables and control variables. Heteroskedasticity-robust *t-statistics* are in parentheses. The symbols ***, ** and * indicate significance at the 1, 5, and 10% levels, respectively.

	Measures of Holdings of Highly-Rated Tranches			
	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs"	"Highly-Rated Residual + CDOs and Writedowns"	"Bottom-Up Highly-Rated Tranches"
	(1)	(2)	(3)	(4)
80th %tile - 100th%tile Highly-Rated Tranche Holdings Indicator	-0.137**	-0.137**	-0.141**	-0.083
	(-2.284)	(-2.284)	(-2.341)	(-1.280)
60th %tile - 80th%tile Highly-Rated Tranche Holdings Indicator	-0.108	-0.108	-0.116	-0.068
	(-1.466)	(-1.466)	(-1.575)	(-0.967)
40th %tile - 60th%tile Highly-Rated Tranche Holdings Indicator	-0.099	-0.099	-0.089	-0.013
	(-1.506)	(-1.506)	(-1.378)	(-0.206)
20th %tile - 40th%tile Highly-Rated Tranche Holdings Indicator	-0.091	-0.091	-0.091	0.077
	(-0.949)	(-0.949)	(-0.941)	(0.776)
0%tile - 20th%tile Highly-Rated Tranche Holdings (Omitted Group)				
Unused Loan Commitments	-1.358**	-1.358**	-1.357**	-1.266**
	(-2.402)	(-2.402)	(-2.389)	(-2.201)
Mortgage Loans as % of Total Assets	-0.767**	-0.767**	-0.765**	-0.785**
	(-2.204)	(-2.204)	(-2.221)	(-2.182)
C&I Loans as % of Total Assets	-0.761*	-0.761*	-0.773*	-0.802*
	(-1.824)	(-1.824)	(-1.877)	(-1.952)
"Other" H.T.M. and A.F.S. Securities	0.615	0.615	0.620	0.627
	(1.470)	(1.470)	(1.488)	(1.443)
"Other" Trading Securities	-2.705*	-2.705*	-2.674*	-2.626*
	(-1.801)	(-1.801)	(-1.803)	(-1.748)
Log Market Cap	-0.005	-0.005	-0.005	-0.009
	(-0.270)	(-0.270)	(-0.228)	(-0.446)
Prior Returns	0.167	0.167	0.169	0.176
	(1.087)	(1.087)	(1.096)	(1.143)
Market-to-Book	0.113***	0.113***	0.112***	0.107***
	(3.107)	(3.107)	(3.093)	(2.923)
Tier 1 Leverage	-0.012	-0.012	-0.012	-0.011
	(-0.594)	(-0.594)	(-0.610)	(-0.553)
Constant	0.551	0.551	0.538	0.585
	(0.922)	(0.922)	(0.901)	(0.924)
Observations	218	218	218	218
Adjusted R-squared	0.237	0.237	0.237	0.226

Table 3. Are Holdings of Highly-Rated Tranches Explained by Bank Asset Size?

This table tabulates the results of an OLS regression of our measures of highly-rated holdings on measures of bank size, "other" securities holdings, and other control variables. The sample contains the cross-section of publicly traded U.S. BHCs with relevant data as of December 2006. Each regression uses a different measure of highly-rated holdings. Appendix 1 outlines the construction of these measures of highly-rated holdings as well as the definitions of the main explanatory variables and control variables. Heteroskedasticity-robust *t-statistics* are in parentheses. The symbols ***, ** and * indicate significance at the 1, 5, and 10% levels, respectively.

	Measures of Holdings of Highly-Rated Tranches			
	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs"	"Highly-Rated Residual + CDOs and Writedowns"	"Bottom-Up Highly-Rated Tranches"
	(1)	(2)	(3)	(4)
$0-50 Billion	0.797**	0.797**	0.808**	0.881***
	(2.458)	(2.459)	(2.494)	(2.771)
>$50 Billion	-0.063	-0.063	-0.056	-0.062
	(-1.518)	(-1.519)	(-1.336)	(-1.550)
"Other" H.T.M. and A.F.S. Securities	0.029	0.029	0.030	0.030
	(1.170)	(1.170)	(1.174)	(1.238)
"Other" Trading Securities	0.384	0.385	0.357	0.354
	(1.063)	(1.067)	(0.970)	(1.031)
Prior Returns	-0.005	-0.005	-0.005	-0.011
	(-0.514)	(-0.513)	(-0.510)	(-1.144)
Market-to-Book	0.003	0.003	0.003	0.003
	(1.418)	(1.416)	(1.395)	(1.332)
Tier 1 Leverage	-0.001	-0.001	-0.001	-0.001
	(-1.107)	(-1.108)	(-1.113)	(-0.875)
Constant	0.013	0.013	0.013	0.015
	(0.742)	(0.742)	(0.745)	(0.911)
Observations	225	225	225	225
Adjusted R-squared	0.149	0.149	0.152	0.172

Table 4. "Skin in the Game": Does Securitization Activity Explain Holdings of Highly-Rated Tranches?

This table tabulates the results of an OLS regression of our measures of highly-rated holdings on variables measuring a bank's securitization activity. "Securitization-active Indicator" variable in Columns (1) and (2) is equal to one if the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements is greater than zero. "Securitization-league-table Indicator" in Columns (3) and (4) is equal to one for any BHC that was involved in the underwriting of any type of securitization. "Loan Pipeline" in Columns (5) and (6) calculates the total amount of retail and wholesale closed-end first and junior lien loans made on 1-4 family residential properties that were for sale, scaled by total assets, as of December 2006. In the regressions including the Loan Pipeline, we measure highly-rated holdings as of December 2007 rather than December 2006. The dependent variable in Columns (7) and (8), "(Highly-Rated Residual $\$_t$ – Highly-Rated Residual $\$_{t-4}$)/$Assets_{t-4,}$" measures year-over-year *changes* in the amount of holdings of highly rated tranches, sampled quarterly from 2002 Q1 through 2006 Q4 (see Appendix 1 – Panel A for a detailed description of the construction of the "Highly-Rated Residual" variable). The variable "(Sec. $\$_t$ – Sec. $\$_{t-4}$)/$Assets_{t-4}$" in Column (7) is sampled quarterly and is calculated as the year-over-year change in the total amount of the outstanding principle balance of assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements. The variable "(Mortgage Sec. $\$_t$ - Mortgage Sec. $\$_{t-4}$)/$Assets_{t-4}$" in Column (8) is sampled quarterly and is calculated as the year-over-year *change* in the amount of the outstanding principle balance of mortgage assets (1-4 family residential loans and home-equity lines of credit) sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements. Control variables are defined in Appendix 1. The sample contains the cross-section of publicly traded U.S. BHCs with relevant data as of Dec 2006. Heteroskedasticity-robust *t-statistics* are in parentheses. Standard errors used to compute the T-statistics reported in columns 7 and 8 are clustered by year-quarter and by Bank. The symbols ***, ** and * indicate significance at the 1, 5, and 10% levels, respectively.

(…Table 4 continued)

	Measures of Holdings of Highly-Rated Tranches							
	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"	(Highly-Rated Residual $t - Highly-Rated Residual $t-4)/Assetst-4	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Securitization-active Indicator	0.015**	0.015**						
	(2.178)	(2.188)						
Securitization-league-table Indicator			0.015	0.015				
			(0.485)	(0.490)				
Loan Pipeline					-0.010	-0.011		
					(-0.280)	(-0.304)		
(Sec. $t - Sec $t-4)/Assetst-4							0.003*	
							(1.69)	
(Mortgage Sec. $t - Mortgage Sec. $t-4)/Assetst-4								0.003**
								(1.98)
$0-50 Billion	0.564*	0.574**	0.736**	0.746**	0.722*	0.731*	0.122	0.122
	(1.967)	(2.001)	(2.138)	(2.173)	(1.911)	(1.930)	(1.48)	(1.48)
>$50 Billion	-0.065	-0.059	-0.062	-0.055	-0.009	-0.005	-0.010	-0.010
	(-1.565)	(-1.383)	(-1.577)	(-1.386)	(-0.544)	(-0.328)	(1.15)	(1.15)
"Other" H.T.M. and A.F.S. Securities	0.032	0.032	0.032	0.032	0.011	0.010	-0.004	-0.003
	(1.261)	(1.265)	(1.346)	(1.351)	(0.629)	(0.594)	(0.37)	(0.37)
"Other" Trading Securities	0.386	0.359	0.311	0.282	-0.027	-0.039	0.048	0.048
	(1.071)	(0.978)	(0.946)	(0.841)	(-0.259)	(-0.361)	(1.05)	(1.05)
Prior Returns	-0.006	-0.006	-0.007	-0.007	-0.007	-0.007	-0.005	-0.005
	(-0.527)	(-0.523)	(-0.649)	(-0.647)	(-0.686)	(-0.688)	(1.55)	(1.55)
Market-to-Book	0.004*	0.004*	0.004	0.004	0.001	0.001	0.002**	0.002**
	(1.755)	(1.733)	(1.539)	(1.517)	(0.450)	(0.433)	(2.24)	(2.25)
Tier 1 Leverage	-0.002	-0.002	-0.001	-0.001	-0.002*	-0.002*	-0.001**	-0.001**
	(-1.238)	(-1.244)	(-0.996)	(-1.001)	(-1.676)	(-1.683)	(2.48)	(2.49)
Constant	0.012	0.012	0.012	0.013	0.031*	0.032*	0.014**	0.014**
	(0.675)	(0.678)	(0.724)	(0.727)	(1.889)	(1.903)	(2.07)	(2.07)
Observations	225	225	225	225	200	200	3,723	3,724
Adjusted R-squared	0.170	0.173	0.150	0.153	0.105	0.110	0.028	0.028

Table 5. Does Regulatory Capital Arbitrage Explain Holdings of Highly-Rated Tranches?

This table tabulates the results of an OLS regression of our measures of highly-rated holdings on proxies identifying banks that are likely to engage in regulatory-capital arbitrage activities. These proxies are an Asset-backed Commercial Paper (ABCP) Activity indicator, change in leverage around the regulation change in 2001, and an indicator variable for banks that are subject to market-risk-equivalent capital rules. The construction of each of these variables, dependent variables, and controls is detailed in Appendix 1. The regressions in columns (1) and (2) are estimated using holdings of highly-rated tranches as of December 2007 and ABCP activity as of December 2006. The sample contains the cross-section of publicly traded U.S. BHCs with relevant data as of December 2006. Heteroskedasticity-robust *t-statistics* are in parentheses. The symbols ***, ** and * indicate significance at the 1, 5, and 10% levels, respectively.

	Measures of Holdings of Highly-Rated Tranches					
	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"	"Highly-Rated Residual"	"Highly-Rated Residual + CDOs and Writedowns"
	(1)	(2)	(3)	(4)	(5)	(6)
ABCP Activity Indicator	-0.009	-0.008				
	(-0.363)	(-0.302)				
Change in Leverage, 2000 Q4 - 2002 Q4			0.002	0.002		
			(1.355)	(1.316)		
Market Risk Equivalent Bank Indicator					0.016	0.015
					(0.575)	(0.553)
$0-50 Billion	0.803	0.800	0.791*	0.804**	0.665	0.681
	(1.572)	(1.567)	(1.975)	(2.007)	(1.586)	(1.631)
>$50 Billion	-0.006	-0.003	-0.061	-0.054	-0.063	-0.056
	(-0.375)	(-0.177)	(-1.513)	(-1.325)	(-1.567)	(-1.376)
"Other" H.T.M. and A.F.S. Securities	0.011	0.011	0.001	0.001	0.030	0.030
	(0.834)	(0.811)	(0.0179)	(0.0247)	(1.177)	(1.181)
"Other" Trading Securities	-0.013	-0.027	0.362	0.334	0.322	0.297
	(-0.176)	(-0.343)	(1.018)	(0.924)	(1.023)	(0.918)
Prior Returns	-0.010	-0.010	-0.014	-0.014	-0.006	-0.006
	(-1.037)	(-1.055)	(-1.065)	(-1.055)	(-0.585)	(-0.578)
Market-to-Book	0.001	0.001	0.008	0.008	0.003	0.003
	(0.914)	(0.905)	(1.563)	(1.534)	(1.431)	(1.406)
Tier 1 Leverage	-0.002*	-0.002*	-0.001	-0.001	-0.001	-0.002
	(-1.731)	(-1.739)	(-0.442)	(-0.450)	(-1.154)	(-1.159)
Constant	0.029**	0.029**	0.015	0.015	0.014	0.014
	(2.180)	(2.206)	(0.481)	(0.485)	(0.921)	(0.919)
Observations	221	221	140	140	225	225
Adjusted R-squared	0.113	0.117	0.135	0.137	0.151	0.154

Table 6: Do Bad Incentives Explain Holdings of Highly-Rated Tranches?

This table tabulates the results of an OLS regression of our measures of highly-rated holdings on various proxies of managerial incentives. The construction of each dependent and independent variable is detailed in Appendix 1. The sample contains the cross-section of publicly traded U.S. BHCs with relevant data as of Dec 2006. Heteroskedasticity-robust *t-statistics* are in parentheses. The symbols ***, ** and * indicate significance at the 1, 5, and 10% levels, respectively.

	Dependent Variable: "Highly-Rated Residual" Measure of Holdings of Highly-Rated Tranches						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Governance Index	-0.014						
	(-0.740)						
High-Compensation Elasticity		0.014					
		(1.056)					
Compensation Residual			0.016				
			(1.400)				
Bonus-per-Salary				-0.002			
				(-0.428)			
Dollar Gain from +1%					0.000		
					(1.099)		
Equity Risk (%)						-2.696	
						(-1.337)	
CEO Ownership %							7.338
							(0.962)
$0-50 Billion	0.833**	0.685	0.918*	0.898*	0.455	0.827*	0.862*
	(2.380)	(0.978)	(1.820)	(1.928)	(1.189)	(1.910)	(1.899)
>$50 Billion	-0.064	-0.070	-0.067	-0.064	-0.065	-0.066	-0.067
	(-1.533)	(-1.514)	(-1.568)	(-1.521)	(-1.254)	(-1.560)	(-1.546)
"Other" H.T.M. and A.F.S. Securities	0.028	0.119	0.083	0.021	0.014	0.028	0.013
	(1.074)	(0.463)	(0.726)	(0.367)	(0.241)	(0.428)	(0.224)
"Other" Trading Securities	0.395	0.444	0.382	0.460	0.224	0.363	0.394
	(1.093)	(1.201)	(1.085)	(1.182)	(0.471)	(0.994)	(1.056)
Prior Returns	-0.007	0.011	-0.004	-0.002	-0.003	-0.004	-0.004
	(-0.633)	(0.167)	(-0.155)	(-0.493)	(-0.632)	(-0.780)	(-0.707)
Market-to-Book	0.004	0.006	0.005	-0.016	-0.011	-0.010	-0.003
	(1.536)	(0.416)	(0.764)	(-0.781)	(-0.535)	(-0.464)	(-0.154)
Tier 1 Leverage	-0.001	-0.003	-0.002	0.010	0.013	0.011	0.012
	(-1.077)	(-0.370)	(-0.300)	(1.535)	(1.561)	(1.548)	(1.542)
Constant	0.021	-0.014	0.001	0.016	0.012	0.027	0.007
	(0.968)	(-0.126)	(0.0111)	(0.328)	(0.217)	(0.494)	(0.147)
Observations	222	51	67	89	79	79	79
Adjusted R-squared	0.146	-0.033	0.063	0.083	0.140	0.088	0.093