Do Institutional Investors Know Banks Better?

Evidence from Institutional Trading Surrounding the 2008 Financial Crisis

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Abstract

The catastrophic economic damage caused by the 2008 financial crisis is unprecedented and caught many market participants by surprise. It also raises the question: what is the role of institutional investors in the banking industry? In this paper, we investigate this under-researched area and provide evidence that grey institutions (i.e. banks and insurance companies) have more information about banks' risk exposure to securitization than do independent institutions (e.g. investment companies and public pension funds) as they shy away from banks that issuing riskier securitization deals before the crisis. We also find that the trading of grey institutions before the crisis can predict high-exposure banks' abnormal returns around the Lehman Bankruptcy and is related to such banks' operating performance during the crisis period.

1. Introduction

Institutional investing in the stocks of banks has increased dramatically for the past decade in U.S.; the median institutional ownership in bank holding companies (BHCs) has increased from around 10% in 2001 to more than 40% in 2013. However, systematic evidence regarding their roles in the banking industry is scarce despite the fact that banks provide important services in the economy and the governance of banks is more important than ever since the 2008 financial crisis (Becht et al. (2011)). In U.S. alone, this crisis wiped out over 50% market capitalization, led to drastic deterioration in financial institutions' balance sheets and fire sales due to the run on the shadow banking system. The catastrophic collapse of subprime mortgage securitization market raises the important question on how securitization affects lenders' screening incentives. Keys, Mukherjee, Seru, and Vig (2010) empirically examine this question and conclude that the screening standard of subprime mortgages is adversely affected by securitization practices.

With hindsight, it is obvious that some banks had taken excessive risk prior to the crisis that led to their subsequent collapses and tremendous losses of equity value. It then raises the questions how much institutional investors have anticipated this event and what role they played in the banking industry prior to the 2008 financial crisis. In this paper, we investigate these questions to shed light on the potential for institutional investors to be bank monitors. Empirical literature has documented their monitoring role in the manufacturing sectors. For example, Nelson, and Weisbach (1998) show that institutions with large ownership positions often have access to board members and senior managers. Using invested firms' decisions on mergers and acquisitions, Chen, Harford, and Li (2007) show that only concentrated holdings by independent long-term institutions are related to post-merger performance and make withdrawal of bad bids

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more likely. They also find that these institutions make long-term portfolio adjustments rather than trading for short-term gain and only sell in advance of very bad outcomes.

We follow the spirits of Chen, Harford, and Li (2007) in this study, but with an important twist to fit our purpose. We postulate that grey institutions, i.e., banks and insurance companies, have more information on BHCs with high exposure to the risk associated with securitization activities than do independent institutions, i.e. pension funds, investment companies and advisers. Banks are in the same business with other banks, they should know other banks better. Insurance companies are active participants in the securitization business by being the investors of these products or the insurers of mortgage backed securities. Both roles played by insurance companies suggest that they have the incentives to monitor banks. However, the premium received from insuring these securitized products can also taint their incentives. The case of AIG is a gruesome example. Nonetheless, in any case, these grey institutions are likely to have more information than independent institutions through their own business lines.

On the other hand, given institutional investors' experience and expertise in investing, independent institutions also have incentives to produce information. Extant literature also documents evidence that institutional trading is motived by the skills and information they possess. For example, Yan and Zhang (2009) find that stocks experiencing the largest increase in short-term institutional holdings have significantly higher earnings surprises and earnings announcement abnormal returns over the subsequent four quarters than stocks experiencing the largest decrease in short-term institutional holdings. Given the complex incentives of grey institutions and the normal investment incentives of independent investors, it is indeed an empirical issue, how they have traded invested banks prior to the financial crisis.

The 2008 crisis is definitely qualified to be a very bad outcome. To protect their investments, better informed institutional investors regardless of their investment horizons should reduce their holdings of banks that have a high potential of collapsing. Using BHCs' reported securitization level in FR Y-9C, we find that institutional investors started to reduce their investments in BHCs at least 4 quarters before the crisis hit and the selling is more pronounced for BHCs with a high exposure to securitization. The empirical results confirm our prediction: grey institutions reduced their holdings more in BHCs with high exposure to securitization than independent institutions before the crisis. The results are robust even after controlling for heterogeneity among BHCs and potential endogeneity issues.

The securitization information obtained in FR Y-9C only shows the quantity of involvement in securitization. But the volume of activities does not necessarily translate into worse quality of deals. In this paper, we utilize a unique dataset, *BBx data^{TM}*, provided by BlackBox Logic to formally examine deal quality. $BBx\ Data^{TM}$ covers over 90% of the U.S non-agency residential mortgage backed securities (RMBS) market. It contains more than 7,400 deals, 21 million loans, and over 740 million remittance records dating back to 1999. The coverage includes all the mortgage market sectors, i.e., Jumbo A, Prime, Subprime, and Alt A deals. To match BHCs with deals they issued, we use the deal identifications provided in BBx Data to look up each deal's prospectus (Form 424B5) in SEC EDGAR and find the issuer for the deal from the prospectus. We are able to identify 2,152 deals whose issuers are in our BHC sample over the period of 2001-2013.

When we add BBX deal quality measures and confine ourselves to only issuing BHCs, we find that grey institutions tilt their investment towards BHCs that issue safer securitization deals prior to the crisis. Specifically, we find that grey institutions prefer BHCs that issue deals

with higher documentation level, higher proportion of owner-occupied properties, and lower combined loan-to-values (CLTV) over the four quarters leading up to the crisis; they also tilt their portfolios away from BHCs that issue deals with missing FICO or combined CLTV information. In contrast, independent institutions seemed to prefer BHCs that issue riskier deals; for example, deals with lower documentation levels, lower proportion of prime mortgages, and smaller proportion of owner-occupied properties over the same pre-crisis period. The ownership of independent institutions also loads positively on deals with no FICOs or CLTVs.

Finally, to further test whether the trading is information driven, we investigate whether the trading of institutions before crisis can predict BHCs' stock performance and operating performance during the crisis. We perform an event study on the Lehman Bankruptcy. We find that the trading of both grey institutions and independent institutions before the crisis have significant power in predicting BHCs' event day returns, but grey institutions does a much better job in predicting event returns for high-exposure BHCs. Furthermore, we find no evidence of price reversal for high-exposure BHCs based on the trading of grey institutions. The evidence lends more support to the conjecture that the trading of grey institutions is driven by their better information instead of negative fund flows they experience before the crisis. We also find some evidence that the pre-crisis trading of grey institutions can predict high-exposure BHCs' profitability during the crisis.

To the best of our knowledge, our study is the first paper systematically examining the role of institutional investors in the banking industry surrounding the 2008 crisis. The closest paper that we can find is by Cziraki (2013) who uses bank executives' trading in their own banks' stocks to infer their knowledge about the impendent crisis and finds that insiders of banks with a high exposure to the housing market sell 39% more equity than insiders of low-exposure

banks. Unlike Cziraki (2013) who uses the correlation between the returns on the Barclays index of BBB-rated collateralized mortgage-backed securities (MBS) and the stock returns of the banks during July 2007 – December 2008 to proxy a bank's exposure to the housing market, we use a more direct measure—BHCs' reported securitization level in FR Y-9C. We also obtain specific deal information in BBx dataset and formally examine the FICO score, combined loan-to-value ratio, documentation level, mortgage owner status, and proportion of prime mortgages in deals issued by BHCs.

In general, this paper also contributes to literature in the role of institutional investors in the financial markets. As Becht et al. (2011) point out, the evidence of shareholder oversight in the banking industry is scarce albeit its importance. We fill the gap by documenting the trading patterns of institutional investors prior to the 2008 Crisis. We show that institutional investors, particularly insurance companies and banks, are concerned about the subprime mortgage securitization practices in some BHCs prior to the 2008 crisis. Their votes with their feet suggest that these grey institutions oppose such risk-taking behaviors of some BHCs, which subsequently failed catastrophically during the crisis. However, the lack of evidence from independent investors and the magnitude of trading effects from grey institutions suggest that it is unlikely to delegate a monitoring role to institutional investors in the banking industry. Our analysis, thus, also adds to the literature on governance through trading, such as Edmans and Manso (2011) and Chang, Lin, Ma (2014) that trading of institutional investors can serve as a commitment device that punish or reward firms making good decisions.

The remainder of the paper is organized as follows. We describe our date sources and definitions of key variables in Section 2, and provide descriptive statistics and univariate analysis in Section 3. Our main empirical results are provided in Section 4. Section 5 concludes the paper.

2. Data Sources and Variable Construction

2.1 Sample Selection and BHC Characteristics

To construct our sample, we start with the "Federal Reserve Bank of New York, 2013 CRSP-FRB link."[1] The linking table includes 1,289 PERMCO-RSSD links from January 1, 1990 to September 30, 2012. The table reports name, entity type, entity ID, PERMCO, as well as the starting and ending dates for the link. The entity ID (RSSD9001) is the primary identifier for reporting institutions. It never changes and is never reused. We only keep the entities listed as "Bank Holding Company", i.e., we exclude "Commercial Bank" and "Thrift Holding Company". Furthermore, we exclude from our sample the BHCs that were not held by any institutional investors over the sample period. We obtain the financial data for sample BHCs from FR Y-9C from Federal Reserve Board of Chicago. Our sample starts from 2001 as it's the first year when the Y9-C began reporting securitization by asset type; and our sample ends in 2013. We get stock return information from CRSP daily stock file.

Following Peria and Schumkler (2001), and Hadad, Agusman, Monroe, Gasbarro and Zumwalt (2011), we construct several BHC characteristic measures. Appendix A describes the detail variable items used from Y-9C reports. Below we discuss the economic meaning of these variables:

(1) Liquidity risk. We measure a BHC's balance sheet liquidity by the ratio of liquid assets over total assets (LIQ).

(2) Credit risk or loan quality. We compute the sum of loans past due 90 days or more and loans not accruing for bad loans, scaled by total assets (LQLT).

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[1] For more information, refer to http://www.newyorkfed.org/research/banking_research/datasets.html.

(3) Capital adequacy. We use total equity capital over total assets (EQT).

(4) Profitability. We use return on assets (PRF).

(5) Insolvency risk. We use Z-score to capture a BHC's insolvency risk; it equals the return on assets plus the capital asset ratio, $\frac{ROA + EQT}{\sigma_{ROA}}$. It measures the number of standard deviations that profits must fall to drive a BHC into insolvency. It's essentially a measure of the distance to default for a given BHC.

(6) Efficiency. We use the ratio of noninterest expenditures to total assets (EFF).

Following Ellul and Yerramilli (2013), we also collect the following measures for our sample BHCs:

(7) Reliance on off-balance-sheet activity. We use the ratio of noninterest income over total net income (NONINC).

(8) Time-varying risk preferences. We use BHC's derivative trading over assets (DT) and BHC's derivative hedging over assets (DH).

To measure securitization-related activities, we estimate the following measures:

(9) Private MBS (PMBS). It's calculated as the total value of private-label mortgage-backed securities held in both trading and investment portfolios.

(10) Mortgage securitization. We measure a BHC's mortgage securitization activities by the sum of mortgage and home equity lines securitized over total assets (SCT_MGG).

(11) Aggregate asset securitization. To measure a BHC's aggregate exposure to asset securitization, we use the sum of all securitized assets over total assets, included asset categories are securitized family residential loans, home equity lines, credit card receivables, and other consumer loans, and commercial & industrial loans (SCT_All).

We also include the logarithm of BHC assets (Size) as total assets have been shown to be a proxy for bank diversification potential (Brewer, 1989). Larger banks may also be redeemed safer by investors due to "too big to fail". Lastly, we add two BHC stock performance measure. QRET is for compounded stock return over the quarter using BHCs' daily return data; QVOL is quarterly return volatility, calculated as the variance of daily returns over the quarter. We winsorize variables at the one and 99 percentile to mitigate the impact of outliers.

2.2 Institutional Ownership

We collect institutional holding data from Thomson-Reuters Institutional Holdings (13f) Database. Institutional investors that use United States mail in their business and exercise investment discretion over $100 million are required to file Form 13F with SEC pursuant to Section 13(f) of the Securities Exchange Act of 1934. Form 13F filings provide information regarding the securities holdings of institutional investors. Exceptions are small positions that include fewer than 10,000 shares of a given issuer and the aggregate fair market value of the same position is less than $200,000. The commonly used databases for institutional holdings are the Thomson Financial sets that are also known as CDA/Spectrum 13f database. The Thomson sets are available on WRDS as part of the Thomson Financial Network (TFN).

TFN classifies institutions into five types: 1) banks; 2) insurance companies; 3) investment companies and their managers; 4) independent investment advisers; and 5) others (pension funds, endowments, etc.). One issue with TFN 13f data is that there are serious classification errors in recent years. Many banks (TYPECODE=1) and Independent Investment Advisors (TYPECODE=4) are misclassified as others (TYPECODE=5) in 1998 and beyond. Previous studies usually correct this problem by replacing a manager's TYPECODE after 1998 with the TYPECODE reported before 1998. After further investigating the data, we find that

misclassification can happen to institutions whose post-1998 TYPECODE is not 5 as well. For example, Brown Brothers Harriman & CO had a TYPECODE of "5" up to September 30, 2008 after which its TYPECODE was recorded as "1"; or Epoch Investment Partners, Inc. whose TYPECODE changed from "5" before December 31, 2006 to "4" afterwards. To fully address this issue, we replace an institution's later date TYPECODE with its earliest date TYPECODE. Because the MGRNO identifiers are reused in TFN 13(f), we assign a new unique identifier to each included institution based on its MGRNAME, MGRNO, and RDATE in TFN. Whenever in doubt, we double check the institution's information on EDGAR and the institution's website (if a website is available). Then we further confine our sample to institutions that have ever invested in BHCs. We merge BHCs and their institutional investors using CUSIP.

Literature has shown that institutional investors differ significantly depending on the types of investment strategies, horizons, and information advantages. In the context of investing in BHCs, institutional investors may have different degrees of relationships with these BHCs. For example, insurance companies and banks might have stronger business ties with BHCs that they invest; while other institutions, such as independent advisers may be more independent from these BHCs. Following Chen, Harford, and Li (2007), we group institutions into two categories: we classify types 3 and 4 as well as public pension funds from type 5 as independent institutions; and types 1 and 2 as well as the remaining institutions from type 5 as grey institutions[2].

It is intuitive that bank-type institutional investors are better informed about BHCs' business and performance than do independent institutions due to their own operations in the same business and syndication relationships with invested BHCs. For insurance company-type institutional investors, they also enjoy developed business relationship with BHCs and/or are

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[2] In alternative specification, we include only banks and insurance as grey institutions, our major results continue to hold.

active participants of securitization market and CDS market. For example, in an introductory statement about its mortgage insurance product, "United Guaranty", AIG states that "private mortgage insurance helps lenders by providing protection against the risk of a borrower defaulting on a mortgage loan…United Guaranty provides responsible risk management with its risk-based pricing model, which prices the mortgage insurance premium according to the unique risk of each loan."[3]

Similarly, Wells Fargo Mortgage Backed Securities 2004-D Trust states in its prospectus "WFHM supplements the mortgage loan underwriting process with either its own proprietary scoring system or scoring systems developed by third parties such as Freddie Mac's Loan Prospector, Fannie Mae's Desktop Underwriter or scoring systems developed by private mortgage insurance companies"

In addition, insurance companies are also involved in securitization deals directly. For example, J.P. Morgan Mortgage Acquisition Trust 2006-HE2 states in its prospectus "One or more insurance companies may issue a financial guaranty insurance policy covering certain payments to be made on net interest margin securities to be issued by a separate trust and secured by all or a portion of the Class C certificates and the Class P Certificates." For another example, Morgan Stanley ABS Capital I INC. Trust 2003-HE1 states in its prospectus "…deficiencies in amounts otherwise payable on the securities or on specified classes will be covered by insurance policies and/or surety bonds provided by one or more insurance companies or sureties." Thus, it's not unreasonable to assume that insurance companies also have more information than independent institutions.

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[3] Ironically, AIG failed miserably during the crisis. It'll be interesting to see if other insurance companies also have the incentive problem.

We, therefore, construct three different institutional ownership measures and three trading variables. Total institutional ownership (IO_Total) is calculated as the ratio of a BHC's total shares held by 13f investors over the BHC's total shares outstanding. Total institutional ownership from grey institutions (IO_Grey) is computed as the percentage of shares outstanding held by grey institutions; total institutional ownership from independent institutions (IO_Indp) is computed as the percentage of shares outstanding held by independent institutions. CHGIO_Total, CHGIO_Grey, and CHGIO_Indp are corresponding trading measures. They are defined as the change in institutional ownership from previous quarter for a BHC.

2.3 Deal Quality Measures

We obtain the deal quality measures of securitized mortgages from $BBx\ Data^{TM}$ provided by BlackBox Logic. $BBx\ Data^{TM}$ covers over 90% of the U.S non-agency residential mortgage backed securities (RMBS) market. It contains more than 7,400 deals, 21 million loans, and over 740 million remittance records dating back to 1999. The coverage includes all the mortgage market sectors, i.e., Jumbo A, Prime, Subprime, and Alt A deals. To match BHCs with deals they issued, we use the deal identifications provided in BBx Data to look up each deal's prospectus (Form 424B5) in SEC EDGAR and find the issuer for the deal from the prospectus. We are able to identify 2,152 deals whose issuers are in our BHC sample over the period of 2001-2013.

We collect average issue balance and deal issue year as control variables, and the following five different deal quality measures from BBx Data:

(1) Average FICO score for all loans in the deal (FICO);

(2) Average documentation level for all loans in the deal (DOC). For each mortgage, BBx reports one of the documentation status, "Full Documentation (FD)", "Low Documentation (LD)", "No Documentation (ND)", "Reduced Documentation (RD)" and "Unknown (UN)". We assign a value of 1 to mortgages with ND or UN, a value of 2 to mortgages with RD or LD, and a value of 3 to mortgages with FD. We then compute the average documentation level of all mortgages included in one deal as the deal's average documentation level.

(3) Combined loan-to-value (CLTV). BBx reports the ratio of all loan amounts on the property at the time of origination to the property value at loan origination for each mortgage. We compute the mean value of all mortgages include in one deal as deal's average CLTV.

(4) Proportion of prime mortgages in the deal (LSEC). BBx reports the credit sector each mortgage belongs, including "Alt-A (AA)", "Prime (PR)", "Subprime (SP)", and "Unknown (UN)". We assign a value of 1 to mortgages with UN or SP, a value of 2 to mortgages with AA, and a value of 3 to mortgages with PR. Then we compute the average value of all mortgages in one deal as the deal's average loan sector, the higher the value the higher portion of prime mortgages in the deal.

(5) Property occupancy status. BBx provides occupancy types: "Non Owner Occupied", "Other", "Owner Occupied", "Second Home", "Unknown" and "Vacant". We assign a value of 1 to mortgages recorded as "Owner Occupied" and a value of 0 to the rest mortgages. We then compute the average value of all mortgages in one deal as the deal's average owner-occupancy. The higher the value, the more properties are owner-occupied in the deal.

3. Descriptive Statistics

3.1 Descriptive Statistics for BHC Characteristics

Table 1 reports summary statistics for BHC characteristics. Panel A, Table 1 presents the descriptive statistics for all sample BHCs. We provide mean, median, standard deviation, 25th percentile, and 75th percentile for each variable. Along with each variable, we also provide the number of BHC-quarters that has available information to compute the statistic. The mean and median for BHC size are fairly close, indicating that our size measure is fairly symmetrical after taking logarithm of the book value of asset. An average BHC holds around 22% liquid assets, has 0.4% return on assets, and keeps around 9% of asset value in equity capital.

On average, BHCs spend 2% of assets in noninterest expense. Nonperforming loans, estimated by the sum of loans over 90 days late and loans not accruing, take up around 1.2% for an average BHC. Z-score has a mean 40.97, suggesting that the profit must fall at least 41 standard deviations to drive an average BHC into insolvency. The distribution of derivatives used for trading and hedging are highly skewed, and indicates that not every BHC is equally active in using derivatives. For an average BHC, the noninterest income accounts for around 18.4% of its total net income; and the value of private-label mortgage-backed securities accounts for around 0.6% of its total assets. The securitization-related measures are also skewed, indicating not every BHC is equally involved in securitization. Average quarterly return for sample BHCs is 0.025 with a standard deviation of 0.001.

On average, institutional investors hold 29.4% of sample BHCs' shares. Independent institutions seem to have a greater ownership in BHCs than grey institutions; but both have meaningful existence in BHCs.

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In Panel B of Table 1, we seek to understand the differences in characteristics between BHCs with high exposure to asset securitization and BHCs with low exposure to asset securitization. To do so, we aggregate sample BHCs' reported asset securitization (SCT_ALL) over the whole sample period, and then we treat BHCs with non-zero aggregated asset securitization as Securitizing BHCs and those with zero aggregated asset securitization as Non-securitizing BHCs. We then perform a T-test and Wilcoxon rank test of the values of various BHC characteristics.

As we can see, Securitizing BHCs are larger in size, hold a slightly bigger percentage of liquid assets, are more profitable, spend more on noninterest expense, and hold more bad loans, and have smaller distance to insolvency than Non-securitizing Securitizing BHCs are much more active in using derivatives for trading and hedging purposes than Non-securitizing BHCs. Securitizing BHCs attribute a greater percentage of their net income to non-interest-generating activities and hold a greater private-label MBS in their portfolios than do Non-securitizing BHCs. Not surprisingly, Issuer BHCs also have higher mortgage/all asset securitization level as well as higher charge-offs on securitized assets. Over our sample period, Securitizing BHCs also have lower return volatility than Non-securitizing BHCs but the two groups do not seem to have different stock returns over the sample period. In terms of institutional investment, Securitizing BHCs have significantly higher institutional ownership than Non-Securitizing BHCs; the same holds for both grey institutions and independent institutions.

3.2 Descriptive Statistics for Deal Characteristics

We present summary statistics for securitization deal related measures in Table 2. We provide mean, median, standard deviation, 25th percentile and 75th percentile for each variable. Along with each variable, we also provide the number of deals that has available information to

compute the statistic. Even though we are able to match 2,152 deals in total, some deals are missing one or more quality measures we use here.

Grand mean of FICO scores is 700 with a median of 719. Combined loan-to-value has a mean of 79.46%, which tells us the average loan amounts on the deal property at the time of origination is about 80% of the property value at loan origination. Average documentation level is 1.8, indicating that an average borrower in these deals provide some kind of income documentation but not full documentation. Loan sector indicator has a mean of 2.4, indicating the average loan lies between Alt-A and prime mortgages. Owner status indicator has a mean value of 0.79, suggesting that around 79% properties in the deal are the borrowers' primary residence. In addition, the average amount of loan principal outstanding at the time of deal issuance is around 360 thousands. Lastly, most securitization deals in our sample were issued in year 2005 and 2006.

4. Empirical Results

4.1 Institutional Trading in BHCs prior to the 2008 Financial Crisis

We postulate that institutional investors, particularly grey institutions, with their expertise in investment and experience in the securitization markets may have some knowledge about the impending crisis and revise their assessment of investment prospect in BHCs. Following Ivashina and Scharfstein (2010), we define August 2006 to July 2007 as pre-crisis period and create four dummies for each of the four quarters leading up to the crisis. We analyze trading of institutional investors during these quarters.

Because the 2008 financial crisis is closely related to the excessive risk taking in securitization, one natural question to ask is whether institutional investors distinguish between

high securitization exposure BHCs and no (or low) exposure BHCs. We use three different proxies to classify BHCs. The first proxy captures banks that invested in private-label mortgage-backed securities (PMBS). PMBS denotes the total value of private-label mortgage-backed securities held in both trading and investment portfolios over total assets. Following Ellul and Yerramilli (2013), we exclude mortgage-backed securities that are either issued or guaranteed by government-sponsored enterprises (GSEs) as they are less risky.

The second and third proxies separate BHCs into securitizers and non-securitizers based on whether they report a non-zero balance of asset securitization on their balance sheet. Starting from the third quarter of 2001, securitization by asset type became available in FR Y9-C. The reported asset categories are 1-4 Family Residential Mortgage Loans, Home Equity Lines, Commercial and Industrial Loans, Credit Card, Auto, and Other Consumer Loans. We first construct two continuous variables to proxy for a BHC's exposure to securitization: SCT_MGG is the sum of mortgage and home equity lines securitized over total assets; SCT_ALL is the sum of all securitized assets over total assets. We also create two dummy variables: MGGD takes value of 1 if SCT_MGG is greater than 0 for a BHC and 0 otherwise over the quarter; ALLD takes value of 1 if SCT_ALL is greater than 0 for a BHC and 0 otherwise over the quarter. We then employ a difference-in-difference type of analysis by estimating the following model for each type of institutional investors,

$$IO_{Type_{i,t}} = \alpha + \beta_0 * SCT_{i,t} + \sum_{k=1}^{4} \beta_{1,k} * Dummy_k + \sum_{k=1}^{4} \beta_{2,k} * Dummy_k * SCT_{i,t}$$

$$+\gamma * X_{i,t-1} + u_i + v_t + \varepsilon_{i,t} \quad (1)$$

In the above equation, $IO_{Type_{i,t}}$ denotes either grey or independent institutional ownership for BHC i in quarter t; $SCT_{i,t}$ is one of the above three securitization measures; Dummy $1-4$

represent the third quarter of 2006, the fourth quarter of 2006, the first quarter of 2007, and the second quarter of 2007 respectively; $X_{i,t-1}$ is a vector of BHC characteristics that may affect institutional ownership. We also include BHC fixed effect and quarter fixed effect to control for unobservable heterogeneity. We are interested in the coefficients of pre-crisis dummies as well as the coefficients of interaction terms between securitization measures and pre-crisis dummies. The results are reported in Table 3.[4]

The first two columns of Table 3 report the levels of institutional ownership for grey and independent institutions respectively. The securitization exposure variable is PMBS—the total value of private-label mortgage-backed securities held in both trading and investment portfolios over total assets. Grey institutions appear to avoid investments in BHCs with high PMBS trading activities indicated by the significantly negative coefficient on SCT_t in column 1, Table 3. Grey institutions did not reduce holdings throughout the pre-crisis period as all pre-crisis dummies are insignificant, despite their relatively higher levels of ownership in non-PMBS trading banks than their ownership in high PBMS banks. The significant negative coefficient on SCT_t and pre-crisis dummy for the third quarter in 2006 indicates that grey institutions reduce their holdings in high PMBS exposure banks four quarters prior to the crisis unfolded.

In contrast, the significantly positive coefficient on SCT_t in column (2) suggests that independent institutional investors preferred high PMBS trading banks. They also reduced holdings in BHCs during the pre-crisis period. However, such reductions are general and not specifically aiming high PMBS exposure banks. The distinct differences in ownership pattern between grey and independent institutions indicate that both types of institutions had unfavorable

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[4] All regression analysis is implemented in STATA 12.

information on BHCs, but the concerns of grey institutions were more specific and only restricted to high PMBS exposure banks.

Columns (3) to (6) focus on whether BHCs engage in securitization activities by using a mortgage securitization dummy (MGGD) in Columns (3) and (4); and an all securitization dummy (ALLD) in Columns (5) and (6). The results are very similar, so we mainly discuss the findings using MGGD.[5] With the exception of no significant preference between securitizing and non-securitizing banks by both types of institutions, the results in Columns (3) to (6) are in line with those in Columns (1) and (2). Again, independent institutions did not discriminate the reduction in BHC holdings, but grey institutions only reduced holdings in securitizing banks prior to the crisis. As PMBS trading and securitizing BHCs are more vulnerable to housing market meltdown, we interpret the results as grey institutions are better informed of the nature of 2008 crisis as well as BHCs' exposure to securitization market. To further investigate this proposition, in Section 4.4, we use the Lehman Bankruptcy as an information event and test whether the pre-crisis institutional trading can predict the stock return performance of BHCs surrounding the event.

Several control variables that turn out to be statistically significant for both types of institutional investors also have their expected signs. Regardless of grey or independent, institutional ownership is positively related with equity ratio and BHC size but negatively related with stock return volatility. Following Ellul and Yerramilli (2013), we also include derivative trading and derivative hedging to proxy for BHC's time-varying risk preferences. Institutional

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[5] When we turn to the last two columns, we find that two of the interaction terms between total asset securitization and pre-crisis dummies for independent institutions are negative and significant, but they are smaller in magnitude than those for grey institutions. In addition, this securitization measure is very general and not specific to mortgage securitization. The findings are still in line with our main conclusions that grey institutions reduced holdings more specifically than independent institutions prior to the crisis.

investors also tilt their investments away from BHCs with high derivative trading. Grey

institutions show preference in BHCs holding more liquid assets (LIQ_{t-1}) and with higher

efficiency (EFF_{t-1}; noninterest expenses over total assets), but independent institutions prefer

BHCs with higher prior quarterly stock returns ($QRET_{t-1}$)

4.2 Addressing Endogeneity and Reverse Causality Concerns

A few concerns may arise for the aforementioned relationship as a BHC's decision to

securitize could be determinedly endogenously. For example, the institution–BHC matching

might be nonrandom; some BHCs' decision to securitize may be affected by the percentage of

their shares held by institutional investors; or the difference in institutional ownership between

securitizing and non-securitizing BHCs may reflect other unobservable BHC characteristics

rather than securitization. In this subsection, we provide a series of robustness checks to address

this concern. For this subsection, we confine our sample to the four quarters immediately before

the crisis, i.e., 2006Q3 to 2007Q2.

Our first robustness test addresses the concern that BHCs are heterogeneous. As Table 1

shows, BHCs that choose to involve in securitization are very different from those that do not.

These different characteristics could be the main drivers that affect institutional ownership. To

control for this possibility, we use propensity score matching (PSM). PSM allows us to examine

institutional ownership of the securitizing BHCs in comparison with a matched control sample of

non-securitizing BHCs.

To implement PSM, we first utilize probit regressions with one of our securitization

dummies (PMBS, SCT_MGGD and SCT_ALLD) being the dependent variable. The regressions

can help us to identify BHC characteristics that contribute to a BHC's probability of being

involved in the securitization activities. We run the probit regressions with all of our BHC risk measures with quarter fixed effect. We then calculate each BHC's propensity score based on the probability that a BHC with given characteristics actively involved in securitization. With the computed propensity score, we match securitizing BHCs with non- securitizing BHCs (using 10 nearest neighbors and matching within a 0.01 caliper). Lastly, we implement univariate tests to compare the difference in mean institutional ownership between the treated and the matched sample for each of the 4 quarters leading up to the crisis as well as the whole pre-crisis period. We report the univariate test results in Panel A of Table 4.[6] The results show that BHCs with high exposure to mortgage securitization and aggregate asset securitization experienced greater decline in institutional ownership before the crisis than did matched low-exposure BHCs. In contrast, there's no significant difference in independent institutional ownership between the two groups prior to the crisis. Matching based on private-label MBS does not generate significant results, but the difference is negative for grey institutions before the crisis.

To further address the concern of endogeneity and reverse causality, we resort to instrumental variable (IV) regressions. Admittedly, it is challenging to find valid instrumental variables based on economic theory that predict a BHC's securitization decision but not its institutional ownership. Nevertheless, we choose five macroeconomic variables as our excluded instrumental variables: real disposable personal income, average number of households over the quarter, average number of marriages, and the average growth rate in the number of mortgage applications, and total deposits the BHC holds. Intuitively, we expect higher disposable income, higher number of households and number of marriages and faster growth in mortgage applications and lower deposits available would put more pressure on BHCs to securitize assets to meet the liquidity needs and loan demand.

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[6] For brevity, we only report second stage results for PSM and IV regressions here, first stage results are available upon request.

We report the second-stage regression results in Panel B of Table 4. From Column 1 through Column 3, we investigate the institutional ownership of grey institutions and from Column 4 through Column 6, we investigate the institutional ownership of independent institutions. The results again confirm that grey institutions significantly reduce their investment in high-securitization exposure BHCs as evidenced by the negative and significant coefficients on all securitization measures in the first three columns; in stark contrast, none of the predicted securitization measures turns out significant for independent institutions. In addition, the overidentification tests cannot reject the null hypothesis that the excluded instruments are valid instruments, i.e., uncorrelated with the error term but is correlated with securitization measures.

4.3 Institutional Ownership and Deal Quality

In Section 4.1, we have shown that institutional investors reduce their holdings in BHCs at least 4 quarters before the crisis hit. In particularly, the reduction of grey institution holdings is more profound in BHCs that report higher levels of asset securitization or PMBS trading on their balance sheet. However, high securitization level doesn't necessarily lead to high risk or deterioration of balance sheet for a BHC if risk is appropriately controlled when securitizing mortgages. To further capture BHCs' risk exposure to securitization activities, we re-examine the institutional ownership regressions by including mortgage securitization deal quality. The results are reported in Table 5.

The results in Table 5 show that grey institutions significantly reduced holdings among BHCs issue more mortgage securitization deals between 2006Q3 to 2007Q2 (the pre-crisis period). Grey institutions also tilt their portfolios towards BHCs that issue deals with better qualities during this period, such as higher documentation level and higher proportion of owner-occupied properties as well as lower combined-loan-to-value. Although the coefficients on

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interaction terms between pre-crisis dummy and proportion of prime mortgage or FICO score are insignificant, grey institutions, in general, tend to hold more shares of BHCs securitized a higher proportion of prime mortgage and avoid those BHCs securitized deals without FICO score information. The grey institutions also avoid BHCs that issue deals with no CLTV information in general.

In contrast, independent institutions appear to have tilted their portfolios towards BHCs that are more aggressive in risk-taking, i.e. BHCs that securitize more during the pre-crisis period, that issue deals with lower documentation levels, higher combined loan-to-values, lower portion of prime mortgages, and smaller proportion of owner-occupied properties over the four quarters leading up to the crisis. The results lend further support to our hypothesis that grey institutions are more concerned about the 2008 crisis. They choose safer BHCs over riskier BHCs prior to the crisis to reduce their potential losses in the crisis. On the other hand, even though the independent institutions correctly anticipated the hit of the crisis, they were unable to precisely identify safer BHCs from the BHC universe.

4.4 Event Study of Lehman Brothers Bankruptcy and Ex Post Profitability

Our results so far suggest that institutional investors prefer to invest in safer BHCs, and they are also fairly informed about the BHCs' situation. They reduce their holdings in BHCs prior to the crisis and the reduction is more concentrated in high-exposure BHCs. We also establish that grey institutions with their stronger business ties with the BHCs as well as their experience in similar business lines to BHCs show greater concern than independent institutions. In this subsection, we provide additional tests on whether grey institutions indeed have more information about BHCs than do independent institutions.

We investigate whether institutional trading over the four quarters leading up to the crisis can predict the BHCs' abnormal returns for the 3-day window around Lehman Brothers bankruptcy. We take Lehman Brothers bankruptcy as the one of the clearest signals of the housing market meltdown and excessive risk-taking in securitization deals. If institutional investors have anticipated the crisis and are able to identify the BHCs that were more aggressive in securitizing assets, their trading in these BHCs should predict the BHCs' stock performance around the event. To increase the precision of BHCs actively involved in questionable securitization practices, we only use PMBS (private-label MBS) trading as our securitization proxy. The general securitization measures contain more noise and do not provide enough discrimination power for the stock return analysis, therefore, we do not report the results using the general measures (the results are available upon request).

Panel A in Table 6 reports the regression results of BHCs' abnormal event returns on institutional trading as well as their interaction terms with PMBS trading. If institutions have sold BHCs that performed worse during the Lehman event, we should expect positive coefficients on the pre-crisis trading. We find that, among the high securitization exposure BHCs, only the trading of grey institutions from 2006Q3 to 2006Q4 significantly predict the stock returns of BHCs surrounding the Lehman event. The positive estimates suggest that grey institutions anticipated the stock performance of high exposure BHCs. In contrast, none of the estimates for independent institutions are significant and some have negative signs. Among the low exposure BHCs, both types of institution trading from 2007Q1 to 2007Q2 anticipated the stock performance of BHCs. However, the findings for independent institutional trades are mixed for other quarters.

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In Table 6, Panel B reports the one-year long term abnormal stock performance of BHCs following the Lehman event. The trades of grey institutions among high exposure BHCs during 2006Q3 and 2007Q2 are positively correlated with these banks subsequent long term stock performance. Nonetheless, none of the trades of independent institutions are significantly correlated with high exposure BHCs. The results suggest that there's no price-reversal for high-exposure BHCs in the long term based on grey institutions' pre-crisis trading activities, which further confirms that the of grey institutions before the crisis is driven by the information they had instead of negative fund flows or liquidity need they were facing.

As an additional robustness check, we also examine BHCs' operating performance (ROA) during crisis in Table 7. Again, the trades of grey institutions on high exposure BHCs have better predicted power than those of independent institutions. However, grey institutions do not appear to know low exposure BHCs better than independent institutions as some estimates of grey institutional trades for low exposure banks are significantly negative. In any case, the findings of stock performance and operating performance confirms that grey institutions have more information than independent institutions regarding high exposure BHCs prior to the crisis.

5. Conclusion

In this paper, we test whether institutional investors have better information about the BHCs they invest. We use the 2008 financial crisis as a major event and examine how institutional investors trade in BHCs around the crisis. We divide BHCs into high-exposure BHCs and low-exposure BHCs based on their involvement in securitization. We supplement BHCs' aggregate securitization level from FR Y-9C with detailed securitization deal quality measures from BBx Data, which contains more than 7,400 private label mortgage securitized deals.

We find that grey institutions can better identify high-exposure BHCs and reduce their holdings more in such BHCs than independent institutions during the four quarters prior to the crisis. When we confine the analysis to only securitizing BHCs, we find that grey institutions prefer BHCs that issued deals with higher documentation level, higher proportion of owner-occupies properties, and lower loan-value during the pre-crisis period. On the contrary, independent institutions tilt their investment towards BHCs that issue riskier securitization deals over the same period.

Lastly, the trading of both grey institutions and independent institutions immediately before the crisis have significant power in predicting BHCs' event day returns surrounding the Lehman Bankruptcy, but grey institutions does a much better job in predicting event returns for high-exposure BHCs. Overall, our findings suggest that it is unlikely to rely on independent institutions to provide information on BHCs. Although, through their trades, grey institutions had revealed perverse information on some high exposure BHCs prior to the crisis. The magnitude does not appear to be economically strong enough as a pre-warning signal. In sum, our analysis demonstrate that there were concerned institutions regarding the risk-taking behaviors of BHCs prior to the crisis. However, it is not systematic among institutions to delegate them a monitoring role in the banking industry.

Appendix A: Definitions of Variables

BHC-level variables

We obtain consolidated financial information of bank holding companies (BHCs) from the FR Y-9C reports from the Federal Reserve Bank of Chicago (FRB Chicago). Federal Reserve Bank of New York provides PERMCO_RSSD links from January 1, 1990 to September 30, 2012[7]. We use this linking table to collect PERMCOs for our sample BHCs and then we obtain stock return information of BHCs from CRSP. The expressions in parentheses denote the corresponding variable names in the FR Y-9C.

- Size is natural logarithm of total assets (BHCK2170).
- LIQ measures a BHC's balance sheet liquidity, it's calculated as liquid assets over total assets. Liquid assets equals the sum of Fed funds sold and securities purchased under agreements to resell (BHCK1350), securities held to maturity (BHCK1754), and available for sale securities (BHCK1773) for the period up to 2001Q4. For the period starting from 2002Q1, liquid assets equals the sum of BHCKC225, BHCK1754, and BHCK1773. From the first quarter of 2002, we use BHCKC225 to account for Fed funds sold and securities purchased under agreements to resell.
- PRF measures a BHC's profitability, it's calculated as net income (BHCK4340) over total assets (BHCK2170).
- EQT is equity ratio, calculated as equity capital (BHCK3210) over total assets (BHCK2170).
- EFF is BHC efficiency measures, it's calculated as noninterest expenses over total assets (BHCK2170).
- DT is total gross notional amount of derivative contracts held for trading, obtained adding the values of interest rate contracts (BHCKA126), foreign exchange contracts (BHCKA127), equity derivative contracts (BHCK8723), and commodity and other contracts (BHCK8724) over total assets.
- DH is total value of derivatives used for hedging purposes (sum of BHCK8725, BHCK8726, BHCK8727, and BHCK8728) over total assets.
- NONINC is the ratio of noninterest income (BHCK4079) over the sum of noninterest and interest income (BHCK4079+BHCK4107).
- LQLT measures a BHC's loan quality, it's calculated as the sum of loans past due 90 days or more (BHCK5525) and loans not accruing (BHCK5526) over total assets.
- PMBS, private MBS: the total value of private-label mortgage-backed securities held in both trading and investment portfolios; it excludes mortgage-backed securities that are either issued or guaranteed by government sponsored enterprises. It is calculated as the sum of BHCK1709, BHCK1733, BHCK1713, BHCK1736 and BHCK3536.
- SCT_MGG, the amount of mortgage securitized over total assets. The amount of mortgage securitized is obtained by adding outstanding principal balance of assets sold and securitized with recourse or other seller-provided credit enhancements – home equity lines (BHCKB706) and 1-4 family residential loans (BHCKB705).

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[7] "Federal Reserve Bank of New York. 2013. *CRSP-FRB Link*."

- SCT_ALL, the sum of all securitized assets over total assets. All securitized assets value is obtained by adding the values of outstanding principal balance of assets sold and securitized with recourse or other seller-provided credit enhancements from the following six categories: 1-4 family residential loans (BHCKB705), home equity lines (BHCKB706), credit card receivables (BHCKB707), auto loans (BHCKB708), other consumer loans (BHCKB709), and commercial and industrial loans (BHCKB710).
- Z-score. It equals the return on assets (PRF) plus the capital asset ratio (EQT) divided by the standard deviation of asset returns. It captures the number of standard deviations that profits must fall to derive a BHC into insolvency.
- QRET is compounded stock return over the quarter using daily return data.
- QVOL is quarterly return volatility, calculated as the variance of daily returns over the quarter.

Institutional ownership measures

We obtain institutional holding data from Thomson-Reuters Institutional Holdings (13f) The Thomson sets are available on WRDS as part of the Thomson Financial Network (TFN). Thomson Financial Spectrum classifies institutions into five types: 1) banks; 2) insurance companies; 3) investment companies and their managers; 4) independent investment advisers; and 5) others (pension funds, endowments, etc.). Following Chen, Harford, and Li (2007), we classify types 3 and 4 as well as public pension funds from type 5 as independent institutions; and types 1 and 2 as well as the remaining institutions from type 5 as grey institutions.

- IO_Total, total institutional ownership. It's calculated as the ratio of a BHC's total shares held by 13f investors over the BHC's total shares outstanding.
- IO_Grey, total institutional ownership from grey institutions. It's calculated as the ratio of a BHC's total shares held by grey institutions over the BHC's total shares outstanding.
- IO_Indp, total institutional ownership from independent institutions. It's calculated as the ratio of a BHC's total shares held by independent institutions over the BHC's total shares outstanding.
- CHGIO_Total, the change in total institutional ownership from previous quarter for the BHC.
- CHGIO_Grey, the change in grey institutional ownership from previous quarter for the BHC.
- CHGIO_Indp, the change in independent institutional ownership from previous quarter for the BHC.

Deal quality measures

We collect various quality measures of securitized mortgage deals from BBx database provided by BlackBox Logic. $BBx\ Data^{TM}$ includes more than 7,400 deals, 21 million loans and over 740 million remittance records dating back to 1999.

- FICO: the average FICO score for all loans in the deal. If a deal doesn't have FICO score information, we assign a value of 0 to the FICO score of for such deals.

- MissFICO. Dummy variable that takes 1 for deals with missing FICO score and 0 otherwise.
- DOC: average documentation level for all loans in the deal. For each mortgage, BBx reports one of the documentation status, "Full Documentation (FD)", "Low Documentation (LD)", "No Documentation (ND)", "Reduced Documentation (RD)" and "Unknown (UN)". We assign a value of 1 to mortgages with ND or UN, a value of 2 to mortgages with RD or LD, and a value of 3 to mortgages with FD. We then compute the average documentation level of all mortgages included in one deal as the deal's average documentation level.
- CLTV: combined loan-to-value. BBx reports the ratio of all loan amounts on the property at the time of origination to the property value at loan origination for each mortgage. We compute the mean value of all mortgages include in one deal as deal's average CLTV. If a deal doesn't have CLTV information, we assign a 100% CLTV to such deals.
- MissCLTV. Dummy variable that takes 1 for deals with no CLTV information and 0 otherwise.
- LSEC: proportion of prime mortgages in the deal. BBx reports the credit sector each mortgage belongs, including "Alt-A (AA)", "Prime (PR)", "Subprime (SP)", and "Unknown (UN)". We assign a value of 1 to mortgages with UN or SP, a value of 2 to mortgages with AA, and a value of 3 to mortgages with PR. Then we compute the average value of all mortgages in one deal as the deal's average loan sector, the higher the value the higher portion of prime mortgages in the deal.
- Owner: owner occupancy status. BBx provides occupancy types: "Non Owner Occupied", "Other", "Owner Occupied", "Second Home", "Unknown" and "Vacant". We assign a value of 1 to mortgages recorded as "Owner Occupied" and a value of 0 to the rest mortgages. We then compute the average value of all mortgages in one deal as the deal's average owner-occupancy. The higher the value, the more properties are owner-occupied in the deal.
- Issue year: the calendar year the deal was formed.
- Issue Balance: the average issuing balance for the deal.

Appendix B: List of Public Pension Funds

These public pension funds are collectively identified in Cremers and Nair (2005), Larcker, Richardson, and Tuna (2005), and Dittmar and Mahrt-Smith (2007). The first column provides names of public pension funds; and second column provides manager numbers in Thomson-Reuters Institutional Holdings (13f).

MGRNAME	MGRNO
California Public Employees Retirement System	12000
California State Teachers Retirement	12120
California State Teachers Retirement	12100
Colorado Public Employees Retirement Association	18740
Florida State Board of Administration	38330
Illinois State Universities Retirement System	81590
Kentucky Teachers Retirement System	49050
Maryland State Retirement and Pension System	54360
Michigan State Treasury	57500
Montana Board of Investment	58650
New Mexico Edu Retirement BD	63600
New York State Common Retirement Fund	63850
New York State Teachers Retirement System	63895
Ohio Public Employees Retirement System	66550
Ohio School Employees Retirement System	66610
Ohio State Teachers Retirement System	66635
Texas Teachers Retirement System	83360
Texas Teachers Retirement System	82895
Virginia Retirement System	90803
State of Wisconsin Investment Board	93405
Missouri ST Emp Ret SYS	58150
Pennsylvania Public SCH EMP RE	68830

Appendix C. Securitization deal issuing BHCs and the number of deals they issued

This table provides the names and RSSDID of mortgage securitization deal issuers, along with the number of deals they issue during our sample period.

	RSSDID	BHC Name	# Deals
1	1039502	J P MORGAN CHASE & CO	202
2	1068025	KEYCORP NEW	2
3	1068294	BANK ONE CORP	3
4	1068762	MELLON FINL CORP	3
5	1069125	NATIONAL CITY CORP	2
6	1069778	PNC FINL SVCS GROUP INC	1
7	1070617	PROVIDENT FINL GROUP INC	2
8	1073551	WACHOVIA CORP 2ND NEW	4
9	1073757	BANK OF AMERICA CORPORATION	280
10	1094640	FIRST TENN NATL CORP	161
11	1120754	WELLS FARGO & CO NEW	280
12	1129382	POPULAR INC	29
13	1131787	SUNTRUST BKS INC	1
14	1888193	WILMINGTON TRUST CORP	15
15	1951350	CITIGROUP INC	112
16	2081124	GREENPOINT FINL CORP	3
17	2277860	CAPITAL ONE FINL CORP	59
18	2549857	COUNTRYWIDE CR INDS INC DEL	648

Appendix D. Descriptive Statistic for Instrument Variables

This table reports the descriptive statistics for instrument variables over the pre-crisis period. DPINC is quarterly real disposable personal income; NHOUS is the average number of households over the quarter in thousands; NMARR is average number of marriages during the quarter in thousands; and GRMGGN is the average growth rate in the number of mortgage applications over the quarter. All the four variables are estimated from data series reported in HIS Global Insight. Loans is total loans over total assets, calculated as BHCK2122/BHCK2170; Deposits is total deposits over total assets, calculated as the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636 over BHCK217. Data for these two variables is from FR Y-9C.

Variable	Mean	Median	Std Dev	25th Pctl	75th Pctl	N
NHOUS	110,983	110,937.8	291.295	110,747	111,219	4
NMARR	182.417	184.667	38.801	150.833	214	4
DPINC	35,716	35,806	245.7	35,548.5	35,883.5	4
GRMGGN	1.181	0.531	3.579	-1.296	3.658	4
Deposits	0.747	0.765	0.099	0.699	0.814	1631

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Table 1. Summary Statistics for BHC Characteristics

Panel A presents descriptive statistics for BHC characteristics. Panel B presents a univariate comparison of BHC characteristics between BHCs that report non-zero asset securitization over the sample period (Securitizing BHCs) and those for BHCs that report zero asset securitization over the sample period (Non-securitizing BHCs) over the sample period that starts from the beginning of 2001 to the end of 2013. The observations are at the bank-quarter level. There are 670 unique banks over the whole sample. See Appendix A for variable definitions. Tests of difference in mean (median) are t-tests (Wilcoxon signed-rank tests). *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Panel A. Summary Statistics						
Variable	Mean	Median	Std Dev	25th Pctl	75th Pctl	N
BHC Characteristics						
Size	14.5971	14.2074	1.5907	13.4783	15.3163	19313
LIQ	0.222	0.205	0.1132	0.1401	0.2873	19313
PRF	0.0044	0.0048	0.0083	0.0023	0.0081	19313
EQT	0.0936	0.0905	0.0273	0.077	0.1062	19313
EFF	0.02	0.0181	0.0127	0.0108	0.0261	19313
LQLT	0.0117	0.0062	0.0157	0.0028	0.0141	19313
Z-score	40.9668	31.4055	36.5253	23.7401	45.5817	19250
DT	0.2376	0	2.1309	0	0	19313
DH	0.0386	0.0001	0.0988	0	0.0295	19313
NONINC	0.184	0.157	0.1262	0.1049	0.2308	19313
PMBS	0.0058	0	0.0177	0	0.0012	19313
SCT_ALL	0.0126	0	0.0699	0	0	19313
SCT_MGG	0.0097	0	0.0575	0	0	19313
Stock Performance						
QRET	0.0249	0.0199	0.1851	-0.056	0.1049	19307
QVOL	0.001	0.0004	0.0028	0.0002	0.0008	19306
Institutional Ownership						
IO_Total	0.2938	0.2326	0.2348	0.0988	0.4552	19313
IO_Grey	0.1257	0.0963	0.1111	0.034	0.1977	19313
IO_Indp	0.1684	0.1302	0.1472	0.0475	0.2577	19313

	Panel B. Univariate comparison of Securitizing and Non-securitizing BHCs									
	Non-Securitizing BHCs			Securitizing BHCs			T-test		Wilcoxon test	
	Mean	Median	N	Mean	Median	N				
BHC Characteristics										
Size	14.172	13.938	16772	15.835	15.643	4866	54.2122	***	53.7384	***
LIQ	0.224	0.208	16772	0.228	0.211	4866	2.2818	**	2.6725	***
PRF	0.004	0.005	16772	0.005	0.005	4866	7.8329	***	10.9427	***
EQT	0.093	0.09	16772	0.093	0.089	4866	0.5444		0.388	
EFF	0.02	0.018	16772	0.02	0.018	4866	2.5484	**	0.8158	
LQLT	0.011	0.005	16772	0.012	0.007	4866	5.3244	***	11.4524	***
Z-score	41.355	31.494	16690	36.115	28.762	4853	-10.6253	***	-11.275	***
DT	0.037	0	16772	0.876	0	4866	13.8763	***	43.4883	***
DH	0.02	0	16772	0.088	0.019	4866	28.9636	***	43.4651	***
NONINC	0.164	0.141	16772	0.233	0.207	4866	30.3628	***	35.1131	***
PMBS	0.005	0	16772	0.01	0	4866	13.8029	***	23.8596	***
SCT_ALL	0	0	16772	0.05	0	4866	26.3987	***	93.1645	***
SCT_MGG	0	0	16772	0.039	0	4866	24.5502	***	84.852	***
Stock Performance										
QRET	0.027	0.02	16761	0.023	0.02	4866	-1.2042		-0.4804	
QVOL	0.001	0	16761	0.001	0	4865	-3.6983	***	-9.4074	***
Institutional Ownership										
IO_Total	0.252	0.184	16772	0.382	0.375	4866	33.24	***	33.3467	***
IO_Grey	0.105	0.076	16772	0.172	0.174	4866	35.5772	***	36.2729	***
IO_Indp	0.148	0.105	16772	0.21	0.191	4866	25.5376	***	27.6248	***

Table 2. Summary Statistics for Deal Characteristics

Deal quality measures are from BBx Data. FICO, is the average FICO score for all the mortgages in the deal. DOC is the average documentation level for all the mortgages in the deal. BBx reports documentation level for each mortgage: "Full Documentation (FD)", "Low Documentation (LD)", "No Documentation (ND)", "Reduced Documentation (RD)" and "Unknown (UN)". We assign a value of 1 to mortgages with ND or UN, a value of 2 to mortgages with RD or LD, and a value of 3 to mortgages with FD. DOC is the mean value of all mortgage documentation indicators in a deal. CLTV, is the average combined loan-to-value for all mortgages in a deal. LSEC is the indicator of proportion of prime mortgages in the deal.). BBx reports the credit sector each mortgage belongs, including "Alt-A (AA)", "Prime (PR)", "Subprime (SP)", and "Unknown (UN)". We assign a value of 1 to mortgages with UN or SP, a value of 2 to mortgages with AA, and a value of 3 to mortgages with PR. CLTV is then computed as the average of these numbers for all the mortgages in a deal. Owner is an indicator of occupancy status of the mortgages in a deal. BBx provides occupancy types: "Non Owner Occupied", "Other", "Owner Occupied", "Second Home", "Unknown" and "Vacant". We assign a value of 1 to mortgages recorded as "Owner Occupied" and a value of 0 to the rest mortgages. Owner is then computed as the average for all mortgages in one deal. Issue balance, the average amount of loan principal outstanding at the time of deal issuance.

Variable	Mean	Median	Std Dev	25th Pctl	75th Pctl	N
FICO	700.466	719.1	49.592	689.571	737.171	1456
CLTV	79.462	79.3	7.653	75.442	83.941	1665
DOC	1.798	1.924	0.633	1	2.292	2152
LSEC	2.398	2.849	0.725	1.97	2.966	2152
OWNER	0.793	0.912	0.274	0.774	0.946	2152
Issue Balance	360934	372591.8	239111	191585.7	500187.3	2072
Issue Year	2004.696	2005	1.686	2004	2006	2152

Table 3. Institutional Ownership and Bank Involvement in Securitization

We presents the results from regressions of different institutional holdings on BHC risk measures, dummy variables for the 4 quarters leading up to the crisis, one of our securitization level measures, as well as the interactions of securitization measure and dummy variables. See Appendix A for variable definitions. We obtain BHC securitization information from Y-9C. Private-label MBS (PMBS) is the total value of private-label mortgage-backed securities held in both trading and investment portfolios (scaled by total assets); this excludes mortgage backed securities that are either issued or guaranteed by government sponsored enterprises. The reported asset categories are 1-4 Family Residential Mortgage Loans, Home Equity Lines, Commercial and Industrial Loans, Credit Card, Auto, and Other Consumer Loans. We create two dummy variables to identify BHCs that are active securitizers: SCT_MGGD takes value of 1 if a BHC's sum of mortgage and home equity lines securitized over total assets is greater than 0 and 0 otherwise; SCT_ALLD takes value of 1 if a BHC's the sum of all securitized assets over total assets is greater than 0, and 0 otherwise. The first two columns report the results with PMBS being the main securitization measure; the middle two columns use MGGD as the main securitization measure, and the last two columns report the results with ALLD being the main securitization measure. We cluster standard error at BHC level to allow for intragroup correlation. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
SCT_i:	PMBS	PMBS	MGGD	MGGD	ALLD	ALLD
Dependent Variable:	IO_Grey	IO_Indp	IO_Grey	IO_Indp	IO_Grey	IO_Indp
SCT_t	-0.1644*	0.4044***	0.0020	-0.0014	0.0019	0.0029
	(0.095)	(0.138)	(0.007)	(0.012)	(0.006)	(0.010)
Dummy [1 for 2006Q3]	-0.0018	-0.0632***	-0.0034	-0.0579***	-0.0034	-0.0577***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
Dummy [1 for 2006Q4]	0.0013	-0.0604***	-0.0001	-0.0565***	-0.0001	-0.0562***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
Dummy [1 for 2007Q1]	-0.0014	-0.0542***	-0.0029	-0.0517***	-0.0027	-0.0512***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
Dummy [1 for 2007Q2]	0.0059	-0.0542***	0.0034	-0.0518***	0.0032	-0.0515***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)
SCT_t *Dummy [1 for 2006Q3]	-0.1904***	-0.0621	-0.0237***	-0.0157	-0.0210***	-0.0175**
	(0.070)	(0.164)	(0.007)	(0.010)	(0.007)	(0.009)
SCT_t * Dummy [1 for 2006Q4]	-0.0829	-0.1353	-0.0146*	-0.0100	-0.0130*	-0.0125*
	(0.087)	(0.149)	(0.009)	(0.008)	(0.008)	(0.007)
SCT_t *Dummy [1 for 2007Q1]	-0.1671**	-0.1845	-0.0232**	-0.0003	-0.0217***	-0.0064
	(0.072)	(0.207)	(0.009)	(0.011)	(0.008)	(0.010)

SCT_t *Dummy [1 for 2007Q2]	-0.1209	-0.1771	-0.0070	0.0054	-0.0043	-0.0008
	(0.084)	(0.237)	(0.012)	(0.012)	(0.011)	(0.011)
Z_SCORE_{t-1}	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ_{t-1}	0.0568**	-0.0102	0.0516**	0.0013	0.0516**	0.0017
	(0.024)	(0.031)	(0.024)	(0.031)	(0.024)	(0.031)
PRF_{t-1}	0.1961	-0.1681	0.1913	-0.1565	0.1924	-0.1583
	(0.158)	(0.182)	(0.158)	(0.183)	(0.158)	(0.182)
$LQLT_{t-1}$	-0.1905	-0.1803	-0.2100	-0.1524	-0.2089	-0.1556
	(0.154)	(0.168)	(0.154)	(0.169)	(0.154)	(0.169)
EQT_{t-1}	0.5879***	1.0662***	0.5871***	1.0623***	0.5869***	1.0627***
	(0.077)	(0.104)	(0.077)	(0.104)	(0.077)	(0.104)
$SIZE_{t-1}$	0.0409***	0.0530***	0.0409***	0.0531***	0.0409***	0.0528***
	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)
$QRET_{t-1}$	-0.0004	0.0049*	-0.0006	0.0052*	-0.0006	0.0052*
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
$QVOL_{t-1}$	-0.5803**	-1.1859***	-0.5746**	-1.1984***	-0.5761**	-1.1969***
	(0.243)	(0.311)	(0.243)	(0.313)	(0.243)	(0.313)
EFF_{t-1}	0.2704*	-0.0235	0.2653*	-0.0101	0.2646*	-0.0121
	(0.153)	(0.159)	(0.154)	(0.158)	(0.155)	(0.158)
DT_{t-1}	-0.0031***	-0.0054***	-0.0032***	-0.0054***	-0.0032***	-0.0054***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
DH_{t-1}	0.0034	-0.0080	0.0024	-0.0087	0.0026	-0.0090
	(0.020)	(0.029)	(0.020)	(0.029)	(0.020)	(0.029)
$NONINC_{t-1}$	0.0126	0.0100	0.0112	0.0115	0.0110	0.0108
	(0.022)	(0.029)	(0.022)	(0.029)	(0.022)	(0.029)
Constant	-0.5354***	-0.6365***	-0.5329***	-0.6410***	-0.5325***	-0.6369***
	(0.046)	(0.083)	(0.047)	(0.088)	(0.047)	(0.088)
Observations	19,176	19,176	19,176	19,176	19,176	19,176
Number of BHCs	670	670	670	670	670	670
Date Fixed	Yes	Yes	Yes	Yes	Yes	Yes
BHC Fixed	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.611	0.448	0.614	0.437	0.613	0.436

Table 4. Institutional Ownership and Bank Securitization: Robustness Check Using Pre-crisis Sample

In Panel A, we report the mean difference in institutional ownership between BHCs with high exposure to securitization and BHCs with low exposure to securitization using Propensity Score Matching. In the first stage, we run Probit regression with one of the securitization measure dummies being the department variable, and all our control variables as independent variables along with date fixed effect. The three securitization dummies we use are: PMBSD, equals 1 if a BHC reports nonzero PMBS and 0 otherwise, SCT_MGGD, equals 1 if a BHC reports nonzero mortgage securitization and 0 otherwise; SCT_ALLD, equals 1 if a BHC reports nonzero aggregate asset securitization and 0 otherwise. We then conduct propensity score matching (PSM) based on the results we obtain from Probit regressions, using the nearest-neighbor matching with n=10 and a caliper of 0.01. We conduct mean difference t-tests on grey institutional ownership and independent institutional ownership between the treated sample and matched sample for each of the 4 quarters prior to crisis as well as the whole year prior to crisis. Panel B provides the second-stage regression results of institutional ownership on various securitization measures and controls over the pre-crisis period, which is from 2006Q3 to 2007Q2. In each of the regressions, we treat the securitization measure as endogenous variable. In the first-stage, we regress securitization measure on the included control variables as well as four excluded instrument variables: DPINC, NHOUS, NMARR, GRMGGN, Deposit; and then we include the predicted values in the second-stage as independent variables along with other controls. DPINC is quarterly real disposable personal income; NHOUS is the average number of households over the quarter; NMARR is average number of marriages during the quarter; and GRMGGN is the average growth rate in the number of mortgage applications over the quarter and Deposit is total deposits over total assets. Descriptive statistics for the instrumental variables are provided in Appendix D. We cluster standard error at BHC level to allow for intragroup correlation. *** p<0.01, ** p<0.05, * p<0.1

	Panel A. Propensity Score Matching										
	IO_Grey						IO_Indp				
	2006Q3	2006Q4	2007Q1	2007Q2	Pre-Crisis		2006Q3	2006Q4	2007Q1	2007Q2	Pre-Crisis
	1. Mean difference in institutional ownership using PMBS dummy										
Observations	383	377	369	368	1,497		383	377	369	368	1,497
Mean Diff	-0.00480	0.00743	-0.00492	-0.000553	-0.00375		-0.00241	0.00829	0.00701	0.0145	0.00196
T-value	-0.368	0.545	-0.376	-0.0419	-0.477		-0.132	0.485	0.363	0.771	0.183
	2. Mean difference in institutional ownership using mortgage securitization dummy										
Observations	383	377	369	368	1,497		383	377	369	368	1,497
Mean Diff	-0.0664	-0.106	-0.0421	-0.0204	-0.0518		-0.000517	-0.0229	0.0286	-0.0263	-0.00632
T-value	-2.574	-3.408	-1.679	-0.840	-3.858		-0.0112	-0.514	0.625	-0.550	-0.306
	3. Mean difference in institutional ownership using aggregate asset securitization dummy										
Observations	383	377	369	368	1,497		383	377	369	368	1,497
Mean Diff	-0.0655	-0.0229	-0.00905	-0.0417	-0.0489		-0.0250	-0.0251	-0.0507	-0.0159	-0.0281
T-value	-2.727	-0.821	-0.388	-1.264	-3.567		-0.621	-0.616	-1.140	-0.336	-1.410

Table 4. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel B. IV Regressions					
VARIABLES	IO_Grey	IO_Grey	IO_Grey	IO_Indp	IO_Indp	IO_Indp
$PMBS\ Dummy_t$	-0.0988**			-0.0824		
	(0.041)			(0.056)		
SCT_MGGD_t		-0.2649***			-0.1817	
		(0.101)			(0.136)	
SCT_ALLD_t			-0.1980***			-0.1291
			(0.070)			(0.099)
Z_SCORE_{t-1}	-0.0001	-0.0001	-0.0002	0.0002	0.0002	0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ_{t-1}	0.0693*	0.0212	-0.0008	0.1089**	0.0650**	0.0497*
	(0.037)	(0.024)	(0.021)	(0.052)	(0.033)	(0.029)
PRF_{t-1}	-2.9558***	-3.6264***	-3.8992***	-1.3981	-1.7745	-1.9109
	(0.936)	(1.036)	(1.007)	(1.289)	(1.394)	(1.419)
$LQLT_{t-1}$	-0.0907	2.8820***	2.1228***	-4.9259***	-2.8009*	-3.3766***
	(0.661)	(1.108)	(0.819)	(0.911)	(1.492)	(1.154)
EQT_{t-1}	0.3401***	0.4058***	0.4767***	0.2856*	0.3316**	0.3758**
	(0.106)	(0.110)	(0.110)	(0.146)	(0.148)	(0.155)
$SIZE_{t-1}$	0.0640***	0.0777***	0.0720***	0.0713***	0.0788***	0.0742***
	(0.006)	(0.010)	(0.008)	(0.008)	(0.014)	(0.011)
$QRET_{t-1}$	-0.0273	-0.0300	-0.0269	-0.0884**	-0.0904**	-0.0884**
	(0.026)	(0.027)	(0.025)	(0.036)	(0.036)	(0.035)
$QVOL_{t-1}$	31.1903***	39.7964***	35.6672***	-15.8549	-9.8580	-12.8193
	(7.051)	(7.786)	(6.781)	(9.709)	(10.478)	(9.554)
EFF_{t-1}	1.1547***	1.6511***	1.6785***	0.8061	1.1376**	1.1367**
	(0.362)	(0.425)	(0.398)	(0.498)	(0.571)	(0.561)
DT_{t-1}	-0.0127***	-0.0065**	-0.0088***	-0.0122***	-0.0076**	-0.0093***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)
DH_{t-1}	0.0244	0.0410	0.0483	0.0930**	0.0979**	0.1006**
	(0.031)	(0.034)	(0.033)	(0.042)	(0.046)	(0.047)
$NONINC_{t-1}$	-0.0329	-0.0663	-0.0345	-0.1538***	-0.1714***	-0.1483***
	(0.036)	(0.042)	(0.033)	(0.049)	(0.057)	(0.047)
Constant	-0.8025***	-1.0412***	-0.9587***	-0.8485***	-0.9903***	-0.9235***
	(0.069)	(0.151)	(0.112)	(0.095)	(0.204)	(0.157)
Observations	1,497	1,497	1,497	1,497	1,497	1,497
R-squared	0.278	0.253	0.358	0.285	0.294	0.335
BHC Fixed	Yes	Yes	Yes	Yes	Yes	Yes
DWH test of Endogeneity	77.36	29.15	40.43	21.07	24.06	55.30
Sargan-Hansen Stat	1.546	0.369	0.390	2.474	2.931	3.285
P-Value	0.672	0.947	0.942	0.480	0.402	0.350

Table 5. Institutional Ownership and Bank Involvement in Securitization with Deal Quality Measures

In this table, we rerun the regressions of institutional ownership on various deal quality measures and control variables for grey institutions and independent institutions separately. Deal quality measures are from BBx Data. We find each deal's prospectus in Edgar and identify the deals whose issuers are our sample bank holding companies. FICO is the average FICO score for all mortgages in one deal; DOC is the average documentation level for all loans in one deal; CLTV is the average combined loan-to-value for all mortgages in one deal; LSEC is the proportion of prime mortgages in the deal; Owner is the proportion of owner-occupied properties in the deal. For some deals, FICO information is missing, when this happens, we assign a value of 0 to such deals' FICOs and also create a dummy variable (MissFICO), which takes value of one for deals missing FICO and zero otherwise. For some deals, CLTV information is missing, in this case, we assign a value of 100 to these deals' CLTVs and also create a dummy variable (MissCLTV), which takes value of one for deals with no CLTV and zero otherwise. In Column 1 through Column 5, the dependent variable is aggregate ownership from grey institutions; in Column 6 through Column 10, the dependent variable is aggregate ownership from independent institutions. We cluster standard error at BHC level to allow for intragroup correlation. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	IO_Grey	IO_Grey	IO_Grey	IO_Grey	IO_Grey	IO_Indp	IO_Indp	IO_Indp	IO_Indp	IO_Indp
BHC Characteristics										
LIQ_{t-1}	0.0607***	0.0547***	0.0756***	0.0423**	0.0661***	0.0402*	0.0495**	0.0155	0.0371	-0.0031
	(0.021)	(0.021)	(0.022)	(0.021)	(0.023)	(0.024)	(0.024)	(0.025)	(0.024)	(0.025)
PRF_{t-1}	-0.9119***	-0.9110***	-1.1816***	-0.6766**	-1.0180***	-1.3612***	-1.3983***	-0.9464**	-1.1389**	-1.3168***
	(0.334)	(0.327)	(0.321)	(0.339)	(0.336)	(0.481)	(0.469)	(0.455)	(0.463)	(0.468)
$LQLT_{t-1}$	0.4072**	0.4417**	0.3807**	0.5608***	0.4134**	0.0679	0.0477	0.1249	0.1255	0.2276
	(0.179)	(0.178)	(0.176)	(0.184)	(0.178)	(0.228)	(0.227)	(0.220)	(0.223)	(0.216)
EQT_{t-1}	0.2692***	0.3155***	0.2629***	0.2443***	0.2929***	-0.8434***	-0.9298***	-0.8447***	-0.9288***	-0.8842***
	(0.098)	(0.097)	(0.095)	(0.094)	(0.096)	(0.115)	(0.111)	(0.108)	(0.111)	(0.106)
$SIZE_{t-1}$	-0.0053	-0.0051	-0.0045	-0.0106***	-0.0039	-0.0095**	-0.0111**	-0.0111**	-0.0128***	-0.0122***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)
Stock Performance										
$QRET_{t-1}$	-0.0610***	-0.0627***	-0.0606***	-0.0630***	-0.0610***	0.1003***	0.1027***	0.0976***	0.1003***	0.0967***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
$QVOL_{t-1}$	-30.3475***	-29.6641***	-28.1387***	-26.5349***	-30.1918***	55.7833***	55.3645***	52.5815***	54.7622***	55.7937***
	(8.901)	(8.711)	(8.301)	(8.271)	(8.777)	(7.760)	(7.614)	(7.821)	(7.554)	(7.524)
Deal Characteristics										
[1, if a deal was issued during 2006Q3 to 2007Q2]	-0.1184***	-0.0935***	-0.0963***	-0.0770**	-0.0590**	0.0898***	0.0816***	0.0632**	0.0487	0.0166
	(0.024)	(0.024)	(0.023)	(0.036)	(0.028)	(0.026)	(0.025)	(0.027)	(0.043)	(0.033)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Issue\ Balance_t$	0.0000**	-0.0000	0.0000***	0.0000***	0.0000***	0.0000	0.0000	-0.0000**	-0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Issue\ Balance_t$ * [1, if 2006Q3 to 2007Q2]	-0.0000***	-0.0000***	-0.0000***	-0.0000***	-0.0000***	0.0000	0.0000***	0.0000***	0.0000	0.0000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DOC_{t-1}	0.0008					0.0006				
	(0.001)					(0.002)				
DOC_{t-1} * [1, if 2006Q3 to 2007Q2]	0.0103***					-0.0167***				
	(0.003)					(0.005)				
$LSEC_{t-1}$		0.0042***					-0.0015			
		(0.001)					(0.001)			
$LSEC_{t-1}$ * [1, if 2006Q3 to 2007Q2]		0.0010					-0.0162***			
		(0.003)					(0.004)			
$Owner_{t-1}$			-0.0144***					0.0236***		
			(0.003)					(0.004)		
$Owner_{t-1}$ * [1, if 2006Q3 to 2007Q2]			0.0236***					-0.0516***		
			(0.006)					(0.014)		
$FICO_{t-1}$				-0.0000**					0.0000***	
				(0.000)					(0.000)	
$FICO_{t-1}$ * [1, if 2006Q3 to 2007Q2]				-0.0000					-0.0000	
				(0.000)					(0.000)	
$MissFICO_{t-1}$				-0.0414***					0.0305**	
				(0.013)					(0.012)	
$MissFICO_{t-1}$ * [1, if 2006Q3 to 2007Q2]				-0.0064					0.0491	
				(0.030)					(0.040)	
$CLTV_{t-1}$					0.0005***					-0.0002*
					(0.000)					(0.000)
$CLTV_{t-1}$ * [1, if 2006Q3 to 2007Q2]					-0.0003**					0.0003
					(0.000)					(0.000)
$MissCLTV_{t-1}$					-0.0121***					-0.0047
					(0.003)					(0.003)
$MissCLTV_{t-1}$ * [1, if 2006Q3 to 2007Q2]					-0.0063					0.0506***
					(0.005)					(0.008)
Constant	0.5040***	0.4881***	0.4862***	0.6259***	0.4266***	0.7930***	0.8364***	0.8359***	0.8379***	0.8734***
	(0.078)	(0.076)	(0.077)	(0.076)	(0.078)	(0.094)	(0.090)	(0.091)	(0.098)	(0.090)
Observations	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456	1,456

	R-squared									
R-squared	0.877	0.877	0.878	0.882	0.878	0.977	0.977	0.978	0.977	0.979
Date Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BHC Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6. Pre-crisis Institutional Trading and Stock Return around Lehman Brothers Bankruptcy

In this table we report the regression results of BHCs' abnormal returns for the 3-day window around Lehman Brothers bankruptcy on September 15, 2008 on institutional trading in the four quarters leading up to the crisis. In the regressions, we also include the interaction terms of institutional trading with private-label MBS (PMBS) from the pre-crisis period. We use Fama-French 3 factor model and Carhart 4 factor model to estimate the cumulative abnormal returns for each BHC during the 3-day event window. Panel A reports the results using abnormal stock returns over the 3-day event window; and Panel B reports the results with one year long-run stock performance being the dependent variables.

	Panel A. Abnormal returns around Lehman Bankruptcy (-1 day, +1 day)			
	(1)	(2)	(3)	(4)
Dependent variable return model:	Fama-French	Carhart	Fama-French	Carhart
Institutional trading type (CHGIO):	Grey	Grey	Indp	Indp
PMBS	0.0182	0.0261	0.0486	0.0633
	(0.048)	(0.053)	(0.073)	(0.081)
CHGIO_2006Q3	0.3341	0.4009	-0.4780*	-0.5563**
	(0.366)	(0.384)	(0.248)	(0.244)
CHGIO_2006Q4	-0.1767	-0.1900	0.3525	0.4068*
	(0.236)	(0.240)	(0.224)	(0.237)
CHGIO_2007Q1	-0.2160	-0.2747	0.5487**	0.6253**
	(0.265)	(0.271)	(0.255)	(0.269)
CHGIO_2007Q2	0.2992***	0.3252***	0.2591**	0.2734*
	(0.106)	(0.118)	(0.131)	(0.150)
PMBS * CHGIO_2006Q3	0.4320	0.2123	8.3341	9.2917
	(2.830)	(3.196)	(5.375)	(5.847)
PMBS * CHGIO_2006Q4	6.6583**	6.9553**	-1.5067	-1.8382
	(2.892)	(3.132)	(2.797)	(3.074)
PMBS * CHGIO_2007Q1	1.1313	1.2345	-1.1656	-1.4811
	(4.053)	(4.407)	(2.295)	(2.479)
PMBS * CHGIO_2007Q2	1.8616	2.3564	0.5239	0.8618
	(2.289)	(2.500)	(1.773)	(1.916)
Constant	0.0268***	0.0339***	0.0220***	0.0286***
	(0.004)	(0.005)	(0.005)	(0.005)
Observations	322	322	322	322
R-squared	0.050	0.058	0.081	0.092

Table 6. (Continued)

	(1)	(2)	(3)	(4)
Panel B. Post-Lehman Bankruptcy long run performance (0, +12 months)				
Dependent variable return model:	Fama-French	Carhart	Fama-French	Carhart
Institutional trading type (CHGIO):	Grey	Grey	Indp	Indp
PMBS	0.4940	0.1535	0.5263	-0.1644
	(0.453)	(0.530)	(0.772)	(0.915)
CHGIO_2006Q3	-1.9850	-4.4239	-0.1739	3.5869
	(2.639)	(3.297)	(3.096)	(3.375)
CHGIO_2006Q4	3.2120	3.7958	2.2855	-0.6708
	(3.169)	(3.386)	(2.177)	(2.139)
CHGIO_2007Q1	-0.0369	2.2546	0.7889	-3.2840
	(3.668)	(3.789)	(2.449)	(2.526)
CHGIO_2007Q2	-1.5909	-3.7074**	-1.5568	-2.9421*
	(1.271)	(1.672)	(1.010)	(1.622)
PMBS * CHGIO_2006Q3	50.6817**	64.7883**	16.7082	-35.4322
	(20.310)	(32.704)	(55.395)	(51.288)
PMBS * CHGIO_2006Q4	-15.2785	-31.5319	-2.5728	13.7307
	(36.835)	(36.536)	(27.901)	(31.193)
PMBS * CHGIO_2007Q1	39.9384	37.8475	-33.5926	-14.0821
	(37.401)	(45.053)	(26.053)	(28.932)
PMBS * CHGIO_2007Q2	43.0683**	23.4902	-20.2635	-29.8722
	(20.451)	(22.579)	(21.354)	(23.392)
Constant	0.3653***	0.0192	0.3925***	0.0812
	(0.048)	(0.051)	(0.058)	(0.064)
Observations	322	322	322	322
R-squared	0.021	0.039	0.018	0.048

Table 7. Pre-crisis Institutional Trading and BHC Operating Performance during Crisis

This table reports the regression results of cumulative ROA during the crisis on institutional trading over the four quarters leading to the crisis. The cumulative ROA is calculated as the sum of net income over the crisis period divided by the average size of the BHC during the same period. In the regressions, we also include the interaction terms of institutional trading with private-label MBS (PMBS) from the pre-crisis period. We employ two different crisis periods: (1) following Ivashina and Scharfstein (2010), we define the crisis period as from August 2007 to December 2008, i.e., from the third quarter of 2007 to the last quarter of 2008; (2) to capture potential future losses related to the crisis, we also use a longer crisis period from the third quarter of 2007 to the second quarter of 2009. The results using two different crisis definitions are reported in the first two columns and last two columns, respectively.

	(1)	(2)	(3)	(4)
Dependent variable ROA period:	2007Q3 to 2008Q4		2007Q3 to 2009Q2	
Institutional trading type (CHGIO):	Grey	Indp	Grey	Indp
PMBS	-0.0108	0.0121	-0.0128	0.0304
	(0.025)	(0.022)	(0.031)	(0.025)
CHGIO_2006Q3	-0.2994*	0.0674	-0.3749*	0.0848
	(0.164)	(0.152)	(0.192)	(0.181)
CHGIO_2006Q4	-0.3515*	0.0618	-0.4047*	0.0454
	(0.187)	(0.129)	(0.209)	(0.147)
CHGIO_2007Q1	-0.2054	0.0217	-0.2269	-0.0184
	(0.154)	(0.133)	(0.182)	(0.150)
CHGIO_2007Q2	0.0172	0.1229	0.0393	0.1839**
	(0.067)	(0.077)	(0.085)	(0.091)
PMBS * CHGIO_2006Q3	1.3072	-0.0196	2.0953	0.0735
	(1.329)	(0.866)	(1.618)	(0.959)
PMBS * CHGIO_2006Q4	3.3043*	-0.5807	4.2808**	-0.7359
	(1.761)	(0.748)	(2.123)	(0.838)
PMBS * CHGIO_2007Q1	1.7061	-0.3766	1.7157	-1.1859
	(1.189)	(1.204)	(1.461)	(1.422)
PMBS * CHGIO_2007Q2	0.2372	-0.6776	-0.1614	-1.4946
	(0.558)	(0.986)	(0.703)	(1.170)
Constant	0.0186***	0.0140***	0.0147***	0.0095**
	(0.003)	(0.003)	(0.003)	(0.004)
Observations	349	349	349	349
R-squared	0.046	0.015	0.043	0.022