University of Connecticut

Department of Economics Working Paper Series

Securitization and the balance sheet channel of monetary transmission

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Working Paper 2010-18

July 2010

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Abstract

This paper shows that the balance sheet channel of monetary transmission works mainly through U.S. bank holding companies that securitize their assets. This finding is different, in spirit, from the widely-found negative relationship between financial development and the strength of the lending channel of monetary transmission. Focusing on the balance sheet channel, and using bank-level observations, we find that securitized banks are more sensitive to borrowers' balance sheets and that monetary policy has a greater impact on this sensitivity for securitizing bank holding companies. The optimality conditions from a simple partial equilibrium framework suggest that the positive effects of securitization on policy effectiveness could be due to the high sensitivity of security prices to policy rates.

Journal of Economic Literature Classification: E44, F31, F41, O16

Keywords: balance sheet channel, banks, bank holding companies, securitization.

1. Introduction

The current consensus in the monetary economics literature is that the high rate of financial innovation in the past four decades has decreased the Federal Reserve Bank's (Fed) ability to affect the real economy by using its policy tools (more commonly referred to as the monetary transmission mechanism). A majority of the studies in this literature investigate the lending channel of monetary transmission (LCMT) and finds that financial development and innovation have decreased banks' cost of generating loanable funds, thus limiting the scope for monetary policy.[1] In this paper, we focus on the balance sheet channel of monetary transmission (BSCMT) and investigate how the strength of this channel is affected by asset-backed securitization. Our findings show that the BSCMT mainly operates through banks that securitize some of their assets (one aspect of financial innovation). This finding suggests that the usual negative relationship between monetary policy effectiveness and financial innovation may only be limited to some channels of monetary transmission and may be reversed for one important channel -- the BSCMT. The rapid growth observed in securitization activities in the past two decades highlights the economic significance of this finding and the importance of investigating how the various channels of monetary transmission and the overall effectiveness of monetary policy are affected.[2]

The BSCMT operates through borrowers' balance sheets: The Fed, by affecting the strength of these balance sheets, and the lenders' sensitivity to balance sheets, can have an impact on the loans extended to the real sector. Thus, according to the BSCMT the Fed affects

[1] These studies find that with deeper and more global financial markets with new instruments, monetary policy has become less effective. For example, Kashyap and Stein (2000) find that larger banks, with easier access to external funds, are less affected by monetary policy. Similarly, Cetorelli and Goldberg (2009) show that banks with more global operations are more insulated from monetary policy since they can shift funds across borders through internal capital markets. Morgan, Rime and Strahan (2004) and Ashcraft (2006) also reach similar conclusions. Loutskina and Strahan (2009) focus on financial innovation and find a negative relationship between securitization and banks' supply of loans.

[2] For example, our calculations using data from the Securities Industry and Financial Markets Association show that the amount of asset-backed securitizations outstanding as a share of GDP has increased from 4.2 percent in 1995 to 18.5 percent in 2008.

the demnd side of the financial market and how lenders react to these changes in borrowers' balance sheets. In contrast, according to the LCMT, the Fed affects the supply side of the financial market. Although the opportunities that new financial instruments such as asset-backed securities provide for raising funds on the supply side of the financial market is now widely accepted, how securitization may affect the BSCMT has not yet been explored to the best of our knowledge. There are, however, some studies that investigate how securitization affects the riskiness of banks and thus have implications for the BSCMT. The conclusions drawn from these studies are conflicting. On the one hand, some studies (e.g. Greenbaum and Thakor, 1987) predict and some studies (e.g. Altunbas et al., 2009) empirically find that securitization decreases the riskiness of a bank's portfolio by limiting its exposure to bad loans. To the extent that the amount of bad loans is affected by economic conditions, this would suggest that banks become less affected by economic fluctuations.[3] On the other hand, some recent empirical studies (Adrian and Shin, 2009, 2010; Casu et al., 2010; Uzun and Webb, 2007) find that factors such as the retention of credit risk of securitized assets (through recourse arrangements) and the effect of asset prices on banks' balance sheets generate a positive relationship between securitization and the riskiness of banks. Faced with higher risk, these banks are also found to show more sensitivity to economic conditions that affect credit risk and asset prices. By demonstrating a higher sensitivity to economic conditions (balance sheet strength) for securitizing banks, our results support the latter of these predictions. The additional and more central insight drawn from our results, however, is that the Fed's monetary policy has a larger effect on securitizing banks' sensitivity to economic conditions compared to banks that do not securitize their assets. In other words, the BSCMT operates mainly through securitized banks' lending.

[3] Indeed, Ashcraft and Campello (2007) find, using bank level data, that the fraction of bad loans are higher during economic downturns.

In our attempt to investigate the relationship between securitization and the BSCMT, we face several obstacles that also explain the scarce body of work. The first and most challenging of these is the separation of the lending channel from the balance sheet channel. Specifically, the lack of loan-level data makes it impossible to determine, to what extent, banks' decisions to increase/decrease the amount of lending are driven by banks' liquidity positions or by the strength of their borrowers' balance sheets. This drawback also raises an issue related to the choice of proxies that measure the importance of balance sheets in loan deals. Second, although measures for the stance of monetary policy are available for a long time period, data on the amount of banks' securitized assets are only available for a relatively shorter time period. The third obstacle is the difficulty in measuring the effects of securitization on the BSCMT that are independent of other bank specific characteristics that may be correlated with the amount of securitization. For example, banks that securitize their assets are often considerably larger than banks that don't securitize. The final difficulty is related to the choice of using bank level securitization data or data on the securitization of the bank holding company (BHC) that the banks are affiliated with. Although, studies such as Akhavein et al. (1997), Berger et al. (1995), Berger et al. (2005) and Stiroh (2000) suggest that using BHC level data would be better, bank level data could be useful if individual banks are independently deciding on the degree of securitization.

Although the severity of some of these issues demands a cautious interpretation of our results, we take several steps to address these concerns and mostly find a positive relationship between securitization and the BSCMT. To separate the LCMT from the BSCMT, we follow the methodology of Ashcraft and Campello (2007) and compare the behavior of small banks that are affiliated with the same BHC to gauge the effects of monetary policy. Under the reasonable assumption that banks affiliated with the same BHC have access to similar internal capital markets, we are able to shut down the LCMT and measure the strength of the BSCMT independently. The focus on smaller banks is a critical feature of this methodology. Indeed, without loan-level data, the strong tie that these banks have with local small businesses (see Strahan and Weston, 1998) is what allows us to capture the effect that local economic conditions, strongly related to the balance sheet strength of small businesses, may have on bank lending. It also allows determine how monetary policy could affect this sensitivity to the strength of balance sheets – i.e., the BSCMT. The reasonable assumption we make here is that, balance sheets are stronger (weaker) in a state that is experiencing an expansion (recession).

Our data is from the Federal Reserve's Call Report of Condition and Income. The bank level data is quarterly and publicly available from 1976Q1 to 2010Q1 and has a large cross section dimension. The data on securitization however, is only available after 2001Q1. Given this constraint, we mostly exploit the cross section dimension of our data when measuring the BSCMT. Although, using data from this time period and the corresponding estimation strategy has several advantages, we use data prior to 2001 to check whether banks that securitize behave differently in the earlier time period.

Finally, we follow several approaches to control for bank specific characteristics that may be correlated with securitization, measure securitization at both the bank level and the BHC level, and use different measures for policy stance to check the sensitivity of our results. The results, although mixed, generally suggest a positive relationship between securitization and the BSCMT. More specifically, we find that securitizing banks are not only more sensitive to borrower balance sheets but are more affected by monetary policy. Our evidence highlights the importance of securitization for overall monetary policy effectiveness and suggests that the developments that may affect the growth/deepening of the securitization market (such as stricter regulation following the recent crisis) should be considered in monetary policy formulation.

In the second half of the paper, we build a partial equilibrium framework, similar in spirit to the well-known bank run model of Diamond and Dybvig (1983) to investigate why securitized banks can be more sensitive to the strength of borrowers' balance sheets and to monetary policy. We include monetary policy into this framework by assuming that the amount of bad loans and security prices are affected by policy rates. These assumptions play a critical role in the relationship between securitization and the BSCMT. The optimization conditions indicate that the effect of monetary policy on the price of securities, despite the smaller exposure to bad loans, can be the main determinant of the higher sensitivity to monetary policy and the strength of balance sheets.

In the next section, we detail our empirical strategy. Section 3 describes the data and presents some summary statistics. Section 4 presents our empirical results. In Section 5 we discuss our partial equilibrium model. Section 6 concludes.

2. Identifying the BSCMT

As mentioned above, to measure the independent effects of borrower's balance sheet strength on the amount of loans extended we must control for the effects of the bank's liquidity position (supply of loans). To do so, we follow a three step identification strategy.

First, we identify small banks that are subsidiaries of the same BHC. We then measure the deviation of the banks' loan growth from the mean value of loan growth measured across all the banks that are affiliated with the same BHC. Specifically, we measure the deviation of bank *i*'s loan growth from its BHC average, denoted by ld_{ijt}, as follows:

$$ld_{ijt} = \mathrm{lg}_{ijt} - \overline{\mathrm{lg}}_{jt} \quad (1)$$

where $\lg_{ijt}$ and $\overline{\lg}_{jt}$ denote the loan growth of a bank and the average loan growth of the other banks affiliated with the same BHC, respectively. We follow a similar approach in constructing the control variables and measure the deviation of a set of bank specific variables from their BHC averages (denoted by cd_{ijt}). The control variables include the log of assets, the equity ratio and the liquid-to-total-assets ratio. The implicit assumption here is that the subsidiaries of these large BHCs are affected symmetrically by the liquidity position of their parent BHC, and by how monetary policy may affect this position. In other words, by measuring these variables as differences from the BHC averages, we are shutting down the LCMT.

Second, we identify the states that banks operate in and approximate the relative strength of balance sheets in these states by using a measure of state-level economic activity (income gap). For each bank, we then compare the income gap (details of the computation are discussed in the data section) in the state in which it operates with the average income gap measured across the other subsidiaries of its parent BHC. Specifically, let $Ygap_{ijt}$ and $\overline{Ygap}_{jt}$ denote the income gap in the state in which bank *i* operates and the average income gap in the states in which all the affliates of BHC *j* operate in, respectively. We measure the relative strength of balance sheets as $bs_{ijt} = Ygap_{ijt} - \overline{Ygap}_{jt}$. By construction, if there is an increase in output, relative to long term trends, $Ygap_{ijt}$ becomes positive.

Third, we estimate the relationship between the strength of balance sheets and bank lending and investigate how this relationship is affected by monetary policy by using the following model:

$$ld_{ijt} = \alpha + \sum_{k=1}^{4} \beta_k ld_{ijt-k} + \sum_{k=1}^{4} \gamma_k bs_{ijt-k} + \sum_{k=1}^{4} \sum_{m=k+1}^{k+8} \varphi_{km} bs_{ijt-k} mp_{t-m} + \sum_{k=1}^{4} \nu_k cd_{ijt-k} + \varepsilon_{ijt} \text{ ,} \qquad (2)$$

where mp_{t-m} represents the stance of monetary policy and $\gamma = \sum_{k=1}^{4} \gamma_k$ approximates the overall effect of balance sheet strength on loan growth (sensitivity to balance sheets). In this model, a positive value of γ would indicate that banks extend more loans when their borrowers' balance sheets are stronger. Notice that the coefficients φ_{km} are the main focus of this paper, and $\varphi = \sum_{k=1}^{4} \sum_{m=k+1}^{k+8} \varphi_{km}$ measures the impact of monetary policy on banks' sensitivity to balance sheets. A negative value of φ, for example, would imply that the increase in loans, prompted by stronger balance sheets, would be smaller if there is monetary tightening.

At this point, it is important to note the disparity between our empirical strategy and the more commonly used two stage empirical methodology of Ashcraft and Campello (2007). In their first stage estimation, authors measure the balance sheet sensitivities, γ, using cross section data, and investigate how this generated variable is affected by monetary policy in a second stage time series model. The time dimension of their dataset (from 1977Q2 through 1998Q2) is sufficient to estimate the impact of monetary policy. In contrast, our dataset is limited to a shorter time period (since securitization data is only available after 2001Q1). Thus, we measure the effect of monetary policy on balance sheet sensitivities in a single stage regression.

Although, we are not able to capture the strength of the balance sheet channel over a longer time period, our approach provides three advantages. First, we are able to exploit the large cross section dimension of the data (over 6000 banks in every quarter) in investigating the effects of monetary policy on the sensitivity to balance sheet strength. Second, since securitization has been more prevalent in the past decade (see footnote 2), and our focus is on the relationship between securitization and the BSCMT, using more recent data does a better job of capturing this relationship. Finally, our single step estimation strategy is not vulnerable to the generated regressors problem that a two stage approach would cause.[4]

To estimate the dynamic panel data model in equation (2) we explore several options. First we use ordinary least squares (OLS) with robust standard errors. Second, to account for the potential endogeneity that may arise from including the lags of the dependent variable on the right hand side, we use the general method of moments (GMM) estimator of Arellano and Bond (1991). Throughout the rest of the paper, we only discuss the results obtained by using this GMM estimator because the parameter estimates are not too different while the standard errors were higher when we use OLS.[5]

Our goal is to test whether securitization impacts the BSCMT. To test this hypothesis, we begin by separating our sample of banks into two groups: banks that securitize (hereafter, SB) some of their assets and banks that don't (hereafter, NSB). The classification strategy that we follow is described in the next section. We proceed by estimating the model described above by limiting our sample to SB and NSB, respectively. We then investigate whether the impact of monetary policy, measured by φ, is different across the two groups.

3. Data

In this section we describe the data used in our analysis and provide some summary statistics on SB and NSB.

Bank level data

[4] This problem is observed when estimated coefficients (generated variables) are used in a second stage estimation without considering their standard errors (see Gawande, 1997).

[5] The methodologies for estimating dynamic panel data models such as Arellano and Bond (1991) and Arellano and Bover (1995) are generally applied to datasets which have a small time-series dimension (typically less than 5 observations). For datasets with a larger time series dimension (as in our paper), Judson and Owen (1999) show that the methodology developed by Anderson and Hsiao (1981) can produce smaller endogeneity biases. We also used Anderson and Hsiao (1981) as an alternative and found similar results.

In our estimations we use the Call Report Data of U.S. banks. The data are quarterly and are from 2001Q1 through 2009Q3.[6] Although data are available for earlier periods, we use this period since securitization data (described below) are only available after 2001. The definitions and acronyms of the Call Report data that we use are summarized in Appendix A.

To effectively identify the BSCMT, we restrict the sample in several ways. First, we only include insured, commercial banks that are not in the top 5 percent of the size (total assets) distribution in a given quarter and identify these as smaller banks.[7] This methodology, similar to Kashyap and Stein (2000) also provides a better way of measuring the BSCMT since monetary transmission is found to be operating mainly through smaller banks' loans. Second, we focus on banks that have a parent BHC (high holder) which in turn has subsidiaries operating in at least two different states. This restriction allows us to measure the BSCMT independent of the LCMT as explained above. The database includes the identification number of the high holder BHC (RSSD 9348) for every bank. We use this variable to identify the subsidiaries of each BHC. Finally, in each quarter, we eliminate banks that do not have at least 4 lags of the loan growth variable. This dependent variable is measured as the differenced log of total loans.

Monetary policy indicators and income gaps

In our baseline estimations, we use the Bernanke and Blinder (1992) index as the measure of monetary policy stance. This measure captures the orthogonal shocks (orthogonal to non-policy variables such as GDP and GDP deflator and other policy variables) to the spread between the Fed Funds rate (FFR) and the long term bond rates.[8] We choose to use it as our

[6] Every U.S. chartered bank is required to file this data to the Federal Financial Institution Examination Council. The data is available at www.chicagofed.org/webpages/banking/financial_institution_reports/data_extraction_for_call_report_data.cfm.
[7] Although a great majority of the banks in our dataset have data for every quarter in the sample period, there are banks that do not. To check for the possibility of a survivorship bias in our results, we excluded banks that did not report in every quarter of our sample periods and found very similar results.
[8] To generate the various measures of monetary policy stance in our sample periods, we included the variables and followed the methodologies described in Bernanke and Mihov (1998).

baseline measure of policy stance since in the past 40 years, the Fed has implemented policy by changing the FFR. We do, however, consider three other measures for policy stance in every experiment (as described in the next section).

The best way of capturing the BSCMT is to investigate loan contracts. Specifically, data such as the interest rate and the maturity of a loan, the amount of the loan, and borrowers' leverage prior to the loan agreement would be needed to fully capture the BSCMT. Comprehesive data, to the best of our knowledge, are not available for U.S. loan deals.[9] Therefore, we use state income gaps in the states that banks operate in to approximate the strength of balance sheets. State income data are obtained from the Bureau of Economic Analysis, and state income gaps are measured by applying a Hodrick Prescott filter (bandwidth of 1600) to the log differenced total income series.[10]

Securitization data

In every quarter, we classify a bank as a SB if its parent BHC has securitized any of its assets. To make this classification, we use the securitization variables listed in Appendix A and classify a bank as securitizing if its parent BHC has a positive amount of any of these assets during the sample period.[11] By design, this classification does not allow us to consider the degree of securitization and how it affects the BSCMT. We investigate the significance of the degree of securization (total securitized assets/total assets) later in the paper.

[9] Outside of the U.S. the only example we could find for a comprehensive dataset on loan deals was the dataset constructed by Jimenez et al. (2009). The authors use data from the Banco de España and the supervisory agency Central de Información de Riesgos to include credit line-specific, borrower-specific, and lender-specific variables in their dataset. Although we could not find comprehensive data for U.S. loan deals, we should note that there are a number of survey based studies that analyze the determinants of corporate credit lines in the U.S. (Ham and Melnik, 1987; Melnik and Plaut, 1986; Berger and Udell, 1995; Morgan, 1998).

[10] In equation (1), we considered the income gaps in addition to the deviation of income gaps from the BHC averages. The results were qualitatively very similar. For brevity, we only report the results obtained by using the deviations of income gaps.

[11] Alternatively, in every quarter, we classified banks as SB and NSB if their parent BHC had a positive amount of securitized assets in the same quarter. Using this strategy, we obtained similar results although standard errors were higher for the estimations using SB data.

Note that using securitization data at the BHC level to classify banks as SB and NSB has its advantages and disadvantages. On the one hand, our choice is justified by studies suggesting that using BHC-level data rather than bank-level data would be a more accurate way of analyzing important business decisions such as risk taking and securitization (Akhavein et al., 1997; Berger et al., 1995; Berger et al., 2005; Stiroh, 2000). These studies argue that managers of subsidiaries would coordinate activities to optimize the performance of the BHC. On the other hand, if individual banks are independently deciding how much of their assets to securitize, looking at BHC data would be misleading. Since we cannot determine to what degree banks make their own decisions, and how much they are affected by their parent BHC's decision to securitize its assets, we use bank-level securitization data as a robustness check.

Table 1 reports some descriptive statistics for the BHCs used in our classification. The first two columns report the number of banks that are affiliated with these BHCs and the number of banks included in our sample, respectively.[12] The large cross section dimension of our dataset, together with the time dimension, thus provides us with a large number of observations. Throughout our sample, BHCs that securitize are, although fewer in number, considerably larger than BHCs that do not securitize and they also have a large share in the loan market.[13] Therefore, one important challenge in this paper will be to identify the effects of securitization on the BSCMT that are independent of bank size. We discuss how we account for bank size in the next section. Table 1 also shows that BHCs that securitize, on average, have more subsidiaries than BHCs that do not securitize. This disparity may be important in our estimation if banks, affiliated with BHCs with more subsidiaries in different states, are more diversified and thus are less sensitive to borrowers' balance sheets. Despite this disparity however, our results are not too

[12] The values represent the number of different banks and are not the sum of the observations in each quarter.
[13] Banks affiliated with BHCs that securitize on average account for 67 percent of the total loans in our dataset.

different when we include the number of subsidiaries of the BHC in our baseline estimation. Controlling for this characteristic, using a methodology similar to that we followed to control for size, complicates the analysis considerably without changing the results. Therefore, in the next section, we do not report the results from estimations that include the number of subsidiaries of BHCs. Finally, one can see that securitized assets are an important share of the total assets of the BHCs in our sample, albeit smaller during and after the recent crisis.

4. Results

Table 2 reports the results obtained from the estimation of equation (2) when the Bernanke and Blinder (1992) index is used to measure the stance of monetary policy. The numbers in parentheses are the F-statistics that indicate whether the sum of the coefficient values is significantly different from zero. The results reported in the first column suggest that for both SB and NSB, an improvement of borrowers' balance sheets has a positive impact on loan growth. Comparing SB to NSB however, we see that SB have larger sensitivity to balance sheets. Results in column 2 further indicate that monetary policy has a stronger, negative impact on this sensitivity for SB. Our results also show that this disparity is not a result of aggregation. Indeed, as reported in columns 3 to 6, we find that the impact of monetary policy is larger for SB when we consider the interactive variables with specific lags of the income gap variable. The coefficient values for SB are also more significant despite the smaller number of observations.

The coefficient value for SB in the first column suggests that if the state in which SB operate experiences an increase in economy activity (relative to the other states in which the parent BHC has subsidiaries) by one standard deviation for 4 consecutive quarters, these banks' loan growth is approximately 5 percent higher than the average growth for the other subsidiaries (in other states). In comparison, this relative increase in loan growth for NSB is only 1.34

percent. Thus, our results indicate that SB in our sample are considerably more sensitive to local economic conditions (and thus the strength of balance sheets). The evidence we find is consistent with the strong relationship found between economic activity and loan growth in other studies (e.g. Gambacorta and Mistrulli, 2004). These studies emphasize the importance of bank specific variables such as bank capital and the presence of internal capital markets for loan growth. Our results, obtained by controlling for both internal capital markets and other bank specific variables, suggest that balance sheet effects have independent and strong effects on loan supply.

The coefficient values reported in the second column further indicate that SB are more sensitive to monetary policy. For example, the coefficient value of 1.3 estimated using SB data implies that the response of loan growth to an increase in economic activity would be approximately 1.3 percent lower if monetary policy is countercyclical and the FFR long term bond spread is increased 100 basis points in the previous 8 quarters. This impact of monetary policy prompts a smaller response in NSB lending (a 0.17 percent decline).

Alternative Measures of Policy Stance

Although using the Bernanke and Blinder (1992) index is a good way of capturing orthogonal shocks to the FFR, there are other widely-used measures that approximate the policy stance. For example, Christiano and Eichenbaum (1992) construct an index using the unexpected shocks to the quantity of nonborrowed reserves (NBR). They argue that the Fed has the most direct control over this variable and that the innovations to NBR match the previous notions of how the economy reacts to monetary shocks. Using a more flexible approach, Strongin (1995) nests the methodologies of Bernanke and Blinder (1992) and Christiano and Eichenbaum (1992) by allowing for operating procedures to change. In this section, we check whether the disparity between SB and NSB is robust to these alternative measures of policy stance. For completeness, we also consider the possibility that the Fed targets borrowed reserves.

The results displayed in Table 3, consistent with our baseline results, reveal a larger sensitivity to balance sheet strength and to monetary policy shocks for SB when these alternative measures of monetary policy stance are used. The SB coefficients are in general significant and have the expected signs (negative). In contrast, the interactive variable coefficients for NSB are in general insignificant and are positive for the CE and borrowed reserves regressions.

Accounting for size

In our baseline estimations, we include banks' size (total assets) as a control variable. However, when we classify banks into SB and NSB based on their parent BHC's amount of securitization, so far, we have not accounted for the effects of BHCs' size. This is an important caveat given the large size differences between securitizing BHC and non-securitizing BHCs that we discussed in Section 3.

To measure the effects of securitization on the BSCMT that are independent of BHC size, we compare the estimation results of SB to those of NSB that have parent BHC with similar sizes (total assets). To match the size distribution of the securitizing BHCs with non-securitizing BHCs, we follow two steps. First, we divide the securitizing BHCs' size distribution into four categories (each with an equal number of BHCs) and determine the range of values that define each category. Next, we randomly pick non-securitizing BHCs that fall into these categories until the number of non-securitizing BHC in each size category equals the number of securitizing BHC. Since the number of securitizing BHCs is considerably larger than securitizing BHCs, we are able to replicate this experiment (i.e., picking a group of non-securitizing BHCs) using 100 random draws. For each random draw, we estimate equation (2).

In Table 4 we report the averages of the coefficient values estimated by using the random draws of non-securitizing BHCs, and reproduce the estimation results from using SB data for comparison. The central result is that accounting for size does not change the disparity between SB and NSB coefficients, and thus securitization has an independent effect on the strength of the balance sheet channel. We do, however, find that the coefficient values for NSB are in general smaller and less significant than the coefficient values obtained from the baseline estimation. This result implies that the subsidiaries of larger BHCs may be less sensitive to economic conditions and to monetary policy.

Evidence from historical data

The results obtained by controlling for size predicted an independent effect of securitization on the BSCMT. There are, however, other characteristics of BHC, not related to but correlated with securitization, that could be the main reason for the disparity between the estimation using SB and NSB data. For example, a large number of studies (Hermalin and Rose, 1999; Iacoviello and Minetti, 2006; Rajan and Zingales, 1998) argue that bankruptcy costs and hence sensitivity to balance sheet strength could be higher for more global banks. In this section, we check whether BHC-specific characteristics, not related to size, play a role by using historical data. As mentioned above, while securitization is more prevalent recently, Call Report data are available since 1978. It is this feature of the data that we use to test whether BHC characteristics, other than securitization drive our results. Specifically, we test whether the disparity between the SB and NSB is observed when data from earlier periods, when securitization was not as widespread.

We proceed by using the same group of BHCs (securitizing and non-securitizing) identified in our baseline analysis (2001Q1 to 2009Q3) and collect data from the period 1978Q1 to 2000Q4 for banks that are affiliated with these BHCs and label them as SB and NSB. In doing so, we control for size using the methodology described in the previous section and collect NSB data for the 100 random groups of non-securitizing BHCs. We then estimate equation (2) separately for SB and NSB.

The results are displayed in Table 5. For brevity, we report only the difference in the coefficient values for SB and NSB. For example, the coefficient value of 5.58 is the difference between the SB coefficient value (5.73) and the NSB coefficient value (0.15) obtained by using the sample period 2001Q1 to 2009Q3. The numbers in parentheses are the *F-statistics* that test whether the difference in the coefficient values is significantly different from zero. Comparing the two sub-periods reveals that the differences in output and balance sheet sensitivities of SB and NSB are only significant and large in magnitude during 2001Q1 to 2009Q3. There does not seem to be any noticeable difference in the coefficient values in the earlier period. It is important to note, however, that our analysis in this section does not fully account for BHC-specific variables that may have changed from one period to the other similar to securitization. For example globalization of banking operations has increased dramatically in the past 10 years (see, Cetorelli and Goldberg, 2009). But to the extent that these characteristics are related to size (for example, global BHCs are typically larger), the exercise above is effective in comparing the unique effects of securitization during the two periods.

Bank level securitization

So far we have used securitization at the BHC level to classify affiliated banks into SB and NSB. As mentioned above, this could be a questionable methodology if the individual banks are independently formulating their securitization strategies. In this section, we alternatively use securitization data at the bank level to classify banks into SB and NSB. Similarly, if a bank has used any of the securitization instruments listed in Appendix A during the sample period, it is classified as a SB and as a NSB otherwise. The results displayed in Table 6 again show that SB are more sensitive to balance sheets. Conversely, the evidence for the effect of monetary policy is mixed. The interactive variable coefficients for SB are only larger for two out of the four measures of policy stance. Note, however, that the proportion of banks that securitized during the sample period was very small. Therefore, this strategy generates a considerably smaller number of observations for SB, relative to using BHC-level securitization data, and the results are less informative.

Degree of securitization

So far we did not consider the degree of securitization and classified BHCs as securitizing BHCs even if their securitized assets are only a negligible share of their total assets. To investigate whether the degree of securitization affects our results, we classify securitizing BHCs into two groups: high securitizers and low securitizers. To do so, we rank BHCs according to their securitized assets to total assets ratios and classify the top 40 percent as high securitizers and the bottom 40 percent as low securitizers, respectively.

The results obtained by estimating equation (2) for these two groups are displayed in Table 7. We find that both the significance and the magnitude of the coefficient values are larger for the affiliates of BHCs that securitize relatively more. These results imply that that the strength of the BSCMT may be positively related to the degree of securitization, and that it mainly operates through its effects on BHCs that securitize more.

Excluding crisis periods

Our linear estimation methodology is not designed to capture the dynamics governing an economy that faces large shocks. Therefore, we exclude periods after 2007:Q3, the start of the recent financial crisis, to test the sensitivity of our results. Despite the shorter time period, the results reported in Table 8 point to a similar difference between the significance and the magnitude of the coefficient values estimated using SB and NSB data.

5. A Partial Equilibrium Framework

Our empirical results suggest that securitization may increase the strength of monetary transmission. In this section, we explore the possible determinants of this positive relationship. To do so, we build a three period partial equilibrium model that is similar in spirit to the bank run model of Diamond and Dybvig (1983). We enrich this model in a straightforward way to construct a framework conducive to analyzing the effects of securitization on the strength of monetary transmission.

The economy consists of a bank, an investor and consumers. The consumers own the bank and they are of two types: λ impatient and $(1-\lambda)$ patient consumers. The impatient and patient consumers value consumption only in periods 1 and 2, respectively, and the price of consumption is fixed at one dollar. The impatient and patient agents' consumption is denoted by x and y respectively, and each consumer is born (in period 0) with an endowment of e. The bank can borrow from, and the consumers can invest in the financial market. One dollar invested in period 0 yields one dollar in either period 1 or period 2. The bank can finance a long term project at $t=0$ and collect R dollars per unit invested in period 2. This investment is denoted by k. We assume that the bank has access to external loanable funds in period 0 and period 1 denoted by *d* and *b* respectively.[14]

We extend this standard framework of Diamond and Dybvig (1983) in two ways: First, we assume that a fraction of these loans go bad in period 1. The amount of bad loans is denoted by *l*. Out of these bad loans the bank can only collect *r* dollars per unit. Notice that this is different from the assumptions of Diamond and Dybvig (1983). In their setup, banks liquidate long term investments to meet the short term demand for deposits by impatient agents during a bank run. In contrast, we focus on a non-crisis setting where the proportion of impatient and patient agents stays constant. Second, and the more central, assumption we make is that the bank can sell a fraction γ of its loans at the price of *p* per unit of a loan. The bank uses these funds in period 1 to meet the demands of impatient agents but is only entitled to fraction $(1-\gamma)$ of the returns from the loan in period 2.[15]

Given this setup, the utility of the representative agent and the corresponding social planner problem can be represented as follows:

$$max\ \lambda u(x) + (1-\lambda)u(y) \qquad s.t.,$$

$$k \leq e + d \tag{3}$$

$$d + b \leq f \tag{4}$$

$$\lambda x \leq (1-\gamma)rl + p\gamma k + b + (e + d - k) \tag{5}$$

$$(1-\lambda)y + d + b \leq (1-\gamma)R(k - l) \tag{6}$$

$$y \geq x \tag{7}$$

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[14] Chang and Velasco (2001) use a similar framework where the bank can borrow from foreigners in periods 0 and 1. In our model, we assume that these funds, through internal capital markets, come from the BHC that the bank is affiliated with. Therefore, borrowing costs are negligible and unlike in a small open economy framework, the external loans are denominated in local currency units (dollars).

[15] It can be shown that the results are identical if the bank has access to the proceeds from securitization in period 0.

$$p = p(r^f) \qquad p'(\cdot) < 0 \tag{8}$$

$$l = l(r^f, k) \qquad l'(\cdot, k) > 0 \quad l'(r^f, \cdot) > 0 \quad l''(r^f, \cdot) > 0 \tag{9}$$

$$R > 1,\ r < 1,\ x, y, k, l, p, r, e, d, b, r^f \geq 0$$

where $u(\cdot)$ is the utility function. Equation (3) ensures that the bank cannot lend more than the total endowment (deposits) and period 0 borrowing. As shown in equation (4), we also assume that the bank's total access to external funding is limited to f. Equations (5) and (6) represent the feasibility constraints in periods 1 and 2, respectively, and the incentive compatibility condition in equation (7) ensures that the patient agents do not lie about their type.

Monetary policy is included in this model in two ways (equations (8) and (9)). *First*, we assume that the price of the security, p, is negatively related to the policy rate, denoted by r^f. Although this negative relationship is well established in the literature, it is reasonable to argue that changes in the policy rate may be endogenously determined (as a response to output and inflation for example). This can be problematic especially for the partial equilibrium framework that we follow. There are, however, a large number of studies (e.g. Rigobon and Sack, 2004) that justify our assumption. These studies identify the exogenous component of policy decisions and find a negative relationship between the policy rate and the price of assets such as asset-backed securities. *Second*, we assume that the amount of loans that result in a default is positively related to the policy rate and the amount of loans extended. The increase in bad loans is assumed to be more than proportional to the additional credit extended. The implicit assumption here is that the borrowers/investors, with a given level of net worth, allocate the additional funds to riskier projects with a higher chance of failure. The usual explanation for the positive relationship between the policy rate and the amount of bad loans is as follows: The negative effect that a monetary contraction, for example, has on the net worth of borrowers/investors would increase adverse selection and moral hazard problems, and the level of funds allocated to riskier projects. This, in turn, causes an increase in bad loans (see Mishkin, 1996; Bernanke et al., 1999 for a more detailed explanation).

In solving the social planner problem, we assume, consistent with our baseline empirical model, that the fraction of securitization, γ, is exogenously determined (by the BHC that the bank is affiliated with). Therefore, the bank only chooses how much to lend (or invest in the long term project) to solve its maximization problem.

Given this utility maximization problem and the fact that there is no aggregate uncertainty, feasibility constraints (5) and (6) always bind, and one can find the following optimal allocation between patient and impatient consumers:

$$\frac{y}{x} = \frac{(1-\gamma)R(l'_k - 1)}{(1-\gamma)rl'_k + p\gamma - 1}, \tag{10}$$

where $y = [(1-\gamma)R(k-l) - f]/(1-\lambda)$ and $x = [(1-\gamma)rl + (p\gamma - 1)k + f + e]/\lambda$. Using this allocation, it is straightforward to derive the relationship between the optimal level of lending, denoted by k^* and the policy rate as,

$$\frac{\partial k^*}{\partial r^f} = \frac{\gamma(1-\lambda)pl'_{r^f} - \gamma\left(\dfrac{(f+e)l'_{k^*}\ p'_{r^f}}{p\gamma - 1}\right) - \phi_1}{(1-p\gamma)[1+\lambda l'_{k^*} - (1-\lambda)k^* l''_{k^*}] + (f+e)l'_{k^*} + \phi_2}. \tag{11}$$

If we assume that the fraction of loans that are recovered, *r* is not high, the expressions ϕ_1 and ϕ_2 play a trivial role.[16,17] However, it is not difficult to show that, under reasonable assumptions, both ϕ_1 and ϕ_2 are greater than zero. Note also that the denominator and the three components of the numerator are all greater than zero.[18]

The expression in equation (11) uncovers a key implication of our model: The degree of securitization has two counteracting effects on the strength of monetary transmission (the first and second terms in the numerator). *On the one hand*, if the policy rate increases, the bank increases loans even though a greater portion of these loans will go bad. The reason is that the patient agents' consumption *y* decreases as more loans go bad and the bank increases its investment to counteract this drop. Although the share of loans that default increases, patient agents receive more funds from this additional investment since bad loans are always smaller than investment. A more critical implication for this paper is that the strength of this channel increases with the degree of securitization. If the degree of securitization is high, the bank needs to allocate more funds to the investment project given that it is only entitled to a small fraction of the returns in period 2. This effect is stronger when the share of patient agents is high.

On the other hand, if the policy rate increases, the price of the security decreases. The resulting drop in period 1 liquidity prompts the bank to decrease the share of funds allocated to

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[16] $\phi_1 = r\frac{\lambda}{1-\lambda}\left[-k(1-\gamma)l''_{rf}\,(1-2l'_{rf}) + \frac{l''_{rf}}{1-l'_{rf}}\left[(1-\gamma)l'_k - f - l'_{rf}\,((1-\gamma)l'_k - f)\right]\right]$ $\phi_2 = (1-\gamma)\frac{\lambda}{1-\lambda}r\left[l'_k + (k+1)l''_k + l'_{rf}\,(1-l'_{rf}) + \frac{l'_{rf}}{l'_{rf}-1}\right]$

[17] The World Bank Doing Business Survey (based on the methodology of Djankov et al., 2008) indicates that between 2004 and 2009 recovery rates, measured as cents on the dollar recovered from bad loans in the U.S., was on average 78 percent. The survey also indicates that these funds were recovered, on average, in 1.5 years. Therefore, the size of *r* depends on the length of the periods in our model. Given that the more common practice is to use policy rate changes over shorter time periods (up to 3 months), *r* can be considerably smaller than 78 percent. When we consider longer time periods (and a larger value of *r*), drawing inferences from equation (11) becomes more complicated but the relationship between the optimal level of lending and the policy rate is unchanged. Thus, for simplicity, we assume that *r* is small.

[18] One can show that even when the economy has only impatient agent the denominator is greater than zero since $f+e$ is always greater than k^*.

the investment project. The strength of this effect is positively related to the degree of securitization and to the policy rate sensitivity of security prices. Notice that the sensitivity of bad loans to the level of investment, l'_k, in equation (11) is the counterpart of the balance sheet effects in our empirical analysis (Section 2).This variable captures the fact that the percentage of loans that default increases with the level of investment (given a certain level of net worth).[19] The second term in the numerator highlights one important prediction of our model: balance sheet effects, given by l'_k, interact with the degree of securitization to amplify the effect of a change in the policy rate on investment. The reason is that if the default rate increases, the returns to investment relative to the costs (the loss of income for impatient agents) decreases and the bank chooses to decrease investment. This is consistent with the evidence we find in Section 4 and highlights the critical role that securitization plays for the BSCMT. Finally, the availability of external funding, f, decreases the strength of monetary transmission. This is consistent with the widely-documented decline in the strength of the LCMT. Specifically, as banks gain easier access to external funding (for example, due to financial innovation), their liquidity constraints become less binding and monetary transmission that operates through the LCMT becomes less effective.

6. Conclusion

Our empirical results demonstrate that the BSCMT operates mainly through banks that securitize some of their assets. This result, in contrast to a majority of the literature, suggests that at least one aspect of financial development and innovation -- namely securitization -- can increase the effectiveness of monetary policy. In particular, the negative effect of securitization

[19] Although it would be unreasonable to assume that the net worth of entrepreneurs (who do the investment) does not change when investment changes, both theoretical and empirical studies (Bernanke et al., 1999; Carlstrom and Fuerst, 1997; Gale and Helwig, 1985) on balance sheet effects predict and show that the increase (decrease) in investment is higher than the increase (decrease) in net worth.

on the LCMT can be counteracted by its effect on the BSCMT. It is difficult to compare the relative strength of these two channels to draw inferences for the overall strength of the monetary transmission mechanism. But given the debate on the existence of the LCMT and the overwhelming evidence showing its decline, our findings suggest that the effect of securitization on the overall strength of monetary transmission may not be negative.

Our simple partial equilibrium model demonstrates that securitization has two opposite effects on the BSCMT. On the one hand, banks are less sensitive to monetary policy due to the limited loan entitlements under securitization. On the other hand, the negative relationship between security prices and the policy rate (and thus the effect of the policy rate on banks' liquidity constraints) force SB to decrease/increase lending more than NSB. It is beyond the scope of this paper to include the price of securities in the empirical specification. Given the implications of our simple model, however, it would be interesting for future studies to consider this variable and investigate to what degree monetary policy is transmitted through its effect on security prices.

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Appendix A.

Table A.1. The definitions of the variables used in estimation

	Acronym	Description
ID	RSSD9001	The primary identifier of a bank.
Date	RSSD9999	The quarter for which the report was filed.
Bank type	RSSD9331	A two-digit code indicating the type of entity. This is used to identify commercial banks
Primary Insurer	RSSD9424	A code indicating the highest level of deposit-related insurance of the head office of a U.S. depository institution or U.S. branch of a foreign bank. This is used to determine whether a bank is
MBHC Affiliation	RSSD9348	The five-digit code assigned to the principle holding company or the highest holding company in a tiered organization.
Large Multi State BHC Affiliation	RSSD9210	A two-digit code assigned to a state of the United States or a U. S. territory in which the entity is physically located or its mailing address.
Total loans	RCFD1400	The aggregate gross book value of total loans (before deduction of valuation reserves)
Capital-Assets Ratio	RCFD3210, RCFD2170	The ratio of total equity capital (RCFD 3210) to the sum of all assets (RCFD 2170).
Liquidity	RCFD0390, RCFD1350, RCFD2146, RCFD0600, RCFD1754, RCFD3545	From 1986Q2 through 1993Q2 period, liquidity is the sum of total investment securities (RCFD0390), RCFD1350, and assets held in trading account (RCFD2146). From 1993Q3 trhough 2009:Q1, liquidity is measured as the sum of RCFD1350, securities held to maturity (RCFD1754), and trading assets (RCFD3545).
Indicators of securitization	BHCKB705	1-4 Family Residential Loans
	BHCKB706	Home Equity Lines
	BHCKB707	Credit Card Receivables
	BHCKB708	Auto Loans
	BHCKB709	Other Consumer Loans
	BHCKB710	Commercial And Industrial Loans
	BHCKB711	All Other Loans

Notes: More detailed definitions of these variables can be obtained from the Federal Reserve Bank of Chicago website by using the acronyms reported in the second column.

Table 1: Descriptive Statistics

	number of banks			BHC that securitize					BHC that do not securitize		
period	total	sample		number	size	avg. number of affiliates	average sec. assets/total assets		number	size	avg. number of affiliates
2001	9,302	6,790		160	38,908	7.1	0.13		5,919	1,356	4.0
2002	8,998	6,620		142	62,803	6.9	0.22		5,848	614	3.9
2003	8,822	6,595		160	63,517	6.7	0.16		5,757	634	3.9
2004	8,665	6,514		135	91,029	6.3	0.12		5,805	671	3.9
2005	8,543	6,463		128	111,153	6.5	0.14		5,772	797	3.8
2006	8,498	6,412		88	99,253	7.0	0.12		5,760	1,154	3.7
2007	8,352	6,351		91	119,262	7.5	0.09		5,747	1,220	3.8
2008	8,119	6,221		87	130,384	7.8	0.09		5,622	1,105	3.7
2009	8,061	6,183		97	108,746	7.6	0.07		5,449	939	3.7

Notes: 1. The table reports the number of banks and BHCs, and the size and number of affiliates of BHCs in our sample.
2. The number of banks and BHCs denote the total number of different banks and BHCs in a given year. These numbers *are not* the sum of the quarterly observations in a given year.
3. The size variables are the total assets measured in millions. Both the size and the number of variables are measured as simple averages in a given year.
4. Securitized assets are computed as the sum of the securitization variables listed in Appendix A.

Table 2: Estimation Results, Equation (2).

	$\sum_{k=1}^{4}\gamma_k$	$\sum_{k=1}^{4}\sum_{m=k+1}^{k+8}\mu_{km}$	$\sum_{p=1}^{8}\mu_{1p}$	$\sum_{p=1}^{8}\mu_{2p}$	$\sum_{p=1}^{8}\mu_{3p}$	$\sum_{p=1}^{8}\mu_{4p}$	R-Sq	N-obs
SB	5.72	-1.340	0.39	-0.08	-0.87	-0.77	0.10	5201
	(3.751)***	(3.750)***	(3.44)***	(3.05)***	(6.93)***	(3.49)***		
NSB	1.34	-0.17	-0.04	-0.08	-0.05	0.00	0.13	14244
	(1.93)*	(1.50)**	(2.22)**	(2.21)**	(1.44)	(1.14)		

Notes: 1. This table reports the results from the estimation of equation (2). SB denotes securitizing banks and NSB denotes banks that do not securitize their assets. The Bernanke-Blinder index is used to measure the stance of monetary policy.
2. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
3. The dependent variable of loan growth. The first column reports the coefficients of the income gap variables. The second column reports the sum of the interactive variables' coefficients and measures the BSCMT. Columns 3 to 6 report the sum of the coefficients of the monetary policy variable interacted with the first, second, third and the fourth lag of the income gap variable respectively.
4. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Alternative Measures of Policy Stance

		BB	S	CE	Borrowed Reserves
SB	$\sum_{k=1}^{4}\gamma_{kt}$	5.72	1.26	2.88	2.98
		(3.751)***	(1.83)***	(1.31)	(1.86)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-1.34	-1.00	-6.16	-3.98
		(3.750)***	(1.79)***	(1.93)***	(2.36)***
NSB	$\sum_{k=1}^{4}\gamma_{kt}$	1.34	0.86	1.42	1.72
		(1.93)***	(1.12)	(2.92)***	(3.67)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-0.17	-0.0016	0.71	0.77
		(1.50)**	(1.60)**	(1.18)	(1.18)

Notes: 1. This table reports the results from the estimation of equation (2). SB denotes securitizing banks and NSB denotes banks that do not securitize their assets.
2. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
3. The numbers of observations in each regression is the same as in Table 1 (5201 for SB and 14244 for NSB).
4. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
5. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Accounting for Size

		BB	S	CE	Borrowed Reserves
SB	$\sum_{k=1}^{4}\gamma_{kt}$	5.73	1.26	2.88	2.98
		(3.751)***	(1.83)***	(1.31)	(1.86)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-1.35	-1.00	-6.16	-3.98
		(3.750)***	(1.79)***	(1.93)***	(2.36)***
NSB	$\sum_{k=1}^{4}\gamma_{kt}$	0.15	0.36	0.46	0.40
		(1.32)	(1.30)	(1.25)	(1.25)
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-0.30	0.02	0.81	0.88
		(1.23)	(1.09)	(1.16)	(1.11)

Notes: 1.The results from the estimation of equation (2) are reported. SB and NSB denote banks that securitize and banks that don't, respectively.
2. NSB coefficient values are obtained by controlling for size effects. This methodology is discussed in Section 4.
3. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
4. The numbers of observations in each regression is the same as in Table 1 (5201 for SB and 14244 for NSB).
5. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
6. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Inference from historical data

		BB	S	CE	Borrowed Reserves
2001-2009	$\sum_{k=1}^{4}\gamma_{kt}$	5.58	0.89	2.42	2.57
		(3.64)***	(1.21)	(1.08)	(1.58)**
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-1.04	-1.02	-6.97	-4.87
		(2.39)***	(1.81)***	(2.13)***	(2.61)***
1978-2000	$\sum_{k=1}^{4}\gamma_{kt}$	0.38	0.31	1.68	1.99
		(0.20)	(0.13)	(1.06)	(1.38)*
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-2.61	0.80	0.94	0.91
		(1.40)*	(0.55)	(0.57)	(0.83)

Notes: 1. The results are obtained by estimating equation (2) using observations from the periods 2001-2009 and 1980-2000 respectively. The reported values represent the coefficient values estimated using data for SB minus the coefficient values estimated using data for NSB.
2. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
3. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
4. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Bank level securitization

		BB	S	CE	Borrowed Reserves
SB	$\sum_{k=1}^{4}\gamma_{kt}$	6.95	8.32	7.38	7.08
		(1.91)***	(5.40)***	(2.69)***	(2.91)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-0.35	0.53	-0.46	-0.79
		(1.90)***	(2.72)***	(2.62)***	(2.65)***
NSB	$\sum_{k=1}^{4}\gamma_{kt}$	2.71	0.71	1.89	2.20
		(5.59)***	(1.19)	(2.12)***	(2.87)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8}\mu_{kp}$	-0.52	-3.33	-1.40	-0.60
		(3.34)***	(2.27)***	(2.16)***	(1.98)***

Notes: 1. This table reports the results from the estimation of equation (2). SB denotes securitizing banks and NSB denotes banks that do not securitize their assets.
2. The banks are classified as SB and NSB based on bank-level securitization data. In the baseline estimation, this classification is based on BHC data. Size effects are controlled for using the methodology discussed in Section 4.
3. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
4. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
5. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Degree of Securitization

		BB	S	CE	Borrowed Reserves
Sec 1	$\sum_{k=1}^{4} \gamma_{kt}$	16.44	5.66	7.17	8.33
		(2.66)***	(1.83)***	(2.56)***	(2.04)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8} \mu_{kp}$	-6.09	-3.34	-21.80	-17.26
		(3.73)***	(2.03)***	(2.31)***	(2.38)***
Sec 2	$\sum_{k=1}^{4} \gamma_{kt}$	9.51	0.02	0.49	1.52
		(1.31)	(0.56)	(0.45)	(0.26)
	$\sum_{k=1}^{4}\sum_{p=1}^{8} \mu_{kp}$	-0.81	-1.16	-11.26	-6.04
		(2.27)***	(1.98)***	(1.85)***	(2.26)***

Notes: 1. This table reports the results from the estimation of equation (2).
2. BHCs are sorted based on their securitized assets/total assets ratio. The banks that are affiliated with the top 40 % and bottom 40% of these BHC are classified under the categories Sec1 and Sec2 respectively.
3. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
4. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
5. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Excluding crisis periods

		BB	S	CE	Borrowed Reserves
SB	$\sum_{k=1}^{4} \gamma_{kt}$	6.12	1.15	2.72	3.60
		(4.14)***	(1.65)**	(1.77)***	(2.14)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8} \mu_{kp}$	-1.40	-12.15	-7.23	-5.53
		(4.15)***	(1.42)*	(1.96)***	(2.11)***
NSB	$\sum_{k=1}^{4} \gamma_{kt}$	1.12	0.89	1.49	1.53
		(1.88)***	(1.58)**	(2.93)***	(2.96)***
	$\sum_{k=1}^{4}\sum_{p=1}^{8} \mu_{kp}$	-0.17	0.24	1.06	0.75
		(2.10)***	(1.77)***	(1.31)	(1.20)

Notes: 1. This table reports the results from the estimation of equation (2). SB denotes securitizing banks and NSB denotes banks that do not securitize their assets.
2. The periods after 2007Q3 are excluded and size effects are controlled for using the methodology discussed in Section 4.
3. The measures for monetary policy stance are: Bernanke and Blinder (1992) index (BB), Strongin (1995) index (S), Christiano and Eichenbaum (1992) index (CE), and an index constructed using the variation in borrowed reserves.
4. The numbers in parentheses are the F-statistics that are used to test whether the summation is significantly different from zero.
5. * significant at 10%; ** significant at 5%; *** significant at 1%.