

# Lending Behavior of Prudent Banks around the 2007 Financial Crisis

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## Abstract

Using information on commercial banks from 2001 to 2014, we examine how bank characteristics affect their lending behaviors. While risky banks show higher lending ratios than prudent banks before the 2007 financial crisis, prudent banks showed higher excess loan growth rates, contributing to the high aggregate credit supply before the crisis. In the pre-crisis period, prudent banks with more assets, higher BIS ratio, higher core deposit ratio or lower NPL ratio are more aggressive in increasing their lending. These results are driven from lending to households rather than commercial borrowers. More aggressive lending leads to lower performance, exhibiting lower excess Return growth and higher excess NPL growth rates. But after the 2007 crisis, prudent banks have decreased their lending growth rates more sharply than risky banks.

Key words: Lending behavior, Credit supply, Bank Performance, Financial Crisis

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## 1. Introduction

Like those in countries that experience a financial crisis, the US banking sector has experienced a large surge in bank loans and aggregate credit supplies before the 2007 subprime mortgage crisis (Schularick and Taylor, 2012). A sharp increase in aggregate lending leads to an increase in asset prices, which in turn increases the credit supply, and send a warning signal for the financial crisis (Ivashina and Scharfstein, 2010; Chari, Christiano and Kehoe, 2008). Over the course of increasing aggregate lending, the banking sector increased newly originated loans (Ivashina and Scharfstein, 2010), and lending to risky households with subprime credit ratings more than to industrial borrowers (Dell'Ariccia, Igan, and Laeven, 2008; Demyanyk and Hemert, 2011).

With a fast increase in lending, a risky bank increased its exposure to a credit risk. In fact, during and after the 2007 crisis, banks with large lending suffered from a sharp increase in non-performing loans, and failed (Saba, Kouser and Azeem, 2012; Lu and Whidbee, 2013). As large banks were more likely to be rescued by regulators who try to avoid potential systemic risks, some might wonder whether the too big to fail belief led large banks to take more risks while small banks did not. However, more small banks have failed than large banks during the post-crisis period, suggesting that relatively small or medium sized banks also took a risk and increased their lending as well.

It is not clear which banks took large risks and increased their lending fast during an asset price bubble period. Past studies have not fully examined characteristics of banks that were taking excessive risks. Did risky banks take risks and increased their lending aggressively while prudent banks did not? In particular, did risky banks with low capital, low profitability, or high non-performing loans take risks? Conversely, have prudent banks been cautious in

their lending decisions? Or have prudent banks also increased their lending fast and also contributed to a sharp increase in credit supply?

Unlike previous studies that focus on large banks' lending behavior, we focus on prudent banks' lending behaviors around the crisis. Banks with high capital adequacy ratios, high stable funding ratios (i.e., high reliance on core deposits rather than wholesale funding) or low non-performing loan ratios are considered to be prudent and to take less risk. As such, financial supervisory commissions are used to evaluate such bank characteristics. For example, the Federal Deposit Insurance Corporation (FDIC) centers its examination on capital adequacy, asset quality, management capabilities, earnings sufficiency, liquidity position and sensitivity to market risks (commonly referred to as CAMELS rating) of financial firms to evaluate the stability of the institutions (FDIC, 2016). Depositors, and investors often consider such banks as safe (Konish and Yasuda, 2004; Martinez-Peria and Schmukler, 2001; Ivashina and Scharfstein, 2010; Berger and Deyoung, 1997), and demand lower interest rates for their deposits and investment (Martinez-Peria and Schmukler, 2001).

This paper examines whether prudent banks behaved prudently before the crisis. Extending previous studies, we argue that facing lower financing constraints, prudent banks with less risk of failure or less risk of insolvency can increase their capital more than non-prudent banks. Using the capital, prudent banks take more risks, and lend more loans to risky borrowers, which can eventually lower their performance. We empirically test whether prudent banks increase their lending faster for a given increase in their assets, taking more risks. In particular, we examine banks' lending behaviors around the 2007 financial crisis, and test how prudent banks' lending decisions differ from other banks using information on U.S. commercial banks from 2001 to 2014.

Building on piecemeal evidence from previous studies on risk taking and bank characteristics, we argue that prudent banks can take more risks than non-prudent banks. First, contrary to the conventional charter value argument (Keeley, 1990; Demsetz et al., 1996; Repullo, 2004), profitable banks become less risk averse with accumulated capital and take more risks to generate profits or take riskier projects (Calem and Rob, 1999; Perotti et al., 2011; Martynova, Ratnovski, and Vlahu, 2015). Second, based on a very small number of large banks, studies find more capitalized banks take more risks before the 2007 crisis, and yield no positive relationship between bank capital and performance during the 2007 crisis (Huang and Ratnovski, 2009; Camara et al., 2013; IMF Global Financial Stability Report (2009)). Third, advances in risk management can lead banks to take more risks and lead to greater credit availability. For example, banks with active risk management or better ability to manage credit risks can allow banks to hold less capital and to invest more aggressively in risky and illiquid loans (Froot et al. 1993; Froot and Stein, 1998; Cebenoyan and Strahan, 2004). Fourth, merged banks or bank holding companies (BHC) with larger capital can increase lending more compared to their capital (Demsetz and Strahan, 1997; Akhavein et al. 1997). In short, the previous literature suggests that prudent banks such as better capitalized banks, larger banks or more profitable banks can take more risks than risky banks, and get exposed to greater risks.

As aggressive banks can increase their lending faster than their assets (suggesting that banks lend more loans for a given capital), we focus on the effects of the bank-specific characteristics on the lending growth rate rather than the lending level. Specifically, we examine whether lending growths of prudent banks before the 2007 crisis period differ from those during the post-crisis period. We also analyze the lending to different types of the borrowers (i.e., households and commercial borrowers) in order to examine the main source

of the banks' lending behaviors. In addition, this study examines the effects of bank lending behavior on their performance. When banks aggressively increase their lending, they would extend their lending to riskier borrowers, or less profitable borrowers. If this is the case, even before the bubble burst, aggressive lending can eventually lead to high risk and to poor performance.

Based on the quarterly information on all commercial banks from 2001 to 2014, we show that in the pre-crisis period, prudent banks are more aggressive in increasing their lending than risky banks. Bank with more assets, higher capital adequacy ratio (higher BIS ratio), more stability in funding (higher core deposit ratio), or lower NPL ratio show a higher growth rate of their loans. Banks with a high composite index of prudence show a higher growth of bank lending. Furthermore, such growth patterns of loans are driven from lending to households rather than commercial borrowers. (Note that an increase in household loans contributes to the 2007 crisis.) During the post-crisis period after the 2007 crisis, prudent banks have decreased their lending growth rates more sharply than risky banks. In addition, this study finds that prudent banks and their aggressive lending have negative effects on bank performance. Prudent banks have lower ROA growth rate or higher NPL ratio growth rate. Unlike some papers based on a small number of large banks or bank holding companies (Demsetz and Strahan, 1997; Ivashina and Scharfstein, 2010), our study uses all commercial banks. Even so, these results are robust when we control for bank-specific characteristics as well as regional macro-economic conditions including MSAs or States level variables.

Our study contributes to the literature on bank lending behavior around the crisis. While previous studies analyze the effects of financing sources (core deposit or wholesale financing), or other bank characteristics (such as bank size, capital adequacy, asset liquidity or etc.) on bank lending, they do not focus on the effects of prudent bank and these prudent

bank characteristics on lending behaviors.<sup>1</sup> By focusing on prudent banks and their bank characteristics (bank size, capital adequacy ratio, core deposit funding, profitability and non-performing loans), we show that even prudent banks have rapidly increased their lending and showed a higher lending growth rates than non-prudent banks. Furthermore, such a high growth rate of lending in turn lowered their performance and aggravated their non-performing loans, suggesting that banks provided loans to riskier borrowers. These results suggest that even prudent banks also contribute to an increase in aggregate lending before the crisis. To be clear, as our analysis is not based on borrower-level information, it is not direct evidence that prudent banks increase their lending to riskier borrowers.

The rest of the paper proceeds as follows. Section 2 reviews related literature. Section 3 presents our hypotheses. Section 4 describes the data and methodology used in our analysis and Section 5 presents empirical results. Finally, Section 6 summarizes and discusses our results and Section 7 concludes.

## **2. Related Literature**

Previous studies argue that the 2007 financial crisis was triggered by a shock to the banking sector (Brunnermeier, 2009; Acharya and Naqvi, 2012). Supporting the argument, several studies analyze banks' lending behaviors and factors affecting their lending decisions in various ways around the crisis. Studies find that a sharp increase in total bank credits including new loans. For example, Chari, Christiano and Kehoe (2008) show that the total

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<sup>1</sup> Some studies examine lending behavior of a few large banks for a limited time period. Ivashina and Scharfstein (2010) show that banks cut their lending less if they had better access to deposit financing and banks with revolving lines with Lehman affect banks' lending behavior before and during the crisis. Cornett, McNutt, Strahan and Tehranian (2011) focus on the effects of the banks' financing sources on changes in lending during the crisis.

amount of bank credit dramatically rose from 2001 to 2007. Ivashina and Scharfstein (2010) show that total amount of new loans sharply increased before the financial crisis. Using mortgages loan-level data, Demyanyk and Hemert (2011) show that the number of originated loans and total amount originated increased and the quality of loans deteriorated from 2001 to 2006.

After the onset of the financial crisis, banks both reduced their lending to corporate firms (Ivashina and Scharfstein, 2010; Chari, Christiano and Kehoe, 2008) and raised their loan prices (Santos, 2011), leading corporations to lower their corporate investment in the US (Duchin, Ozbas and Sensoy, 2010; Cornett, McNutt, Strahan and Tehararian, 2011) find that banks with a higher exposure to liquidity risk showed loan growth while banks with stable sources of financing (such as deposit rather than wholesale financing) continued to lend relative to other banks in the crisis.

Before the 2007, in contrary to the charter value argument that profitable banks would have less incentive to take risks (Keeley, 1990; Demsetz et al., 1996; Repullo, 2004), profitable banks take more risks for several reasons. They try to satisfy higher bank capital requirements (Blum, 1999; Hellmann et al., 2000; Matutes and Vives, 2000), they become less risk averse with accumulated capital (Calem and Rob, 1999; Perotti et al., 2011), or they take larger-scale risks in non-core activities as their profitable core business enables banks to borrow more (Martynova, Ratnovski, and Vlahu, 2015).

Based on a very small number of large banks, some studies find more capitalized banks take more risks before the 2007 crisis, and yield no positive relationship between bank capital and performance during the 2007 crisis (Huang and Ratnovski, 2009; Camara et al., 2013; IMF Global Financial Stability Report (2009). Huang and Ratnovski (2009) find no relationship between pre-crisis bank capital and performance during the crisis. Camara et al.

(2013) show that better-capitalized European banks took more risk before the 2008 crisis. Global Financial Stability Report (2009) finds that banks that were intervened in during the crisis had statistically higher capital ratios before the crisis than banks that did not require an intervention.

Advances in risk management can lead banks to take more risks and lead to greater credit availability. For example, banks with active risk management or better ability to manage credit risks can allow banks to hold less capital and to invest more aggressively in risky and illiquid loans (Froot et al. 1993; Froot and Stein, 1998; Cebenoyan and Strahan, 2004). In addition, merged banks or bank holding companies (BHC) with larger capital can increase lending more compared to their capital (Demsetz and Strahan, 1997; Akhavein et al. 1997). In short, the previous literature suggests that banks with able risk management, better capitalized banks, and highly profitable banks can take more risks.

Bank performance depends on several factors including bank-specific information, banking-sector market concentration, and macroeconomic environments. Bank performance such as profitability, and insolvency depends on bank-specific variables such as total loan growth rates, funding costs, operational efficiency, and business model (Dietrich and Wanzenried, 2011; Foos, Norden and Weber, 2010). Foos, Norden and Weber (2010) find that loan growth rates lead to an increase in loan loss provisions, to a decrease in relative interest income, and to lower capital ratios. While the ex-ante effects of market concentration in the banking sector are still not clear, theoretical and empirical studies argue that market concentration would affect credit supply and their profits (Keeley, 1990; Demsetz, Saldenberg and Strahan, 1996; Jiménez, Lopez and Saurina, 2007; Boyd and De Nicolo, 2005). In the majority of studies that investigate the determinants of NPLs, either



macroeconomic or bank-specific determinants (but usually not both) are used as explanatory variables.

Most empirical studies examine the effect of bank-specific characteristics (Berger and DeYoung, 1997; Podpiera and Weill, 2008) and the influence of the macroeconomic environment on NPLs (Rinaldi and Sanchis-Arellano, 2006; Berge and Boye 2007; Boss et al. 2009; Cifter et al., 2009; Salas and Saurina, 2002; Louzis et al., 2012). In addition, the upper phase of the business cycle has a positive effect on bank performance (Staikouras and Wood, 2004; Athanasoglou et al., 2008).

### **3. Hypothesis Development**

Our paper tries to identify the effects of prudent bank-specific characteristics on lending behaviors and performances controlling macro-economic conditions before and after the crisis. We have developed hypotheses as below.

Past studies argue that larger banks, more profitable banks, banks with higher capital ratios can take more risks in lending behaviors. Like those with active risk management engage in more risk taking (Froot et al. 1993; Froot and Stein, 1998), larger banks, more profitable banks, banks with higher capital ratios have accumulated more capital and take more risks than smaller banks, less profitable banks or banks with smaller capital ratios (Martynova, Ratnovski, and Vlahu, 2015; Camara et al., 2013). Extending the piecemeal evidence from previous studies, we hypothesize that prudent banks with less risk of failure or insolvency can take more risks, and lend more loans, leading to greater credit. We argue that prudent banks can increase their lending faster than the increase in their assets, taking more risks. We hypothesize that prudent banks which have more assets, higher ROA, higher BIS ratio, higher core deposit ratio or lower NPL ratio increase their lending aggressively.

H1: Prudent banks have higher lending growth rate.

Bank performance depends on loan growth along with other bank-specific factors (Dietrich and Wanzenried, 2011; Foos, Norden and Weber, 2010). When banks increase their lending rapidly, banks have lend loans to low-quality borrowers more, or lend at a lower price than before. With more risky borrowers, banks with a fast growth of loans can experience higher non-performing loans which eventually lower their performances, or they experience lower profitability. So, we hypothesize that banks with higher loan growth would have lower ROA growth rate and higher NPL ratio growth rate.

H2: Aggressive lending of prudent banks lowers bank performance.

Before the crisis with increasing housing prices, banks might have believed that making real-estate related loans is profitable. Exploiting large capital due to less constraints in increasing capital or borrowing, prudent banks have more incentive to invest in real-estate market related loans and take risks.

H3: Prudent banks' aggressive lending behavior is stronger before the crisis.

## **4. DATA and Methodology**

### **4.1. DATA sources**

Our data come from several sources. For bank specific information, we construct quarterly information on US commercial banks from the first quarter of 2001 through the fourth quarter of 2014. We collect bank information from Consolidated Reports of Condition and Income (Call Reports) from the Federal Financial Institutions Examination Council

(FFIEC). We also collect branch-level deposits from Summary of Deposits (SOD) database of the FDIC. For macro-economic conditions, Treasury bill rates from Federal Reserve Economic Data (FRED), and monetary aggregate variables are retrieved from Federal Reserve Board (FRB). For the economic activities and real estate market conditions, we use MSA-level information such as Total Real GDP from Bureau of Economic Analysis (BEA), the Housing Price Index (HPI) from Federal Housing Finance Agency (FHFA). For banks have multiple branches operating in multiple MSAs, banks' MSA variables are value-weighted average based on the banks' branch deposit amounts across MSAs. When a bank has a branch with no MSA location information, we use state-level information that the branch belongs to. For each bank, HPI, Total RGDP, and HHI are value-weighted across MSAs that banks operate.

We exclude banks with zero total asset and branches with zero total deposit. We winsorize the deposit, bank-level, and MSA-level variables at the top and bottom 1% of the distribution of each variable. The final sample consists of 413,362 bank-quarter observations. Table 1 provides definitions and constructions of all the variables used in this study along with their sources.

<Insert Table 1 around here>

As typical characteristic of prudent banks, we examine asset size, capital adequacy ratio, core-deposit ratio, profitability, and NPL ratio. In addition, we also construct a discrete index of bank prudence based on a composite index of the aforementioned characteristics in the following manner. First, we rank all banks in each category of prudent bank characteristics such as bank size, profitability, capital adequacy ratio, core-deposit ratio, and NPL ratio, respectively. Then, the composite index is based on the sum of ranks in all five categories.

Note that firm size is one of the components of bank prudence in our analysis. In fact, while 23% of banks were considered to be the most prudent banks in the group of banks with assets of top 20 percentile, about 25% of banks were classified as the most prudent ones in the group of banks belonging to top 20-40 percentile in assets.

Table 2 provides detailed statistics of variables used in this study. In addition, the Table also shows the mean value of variables across different time periods. Assets and loans have steadily increased regardless of the crisis. In our data, Households Loans constitutes the largest portion of Total Loans. The mean of household loan ratio over total loans is about 0.76. *ROA* is the lowest value in during-crisis period and has improved after the crisis. But it is still lower than one in pre-crisis period. *NPL Ratio* sharply increases from during-crisis period. In post-crisis period, *NPL Ratio* is three times higher than one in pre-crisis period. *HPI* is the highest value in during-crisis period. In post crisis period, *HPI* is not fully recovered as much as one in during-crisis period.

<Insert Table 2 around here>

## **4.2 Methodology and Variables**

Bank lending decisions depend on bank-specific characteristics controlling macro-economic conditions. Bank lending behaviors are measured through the ratio of loans over total assets. We measure the aggressive lending to the magnitude of loan ratios, especially through loans to household borrowers.

The following fixed effects model is used to test lending behaviors, which is similar with Cornett, McNutt, Strahan and Tehranian (2011). To reduce the omitted variable problems and to distinguish prudent banks from other banks, we control for bank-specific characteristics, macro-economic conditions, and MSA level business and real-sector conditions. As there

have been structural changes in the economy after the 2007 crisis, we separate the period into three sub-periods based on the 2007 subprime mortgage crisis and examine the above hypotheses in each sub-period. The pre-crisis period is from 2001:1Q to 2007:2Q, the during-crisis period is from 2007:3Q to 2009:2Q and the post-crisis period is from the 2009:3Q to 2014:4Q.

$$\begin{aligned} Total\ loan\ ratio_{it} = & \beta_0 + \beta_1 \cdot Crisis_t + \beta_2 \cdot Post-Crisis_t + \beta_3 \cdot B_{it-1} + \beta_4 \cdot B_{it-1} \cdot Crisis_t \\ & + \beta_5 \cdot B_{it-1} \cdot Post\ Crisis_t + \beta_6 \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it} \end{aligned} \quad (1)$$

Bank lending is measured through  $Total\ loan\ ratio_{it}$ , which is the value of the credit supply to households, firms and others over total assets for bank  $i$  at time  $t$ . *Growth of Total loan ratio<sub>it</sub>* is measured through a log value of growth of loan ratios,  $\log (Total\ loan\ ratio_t / Total\ loan\ ratio_{t-1})$ , representing the changes in loan ratios over time. A positive value represents that the bank has increased loans over time more than changes in assets over time.

$B_{it-1}$  includes banking sector level variables such as *Total assets*, *ROA*, *BIS ratio*, *Core deposit Ratio* and *NPL Ratio* for each bank. These variables measure the soundness of a bank. To reduce endogeneity issues, we use the lagged values of these variables. To examine whether the effects of these variables change over the crisis or post-crisis periods, we include interaction terms of these variables with *Crisis* or *Post-Crisis* dummies.  $X_{it}$  denotes MSA and macro level variables which include *HPI*, *Total RGDP*, *HHI*, *T-bill* and *M2/GDP*.  $\omega_i$  is an unobserved bank-fixed effect,  $\mu_t$  is a time-fixed effect, and  $\varepsilon_{it}$  is assumed to be serially and cross-sectionally uncorrelated error term.

We also examine prudent banks' lending behavior in different lending channels: lending to households and business borrowers. *Household loan ratio<sub>it</sub>* is the value of the credit supply to households over bank assets for bank  $i$  at time  $t$ . It includes household loans secured by

real-estate properties, car loans and credit card loans. In most banks, household loans are the largest components of total loans. The portion of household loans secured by real-estate properties accounts for almost 89% of all households loans. In addition, we also examine the credit supply to corporations and industrial borrowers through *C&I loan ratio<sub>it</sub>* measuring the ratio of commerce and industrial loans to bank assets for bank *i* at time *t*.

$$\begin{aligned} \text{Household loan ratio}_{it} = & \beta_0 + \beta_1 \cdot \text{Crisis}_t + \beta_2 \cdot \text{Post-Crisis}_t + \beta_3 \cdot B_{it-1} + \beta_4 \cdot B_{it-1} \cdot \text{Crisis}_t \\ & + \beta_5 \cdot B_{it-1} \cdot \text{Post Crisis}_t + \beta_6 \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{C\&I loan ratio}_{it} = & \beta_0 + \beta_1 \cdot \text{Crisis}_t + \beta_2 \cdot \text{Post-Crisis}_t + \beta_3 \cdot B_{it-1} + \beta_4 \cdot B_{it-1} \cdot \text{Crisis}_t \\ & + \beta_5 \cdot B_{it-1} \cdot \text{Post Crisis}_t + \beta_6 \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it} \end{aligned} \quad (3)$$

In addition, we also measure the lending behavior through the growth rates of loan ratios. *Excess Household Loan Growth<sub>it</sub>* is measured through a log value household loan growth in excess of a log value of asset growth ( $\log (\text{Household loan}_t / \text{Household loan}_{t-1}) - \log (\text{Assets}_t / \text{Assets}_{t-1})$ ), representing the changes in household loan ratios over time. A positive value represents that the bank has increased loans to households over time faster than growth of assets over time. Similarly, we also construct *Excess Growth of C&I loan<sub>it</sub>* which is a log value of commercial and industrial loan growth in excess of the log value of asset growth, representing changes in household loan ratios over time over time.

We also estimate the effects of the bank lending behavior to bank performance. Bank performance is measured in two ways: non-performing loans and profitability. *NPL Ratio* is the non-performing loan over total loans, which represents the financial health and outcome of risk taking of a bank. As borrowers do not default immediately after borrowing from banks, new loans do not affect NPL immediately, but affect NPL ratio over longer time periods. So,

we include lagged loan ratio variables from 1 to 4 like Kashyap and Stein (2000). As the equation (4) shows, we use the lagged values of bank's lending ratios.

$$\begin{aligned}
NPL\ Ratio_{it} = & \beta_0 + \beta_1 \cdot Crisis_t + \beta_2 \cdot Post\ Crisis_t + \beta_3 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \\
& + \beta_4 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \cdot Crisis_t + \beta_5 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \cdot Post\ Crisis_t + \beta_7 \cdot B_{it-1} \\
& + \beta_8 \cdot B_{it-1} \cdot Crisis_t + \beta_9 \cdot B_{it-1} \cdot Post\ Crisis_t + \beta_{10} \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it}
\end{aligned} \tag{4}$$

In addition, we estimate the effects of the excess loan growth on the excess NPL growth as the equation (5). Excess NPL growth is growth of NPL over time in excess of Asset growth over time. This is similar to Louzis et al (2012) that use a NPL change variable as a dependent variable.

$$\begin{aligned}
Excess\ NPL\ Growth_{it} = & \beta_0 + \beta_1 \cdot Crisis_t + \beta_2 \cdot Post\ Crisis_t + \beta_3 \cdot \sum_{k=1}^4 Excess\ Loan\ Growth_{it-k} \\
& + \beta_4 \cdot \sum_{k=1}^4 Excess\ Loan\ Growth_{it-k} \cdot Crisis_t + \beta_5 \cdot \sum_{k=1}^4 Excess\ Loan\ Growth_{it-k} \cdot Post\ Crisis_t \\
& + \beta_7 \cdot B_{it-1} + \beta_8 \cdot B_{it-1} \cdot Crisis_t + \beta_9 \cdot B_{it-1} \cdot Post\ Crisis_t + \beta_{10} \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it}
\end{aligned} \tag{5}$$

Finally, we estimate the effects of the banking lending to the bank's profitability. *ROA* is the return on assets of the bank which represents the bank's profitability. And loan ratio variables are included to test how bank's lending behavior affects its profitability.

$$\begin{aligned}
ROA_{it} = & \beta_0 + \beta_1 \cdot Crisis_t + \beta_2 \cdot Post\ Crisis_t + \beta_3 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \\
& + \beta_4 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \cdot Crisis_t + \beta_5 \cdot \sum_{k=1}^4 Loan\ Ratio_{it-k} \cdot Post\ Crisis_t \\
& + \beta_6 \cdot B_{it-1} + \beta_7 \cdot B_{it-1} \cdot Crisis_t + \beta_8 \cdot B_{it-1} \cdot Post\ Crisis_t + \beta_9 \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it}
\end{aligned} \tag{6}$$

In addition, we estimate the effects of the loan ratio growth rate on the excess return growth. Equation (7) is similar to Knapp, Gart Chaudhry (2006) that use a ROA change variable as a dependent variable.

$$\begin{aligned}
\text{Excess Return Growth}_{it} = & \beta_0 + \beta_1 \cdot \text{Crisis}_t + \beta_2 \cdot \text{Post Crisis}_t + \beta_3 \cdot \sum_{k=1}^4 \text{Excess Loan Growth}_{it-k} \\
& + \beta_4 \cdot \sum_{k=1}^4 \text{Excess Loan Growth}_{it-k} \cdot \text{Crisis}_t + \beta_5 \cdot \sum_{k=1}^4 \text{Excess Loan Growth}_{it-k} \cdot \text{Post Crisis}_t \\
& + \beta_6 \cdot B_{it-1} + \beta_7 \cdot B_{it-1} \cdot \text{Crisis}_t + \beta_8 \cdot B_{it-1} \cdot \text{Post Crisis}_t + \beta_9 \cdot X_{it} + \omega_i + \mu_t + \varepsilon_{it}
\end{aligned} \tag{7}$$

## 5. Empirical Results

### 5.1. Univariate test

To examine the difference in lending behavior between relatively prudent banks and risky banks, we run univariate test for the *Total loan ratio and Total loan ratio Growth*. First, we sorted banks in five groups according to bank-specific characteristics such as *Total Assets*, *ROA BIS Ratio*, *Core deposit Ratio and NPL Ratio*. Then, we compare the group mean of the highest quintile group with that of the lowest quintile group dividing Pre-, during and Post-crisis period.

Figure 1 shows the mean values of *Total loan ratio* in the whole sample, the lowest quintile group and the highest quintile group of banks and the mean values over three time periods (pre-crisis, crisis and post-crisis). Figure 1A shows that large banks have a higher lending ratio than small banks in all periods. And Figure 1B represents that Total loan ratio levels are little different between the low and high group of the ROA. Figures 1C, 1D and 1E show that relatively prudent banks with higher *BIS ratio*, higher *Core deposit Ratio* and lower *NPL Ratio* have less lending than risky banks in almost periods.



<Insert Figure 1 around here>

Figure 2 shows the average of *Excess total loan growth* among the whole sample, low quintile group, and high quintile group over the pre- to post- crisis period. Figure 2A shows that small banks have higher growth rate than large banks in the pre-crisis period. Figure 2B represents that banks with lower ROA have higher growth rate than banks with higher ROA in the pre-crisis period. Figures 1C, 1D and 1E show that relatively prudent banks which have higher *BIS ratio*, higher *Core deposit Ratio* and lower *NPL Ratio* have higher growth rate than risky banks in the pre-crisis period. Notably, banks with higher *Excess total loan growth rates* in the pre-crisis period have decreased their lending growth rates more sharply than banks with lower *Excess total loan growth rates*.

<Insert Figure 2 around here>

We divide our sample firms in five groups depending on the quintile of assets. In Panel A of Table 3, we report the growth rates of assets and the growth rates of loans. In the second largest quintile group, loans grow at the fastest rate. In this group, while the assets also grow at the highest rate, the grow rates were lower than the asset growth rates. In Panel B, we divide our sample firms in five groups depending on the quintile of assets and five groups on the quintile of prudence. While 23% of banks were considered to be the most prudent banks in the group of banks with assets of top 20 percentile, about 25% of banks were classified as the most prudent ones in the group of banks belonging to top 20-40 percentile in assets.

<Insert Table 3 around here>

In short, overall univariate test results show that relatively prudent banks have lower lending level than risky banks but they are more aggressive in increasing their lending than risky banks. And they have sharply reduced their lending growth rates after experiencing the financial crisis.

## 5.2. Multivariate Regression

Table 3 shows the effects of bank-specific characteristics to the lending levels which are *Total loan Ratio*, *Household loan Ratio* and *C&I loan Ratio* as a proxy for banks' lending behaviors controlling macro-economic conditions.

The first column shows that the coefficient of *ROA* is positive and significant. Banks with higher profitability have more lending level than banks with lower profitability in the pre-crisis period. The coefficients of *BIS Ratio* and *Core deposit Ratio* are negative. Relatively more sound and safe Banks have lower lending levels than less sound and more risky banks. The coefficient of *NPL Ratio* is negative. The coefficient of *Total assets* is not significant in the first column but in the second column, the coefficient of *Total assets* on *Household loan Ratio* is positive value. This means that large banks have more lending level than small banks to household borrowers. The results of the second column are almost same with the results of the first column, which means that the banks' total lending behaviors are driven from the banks' lending behavior to household borrowers.

For commercial and industrial loans, we address a selection problem that large banks engage in lending to commercial borrowers while small banks tend not to have any commercial borrowers. So, we apply Heckman's (1979) two-stage model when analyzing the C&I loans using instrumental variable *Deposit Rank* whose range is from 1 to 30. Within an

MSA, a relative size of banks can be an important determinant whether a bank would lend loans to commerce and industrial borrowers. Banks are ranked based on the weighted average rank of the deposit size in bank's MSAs every quarter. Banks with the highest deposit rank have more commercial and industrial loans than those with the lowest deposit rank. Those with the lowest deposit rank hardly have commercial and industrial loans. In the fourth column, the results are almost same with the results of the household borrowers except *Core deposit Ratio*. Relatively more stable banks have more lending to commercial borrowers.

<Insert Table 3 around here>

Table 4B shows the effects of bank-specific characteristics to the excess loan growth rates such as *Excess Total loan growth*, *Excess Households loan growth*, and *Excess C&I loan growth*. These dependent variables represent whether banks have increased their loans faster than their assets. So, this is abnormal growth of loans above the growth rate of assets. While these variables are continuous variables, the values are positive when bank loans increase at a faster rate than bank assets, zero when the growth of bank loans is the same as the bank assets, and negative when bank loans grow at a lower rate than assets.

The first column shows that the coefficient of *ROA* is a negative value. Banks with lower profitability quickly increase their lending faster than banks with higher profitability in the pre-crisis period. The coefficients of *Total assets*, *BIS Ratio* and *Core deposit Ratio* are positive values and the coefficient of *NPL Ratio* is a negative value. Banks with more assets, higher capital adequacy ratios, more stable funding sources (higher core deposit ratio), and lower NPL ratios increase their lending more than banks with smaller assets, lower capital adequacy ratios, lower core deposit ratios and higher NPL ratios. Like Table3, the results of the second column of Table 4 are almost same with the results of the first column of Table 4.

In short, Tables 3 and 4 show that risky banks have higher loan ratio level than prudent banks. But prudent banks show higher excess loan growth rates, suggesting that they are more aggressive in increasing their lending than risky banks before the financial crisis. However, they decrease their excess lending growth rates more sharply than risky banks after the crisis.

<Insert Table 4 around here>

Table 5 and Table 6 show the effects of banks' lending behavior to the performances. In the Panel A of the Table 5, the coefficients of the *Total loan ratio* from t-1 to t-2 are negative values. Because the denominator of the *NPL Ratio* variable is total loans, increasing total loan ratio immediately decreases the *NPL Ratio* so this result is reasonable. But the coefficients of the *Total loan ratio* from t-3 to t-4 are positive values, which means that more loans become non-performing beyond the dilution effect after three quarters. The coefficients of the interaction terms with post crisis dummy variables yield the same signs with the non-interaction terms. This means that more loans become non-performing loans in the post crisis period. In the Panel B, the coefficients of the *Excess total loan growth* from t-2 to t-3 are positive values. This means that aggressive lending makes higher excess NPL growth.

<Insert Table 5 around here>

Table 6 shows the effects of banks' lending behavior to the profitability using the ROA as a proxy. In the Panel A of the Table 6, the coefficients of the *Total loan ratio* for t-1 are positive values so banks' with a higher loan ratio have a higher ROA level. But in Panel B, the coefficients of the *Excess Total Loan Growth* from t-1 to t-4 are negative values. This means that aggressively increasing loans aggravates the ROA growth.

In conclusion, Tables 5 and 6 show aggressive lending increases non-performing loans although it reduces non-performing loan ratio in a very short term.

<Insert Table 6 around here>

### **5.3. Robustness Test Results across Bank Sizes**

In order to examine whether the effects of prudent bank characteristics on bank lending are robust across different bank sizes, we divide samples into three equal-sized groups based on total assets. We run regressions in each size group separately. Table 7 shows the effects of prudent banks on total loan ratios within three size groups. Within medium and small-sized banks, banks with a high capital adequacy ratio, high core deposit ratio, or lower NPL ratios increase their loans faster than otherwise. However, among large banks we do not see such aggressive lending behavior. Such aggressive lending behavior is observed in prudent banks in the group of small or medium size banks.

<Insert Table 7 around here>

Table 8 shows the effects of prudent bank characteristics on the excess loan growth rates across different sizes: banks with assets greater than \$1 Billion, and those with assets smaller than \$1 B. Large banks do not show aggressive lending behavior. Such aggressive lending behavior is observed in banks with higher assets, higher capital ratios, higher core deposits and lower NPL in the group of small or medium size banks.

<Insert Table 8 around here>

### **5.4. Lending Behavior of Prudent Banks**

Using a composite discrete index, we examine the effect of bank prudence on the loan ratio and the growth of loan ratio. Banks with a higher prudent index show higher excess loan growth, suggesting that prudent banks were more aggressive in lending than other banks

<Insert Table 9 around here>

We run regressions using a composite discrete index across different size group of banks. Banks with assets greater than \$1 Billion, and those with assets smaller than \$1 Billion. Among these small banks, we also divide banks into two equal-sized groups: large and small. As Table 10 shows, the discrete, composite prudence index does not affect lending behavior among banks with assets greater than \$1 Billion. However, among banks with assets smaller than \$1Billion, the discrete, composite prudence index increase lending growth rates. These results suggest that prudent banks in medium size banks increased their lending aggressively.

<Insert Table 10 around here>

## **5.5. Summary and Discussion**

We examine banks' lending behaviors around the 2007 financial crisis using all commercial banks in the US. While prudent banks have lower loan ratios than risky banks, prudent banks are more aggressive in increasing their lending than risky banks before the financial crisis. The effects of aggressive lending and high growth of loans on bank performance are negative. An increase in lending leads to non-performing loans except immediately after loans are made. These results suggest that banks lent money to riskier borrowers. These results are robust controlling for controlling macro-economic conditions.

Our results suggest that prudent banks in medium or small sized banks engage in more aggressive lending than less prudent banks while prudent banks in large banks do not show

more aggressive lending behavior. Seemingly prudent banks among medium/small sized banks can take more risks by increasing their lending faster than their assets. As such, when there is a negative shock to the market, these aggressive banks can suffer from a sharp increase in non-performing loans.

As our analysis is not based on borrower-level information, to be clear, we do not establish direct evidence that banks increase their lending to riskier borrowers. However, our finding that a high growth rate of bank lending leads to more non-performing loans and contributes to a surge in aggregate lending suggests prudent banks increase their lending to riskier borrowers in the pre-crisis period.

## **6. Conclusion**

Using information on commercial banks from 2001 to 2014, we examine banks' lending behavior around the financial crisis using several bank-specific characteristics controlling macro-economic conditions. While risky banks show higher lending ratios than prudent banks before the 2007 financial crisis, prudent banks showed a higher growth rate of lending, contributing to the high aggregate credit supply before the crisis. In the pre-crisis period, relatively prudent banks which have relatively higher assets, higher BIS ratio, higher core deposit ratio or lower NPL ratio are more aggressive in increasing their lending. These results are driven from lending to households rather than commercial borrowers. Banks with more aggressive lending have lower return growth rate and higher NPL growth rate. But after the 2007 crisis, prudent banks have decreased their lending growth rates more sharply than risky banks.

## References

- Acharya, V., Naqvi, H., 2012. The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics* 106, 349–366.
- Akhavain, J.D., Berger, A.N., Humphrey, D.B., 1997. The effects of bank megamergers on efficiency and prices: Evidence from the profit function. *Review of Industrial Organization* 11, 95–139.
- Athanasoglou, P., Brissimis, S., Delis, M., 2008. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money* 18 (2), 121–136.
- Berge, T.O., Boye, K.G., 2007. An analysis of bank's problem loans. *Norges Bank Economic Bulletin* 78, 65–76.
- Berger, A., DeYoung, R., 1997. Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance* 21, 849–870.
- Blum, J., 1999, Do Capital Adequacy Requirements Reduce Risks in Banking?, *Journal of Banking and Finance*, 23, 755-771.
- Boss, M., Fenz, G., Pann, J., Pühr, C., Schneider, M., Ubl, E., 2009. Modeling credit risk through the Austrian business cycle: an update of the OeNB Model. *OeNB Financial Stability Report* 17, 85–101.
- Boyd, J. H., De Nicolo, G., 2005. The theory of bank risk taking and competition revisited. *The Journal of Finance*, 60(3), 1329–1343.
- Brunnermeier, M.K., 2009. Deciphering the liquidity and credit crunch 2007–2008. *Journal of Economic Perspectives* 23, 77–100.
- Calem, P., Rob, R., 1999, The Impact of Capital-Based Regulation on Bank Risk Taking, *Journal of Financial Intermediation*, 8, 317-352.
- Camara, Boubacar, Lepetit, Laetitia, and Amine Tarazi (2013), Ex Ante Capital Position, Changes in the Different Components of Regulatory Capital and Bank Risk, *Applied Economics*, 45(34), 4831-4856.
- Chari, V., Christiano, L., Kehoe, P., 2008. Facts and myths about the financial crisis of 2008. Unpublished Working Paper.
- Cebenoyan, A.S., Strahan, P.E., 2004. Risk management, capital structure and lending at banks. *Journal of Banking and Finance* 28, 19–43.
- Cifter, A., Yilmazer, S., Cifter, E., 2009. Analysis of sectoral credit default cycle dependency with wavelet networks: evidence from Turkey. *Economic Modeling* 26, 1382–1388.
- Cornett, M.M., McNutt, J.J, Strahan, P.E., Tehranian, H., 2011. Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics* 101, 297–312.
- Dell'Ariccia, Giovanni, Deniz Igan, and Luc Laeven. "Credit booms and lending standards: Evidence from the subprime mortgage market." (2008)
- Demsetz, R. S., Saldenber, M. R., Strahan, P. E., 1996. Banks with something to lose: The disciplinary role of franchise value. *Economic Policy Review*, 2(2).
- Demsetz, R.S., Strahan, E.P., 1997. Diversification, size, and risk at bank holding companies. *Journal of Money, Credit, and Banking* 29, 300–313.

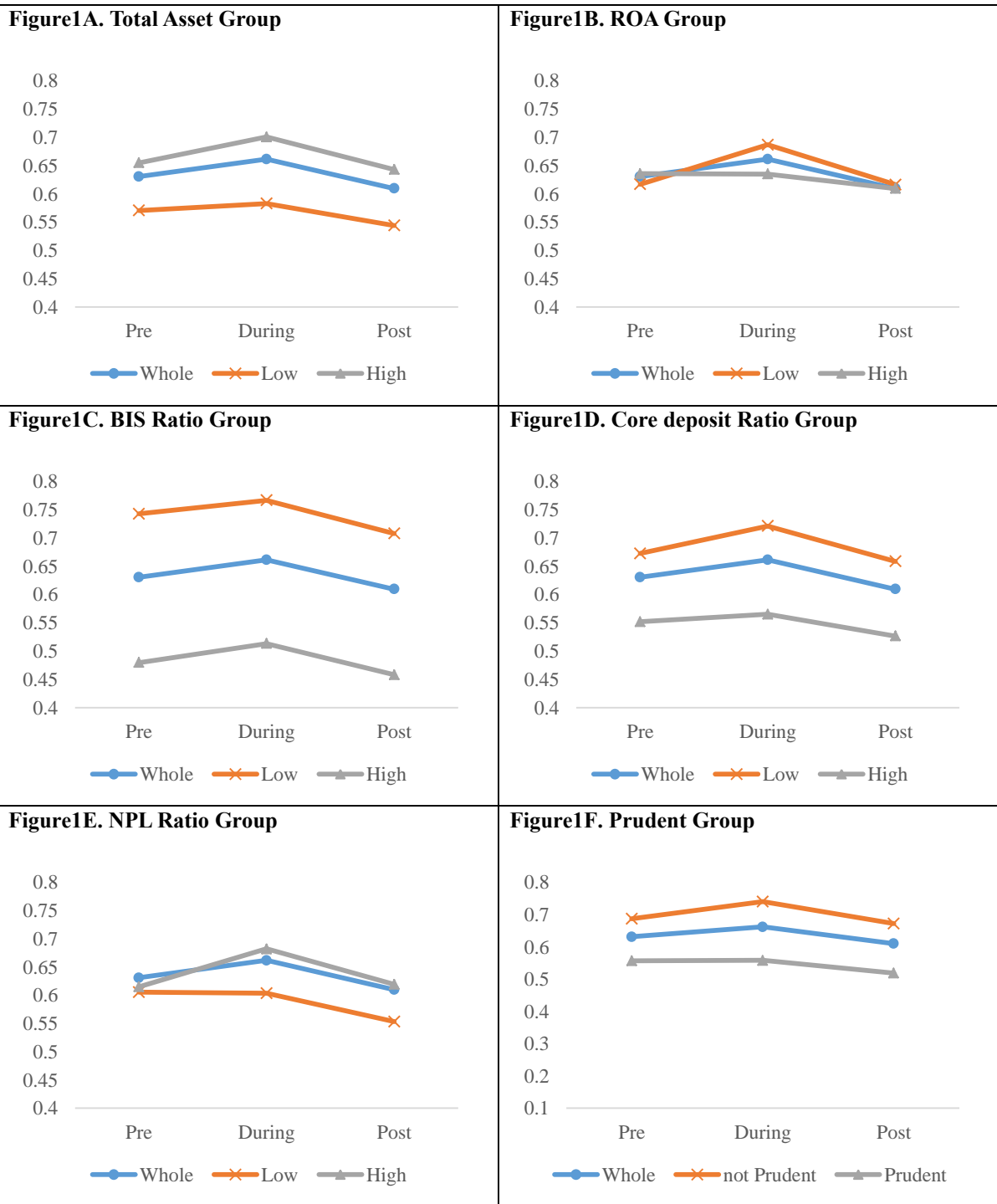


- Demyanyk, Y., Van Hemert, O., 2011. Understanding the subprime mortgage crisis. *Review of Financial Studies* 24, 1848–1880.
- Dietrich, A. and Wanzenried, G., 2011. Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3), 307–327.
- Duchin, R., Ozbas, O., Sensoy, B., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics* 97, 418–435.
- Foos, D., Norden, L., Weber, M., 2010. Loan growth and riskiness of banks. *Journal of Banking & Finance* 34 (12), 2929–2940.
- Froot, K.A., Scharfstein, D.S., Stein, J.C., 1993. Risk management: Coordinating corporate investment and financing policies. *The Journal of Finance* 48, 1629–1658.
- Froot, K.A., Stein, J.C., 1998. Risk management: Capital budgeting, and capital structure policy for financial institutions: An integrated approach. *Journal of Financial Economics* 47, 55–82.
- Heckman, J. J., 1979. Sample selection bias as a specification error. *Econometrica*, 153–161.
- Hellmann, Thomas, F., Kevin, C. M., and Joseph, E. S., 2000, Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?, *American Economic Review*, 90(1), 147-165.
- Huang, Rocco and Lev Ratnovski (2009), Why Are Canadian Banks More Resilient?, IMF Working Paper 09/152.
- IMF Global Financial Stability Report (2009), Responding to the Financial Crisis and Measuring Systemic Risks, April, Chapter 3, Detecting Systemic Risk.
- Ivashina, V., Scharfstein, D., 2010. Bank lending during the financial crisis of 2008. *Journal of Financial Economics* 97, 319–338.
- Jiménez, G., Lopez, J. A., Saurina, J., 2013. How does competition affect bank risk taking? *Journal of Financial Stability* 9(2), 185–195.
- Kashyap, A. K., and J. C. Stein. 2000. What do a million observations on banks say about the transmission of monetary policy? *American Economic Review* 90, 407–428.
- Keeley, M. C., 1990. Deposit insurance, risk, and market power in banking. *The American Economic Review*, 1183–1200.
- Knapp, M., Gart, A., Chaudhry, M., 2006. The impact of persistence and mean reversion of bank profitability on post-merger performance in the banking industry. *Journal of Banking and Finance* 30, 3503–3517.
- Konishi, M., Yasuda, Y., 2004. Factors affecting bank risk taking: Evidence from Japan. *Journal of Banking and Finance* 1, 215–232.
- Louzis, D.P., Vouldis, A.T., Metaxas, V.L., 2012. Macroeconomic and bank-specific determinants of non-performing loans in Greece: a comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance* 36, 1012–1027.
- Lu, W., Whidbee, D., 2013. Bank structure and failure during the financial crisis. *Journal of Financial Economic Policy* 5, 281–299.

- Martinez-Peria, M.S., Schmukler, S.L, 2001, Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises, *Journal of Finance* 56, 1029–1051.
- Martynova, N., Ratnovski, L., Vlahu, R., 2015, Bank Profitability and Risk-Taking, IMF Working Paper.
- Matutes, C., Vives, X., 2000, Imperfect Competition, Risk Taking, and Regulation in Banking, *European Economic Review*, 44, 1-34.
- Perotti, E., Ratnovski, L., Vlahu, L., 2011, Capital Regulation and Tail Risk, *International Journal of Central Banking*, 7(4), 123-163.
- Podpiera, J., Weill, L., 2008. Bad luck or bad management? Emerging banking market experience. *Journal of Financial Stability* 4, 135–148.
- Puri, M., Rocholl, J., Steffen, S., 2011. Global retail lending in the aftermath of the US financial crisis: Distinguishing between supply and demand effects. *Journal of Financial Economics*, 100(3), 556–578.
- Repullo, R., 2004, Capital Requirements, Market Power, and Risk-Taking in Banking, *Journal of Financial Intermediation*, 13, 156-182.
- Rinaldi, L., Sanchis-Arellano, A., 2006. Household Debt Sustainability: What Explains Household Non-performing Loans? An Empirical Analysis. ECB Working Paper.
- Saba, I., Kouser, R., Azeem, M., 2012. Determinants of Non-Performing Loans: Case of US Banking Sector. *The Romanian Economic Journal*, Year XV, 44, 125–135
- Salas, V., Saurina, J., 2002. Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of Financial Services Research* 22, 203–224.
- Santos, J. A., 2011. Bank corporate loan pricing following the subprime crisis. *Review of Financial Studies* 24(6), 1916–1943.
- Schularick, Moritz, and Alan M. Taylor. "Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870–2008." *The American Economic Review* 102.2 (2012): 1029-1061.
- Staikouras, C., Wood, G., 2004. The determinants of European bank profitability. *International Business and Economics Research Journal* 3 (6), 57–68.

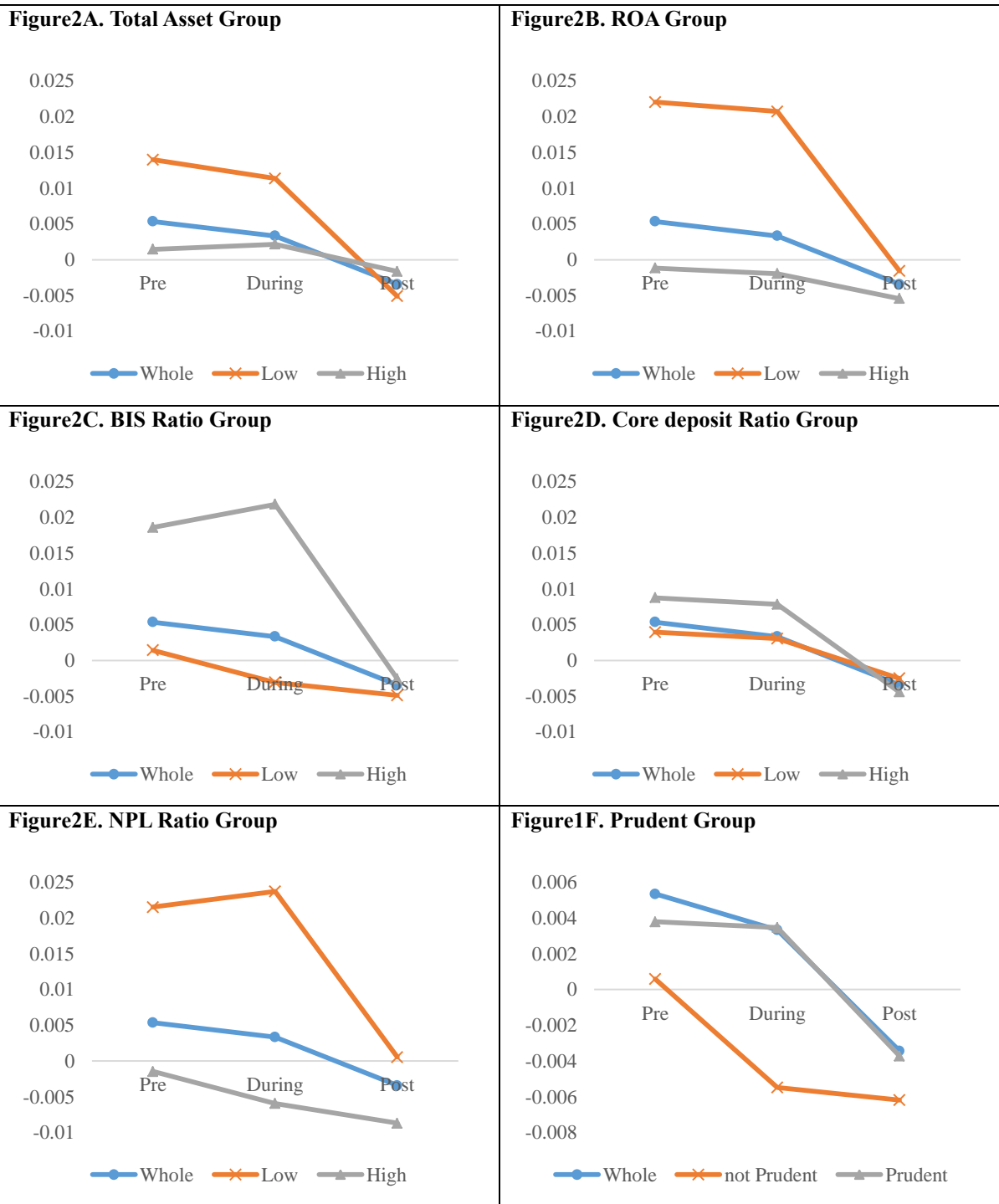
**Figure1. Total loan ratios in the lowest and highest quintile group of firms from the Pre- to Post- Crisis period**

These figures show Total loan ratio between the low and high group. In each quarter, all banks are sorted into quintiles based on bank-characteristics such as total assets, ROA, BIS, core-deposit ratio and NPL ratio. The low group consists of banks that belong to the lowest quintile group and the high group consists of banks that belong to the highest quintile group. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q.



**Figure2. Excess Total Loan Growth in the lowest and highest quintile group of firms from the Pre- to Post- Crisis period**

These figures show Total loan ratio growth between the low and high group. In each quarter, all banks are sorted into quintiles based on bank-characteristics such as total assets, ROA, BIS, core-deposit ratio and NPL ratio. The low group consists of banks that belong to the lowest quintile group and the high group consists of banks that belong to the highest quintile group. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q.



**Table1. Definitions of the variables and data sources**

Each variable is measured at the level specified at the source<sup>2</sup>

Variable	Definition	Source	level
<i>Total (\$1000) assets</i>	The amounts of the assets of the bank	FFIDC	Bank
<i>ROA (Growth)</i>	The return on asset. ROA growth is measured through $\log(ROA_t / ROA_{t-1})$	FFIDC	Bank
<i>BIS Ratio</i>	The equity capital to its total risk-weighted assets, representing the financial soundness of the bank.	FFIDC	Bank
<i>Core deposit Ratio</i>	The core deposit to the sum of the core deposit and wholesale funding of the bank. <sup>3</sup> It represents the financial stability of the bank.	FFIDC	Bank
<i>NPL Ratio (Growth)</i>	The weighted average ratio of a bank's total non-performing loans to its total loans. Its growth is $\log(NPL\ Ratio_t / NPL\ Ratio_{t-1})$	FFIDC	Bank
<i>Total Loan ratio (Growth)</i>	The ratio of a bank's total loans to its Total assets (total loan/total assets). The growth is $\log(\text{total loan ratio}_t / \text{total loan ratio}_{t-1})$	FFIDC	Bank
<i>Household loan ratio (Growth)</i>	The ratio of a bank's household loans (loans secured by real estate and individual loans) to total assets. The growth rate is $\log(\text{household loan ratio}_t / \text{household loan ratio}_{t-1})$	FFIDC	Bank
<i>C&amp;I loan ratio (Growth)</i>	The ratio of a bank's commercial and industrial loans to its total assets. The growth rate is $\log(C\&I\ loan\ ratio_t / C\&I\ loan\ ratio_{t-1})$	FFIDC	Bank
<i>HPI</i>	The weighted average of the house price index of the MSAs or states	FHFA	MSA
<i>Total RGDP</i>	The weighted average of the total real GDP of the MSAs or states	BEA	MSA
<i>HHI</i>	The weighted average of the Herfindahl-Hirschman Index based on the sum of squared value of each bank's share of deposits compared to total deposits in each MSA or state.	FDIC SOD	MSA
<i>T-Bill</i>	The three month treasury bill rate	FRED	Macro
<i>M2/GDP</i>	Money supply, measured as M2 divided by GDP	FRB	Macro

Note: Consolidated Reports of Condition and Income (Call Reports); Federal Financial Institutions Examination Council (FFIEC); Summary of Deposits (SOD); Bureau of Economic Analysis (BEA); Federal Housing Finance Agency (FHFA); Federal Reserve Economic Data (FRED); Federal Reserve Board (FRB)

<sup>2</sup>For example, Total assets is the bank level variable and is calculated by summing of assets of all banks in each MSA. But HPI is the MSA level. Each MSA has a unique HPI value. T-Bill and M2/GDP is the macro level that means all MSAs have the same T-bill and M2/GDP values.

<sup>3</sup>Wholesale funding refers to the sum of federal funds purchased, securities sold under agreements to repurchase, subordinated notes and debentures, brokered deposits, other borrowed money, deposits in foreign offices, and uninsured long-term deposits (Kim, 2015).

**Table2. Summary Statistics**

This table provides the descriptive statistics for the variables used in the analysis. The definition and construction of each variable is explained in Table 1. Variables except for *T-Bill* and *M2/GDP* are winsorized at 1st and 99th percentiles. The Pre-Crisis is from 2001:1Q to 2007:2Q, the During Crisis is from 2007:3Q to 2009:2Q and the Post-Crisis is from the 2009:3Q to 2014:4Q.

	Whole period				Pre-Crisis	During-Crisis	Post-Crisis
	MEAN	STD	MIN	MAX	MEAN	MEAN	MEAN
<i>Total assets(\$1000)</i>	464,138	1,497,556	7,986	20,632,572	386,849	467,493	573,387
<i>Total loans (\$1000)</i>	294,016	932,046	1,229	12,551,281	241,030	317,260	360,256
<i>Household loans (\$1000)</i>	224,451	672,785	251	8,171,915	185,660	244,846	271,548
<i>C&amp;I loans (\$1000)</i>	37,377	170,815	0	2,499,429	29,147	40,674	47,796
<i>Total loan ratio</i>	0.6277	0.1621	0.0445	0.9339	0.6299	0.6617	0.6106
<i>Household loan ratio</i>	0.4828	0.1713	0.0037	0.8613	0.4783	0.5134	0.4766
<i>C&amp;I loan ratio</i>	0.0219	0.0503	0.0000	0.2964	0.0180	0.0243	0.0264
<i>Total loan growth</i>	0.0018	0.0958	-7.8063	7.4191	0.0053	0.0035	-0.0038
<i>Household loan growth</i>	0.0036	0.1161	-9.0796	7.8301	0.0076	0.0080	-0.0038
<i>C&amp;I loan growth</i>	-0.0167	0.1080	-6.7994	11.1260	-0.0210	-0.0203	-0.0093
<i>ROA</i>	0.0052	0.0160	-0.5587	3.1193	0.0066	0.0038	0.0040
<i>BIS Ratio</i>	0.1766	0.0949	0.0016	1.3720	0.1770	0.1726	0.1777
<i>Core Deposit Ratio</i>	0.7784	0.1668	0	1	0.7571	0.6941	0.8437
<i>NPL Ratio</i>	0.0138	0.0214	0	0.1911	0.0078	0.0154	0.0216
<i>HPI</i>	171.8	32.8	108.8	336.9	162.4	189.9	177.7
<i>Total RGDP (\$Billion)</i>	96,865	104,378	1,539	459,699	92,391	100,921	101,592
<i>HHI</i>	0.0716	0.0521	0.0063	0.5068	0.0722	0.0708	0.0709
<i>T-Bill</i>	0.0150	0.0161	0.0001	0.0494	0.0264	0.0098	0.0007
<i>M2/GDP</i>	0.5481	0.0556	0.4802	0.6604	0.5040	0.5383	0.6152
Observations		412,362			207,495	59,913	144,954

**Table 3. Effects of bank-specific characteristics on loan ratios**

Dependent variables are total loan ratio, household loan ratio and C&I loan ratio as a proxy for banks' lending behaviors. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Total loan Ratio (1)	Household loan Ratio (2)	C&I loan Ratio (3)	
			Selection Model	C&I loan Ratio
<i>Log(Total assets)</i>	-0.0006 (-0.37)	0.0128*** (8.45)	1.2588*** (158.57)	-0.0020 (-1.62)
<i>Log(Total assets) · Crisis</i>	0.0065*** (11.79)	0.0041*** (8.11)	0.2230*** (14.69)	0.0026*** (4.76)
<i>Log(Total assets) · Post</i>	0.0069*** (12.70)	0.0011** (2.25)	0.3397*** (29.90)	0.0045*** (7.56)
<i>ROA</i>	0.1553** (2.32)	0.1636*** (2.90)	-0.6026 (-0.71)	0.1502** (2.53)
<i>ROA · Crisis</i>	-0.1221 (-1.57)	-0.1164* (-1.95)	-0.0198 (-0.01)	-0.2405*** (-3.26)
<i>ROA · Post</i>	0.1398* (1.76)	0.0358 (0.53)	0.0565 (0.05)	-0.1474** (-2.22)
<i>BIS Ratio</i>	-0.4846*** (-68.74)	-0.3659*** (-59.00)	-2.3571*** (-30.41)	-0.1323*** (-13.68)
<i>BIS Ratio · Crisis</i>	0.0560*** (6.88)	0.0177*** (2.59)	-0.1515 (-0.99)	0.0271** (2.35)
<i>BIS Ratio · Post</i>	-0.0691*** (-7.90)	-0.0966*** (-13.50)	-1.3106*** (-10.87)	0.0523*** (5.46)
<i>Core deposit Ratio</i>	-0.0579*** (-13.08)	-0.0489*** (-11.81)	0.0465 (1.55)	0.0142*** (4.14)
<i>Core deposit Ratio · Crisis</i>	0.0098** (2.03)	0.0094** (2.17)	-0.3154*** (-5.17)	-0.0044 (-1.33)
<i>Core deposit Ratio · Post</i>	-0.0193*** (-3.31)	-0.0173*** (-3.52)	0.1530*** (2.96)	-0.0191*** (-4.90)
<i>NPL Ratio</i>	-0.2598*** (-7.11)	-0.1377*** (-4.02)	1.0331* (1.85)	-0.2680*** (-5.12)
<i>NPL Ratio · Crisis</i>	0.0139 (0.32)	0.0905** (2.16)	0.3760 (0.50)	0.1381** (2.52)
<i>NPL Ratio · Post</i>	-0.1746*** (-4.32)	-0.0354 (-0.93)	0.5294 (0.89)	0.1048** (2.00)
<i>Log(HPI)</i>	0.0334*** (9.50)	0.0552*** (16.58)	-2.2804*** (-87.70)	-0.0220*** (-8.01)
<i>Log(Total RGDP)</i>	0.0126*** (5.56)	0.0052** (2.49)	-0.0516*** (-14.44)	0.0032* (1.95)
<i>HHI</i>	0.1740*** (6.77)	0.0951*** (3.85)	3.0901*** (35.64)	0.0600*** (3.26)
<i>T-Bill</i>	10.1960 (0.00)	10.4132 (0.00)	-0.6957 (0.00)	-9.1060 (0.00)
<i>M2/GDP</i>	-0.4593 (0.00)	-0.4344 (0.00)	-0.2870 (0.00)	0.2588 (0.00)
<i>Crisis</i>	-3.4755 (0.00)	-3.2193 (0.00)	-4.7693*** (-22.51)	0.6771 (0.00)
<i>Post Crisis</i>	1.3447 (0.00)	1.2836 (0.00)	-6.3206*** (-36.72)	-3.3682 (0.00)
<i>Deposit rank</i>			-0.0508*** (-57.51)	
Observations	404,299	404,299	404,299	404,299
R-squared	0.8343	0.8680		0.8569

**Table 4. Effects of bank-specific characteristics on Excess Loan Growth**

Dependent variables are the growth rates of total loan ratio, household loan ratio and C&I loan ratio as a proxy for banks' lending behaviors. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Excess Total loan Growth(1)	Excess Household loan Growth (2)	Excess C&I loan Growth (3)
<i>Log(Total assets)</i>	0.0201*** (9.67)	0.0178*** (6.73)	0.0711*** (7.51)
<i>Log(Total assets) · Crisis</i>	0.0027*** (4.58)	0.0032*** (4.88)	0.0028 (1.21)
<i>Log(Total assets) · Post</i>	-0.0026*** (-6.76)	-0.0031*** (-5.36)	-0.0051** (-2.25)
<i>ROA</i>	-0.6982*** (-7.38)	-0.8681*** (-6.62)	0.3552 (0.81)
<i>ROA · Crisis</i>	0.4139*** (3.42)	0.6687*** (4.26)	-0.3732 (-0.52)
<i>ROA · Post</i>	0.3341*** (3.28)	0.4532*** (3.37)	0.0742 (0.17)
<i>BIS Ratio</i>	0.4126*** (34.45)	0.5151*** (29.88)	0.0637 (0.68)
<i>BIS Ratio · Crisis</i>	0.0207 (1.40)	0.0889*** (4.39)	0.1365 (1.35)
<i>BIS Ratio · Post</i>	-0.0409*** (-4.21)	-0.0470*** (-3.58)	0.0855 (1.18)
<i>Core deposit Ratio</i>	0.0184*** (3.28)	0.0222*** (2.80)	0.0395** (2.34)
<i>Core deposit Ratio · Crisis</i>	0.0086 (1.46)	-0.0118 (-1.56)	-0.0074 (-0.44)
<i>Core deposit Ratio · Post</i>	-0.0169*** (-2.76)	-0.0337*** (-4.49)	0.0111 (0.63)
<i>NPL Ratio</i>	-0.3587*** (-8.24)	-0.4835*** (-12.83)	-0.6563** (-2.49)
<i>NPL Ratio · Crisis</i>	0.0753 (1.49)	0.0903** (2.07)	0.4783* (1.75)
<i>NPL Ratio · Post</i>	0.1907*** (4.29)	0.2595*** (6.42)	0.8017*** (3.02)
<i>Log(HPI)</i>	0.0039 (1.60)	0.0073** (2.21)	-0.0266*** (-2.69)
<i>Log(Total RGDP)</i>	-0.0049*** (-2.92)	-0.0051** (-2.20)	-0.0040 (-0.81)
<i>HHI</i>	0.0815*** (5.18)	0.0824*** (3.93)	0.1209* (1.80)
<i>T-Bill</i>	7.5819 (0.00)	15.2281 (0.00)	-4.6210 (0.00)
<i>M2/GDP</i>	-0.3420 (0.00)	-0.5464 (0.00)	0.6577 (0.00)
<i>Crisis</i>	-2.7224 (0.00)	-4.1584 (0.00)	11.4918 (0.00)
<i>Post Crisis</i>	0.9614 (0.00)	1.5592 (0.00)	-12.9200 (0.00)
Observations	404,299	404,299	404,299
R-squared	0.1072	0.1133	0.0543



**Table 5. Effects of banks' lending behavior on non-performing loans**

This table shows the effects of banks' lending behavior to the non-performing loans controlling bank-specific characteristics and macro-economic conditions. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies to control for time and MSA fixed effects. T-statistics in parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Panel A		Panel B	
Variable	NPL Ratio	Variable	Excess NPL Growth
<i>Total loan ratio1</i>	-0.0223*** (-18.88)	<i>Excess total loan growth1</i>	0.0504 (0.57)
<i>Total loan ratio1</i> <i>· Crisis</i>	-0.0064** (-2.33)	<i>Excess total loan growth1</i> <i>· Crisis</i>	-0.0134 (-0.12)
<i>Total loan ratio1</i> <i>· Post</i>	-0.0186*** (-8.06)	<i>Excess total loan growth1</i> <i>· Post</i>	0.0059 (0.05)
<i>Total loan ratio2</i>	-0.0028*** (-3.82)	<i>Excess total loan growth2</i>	0.1084** (2.38)
<i>Total loan ratio2</i> <i>· Crisis</i>	0.0004 (0.20)	<i>Excess total loan growth 2</i> <i>· Crisis</i>	0.0747 (0.87)
<i>Total loan ratio2</i> <i>· Post</i>	0.0098*** (5.84)	<i>Excess total loan growth 2</i> <i>· Post</i>	-0.0381 (-0.62)
<i>Total loan ratio3</i>	0.0022*** (3.05)	<i>Excess total loan growth 3</i>	0.3351*** (6.89)
<i>Total loan ratio3</i> <i>· Crisis</i>	0.0039* (1.77)	<i>Excess total loan growth 3</i> <i>· Crisis</i>	0.0277 (0.30)
<i>Total loan ratio3</i> <i>· Post</i>	0.0014 (0.91)	<i>Excess total loan growth 3</i> <i>· Post</i>	-0.1703*** (-2.59)
<i>Total loan ratio4</i>	0.0115*** (10.82)	<i>Excess total loan growth 4</i>	-0.0428 (-0.41)
<i>Total loan ratio4</i> <i>· Crisis</i>	0.0156*** (5.88)	<i>Excess total loan growth 4</i> <i>· Crisis</i>	0.2202* (1.70)
<i>Total loan ratio4</i> <i>· Post</i>	0.0208*** (9.76)	<i>Excess total loan growth 4</i> <i>· Post</i>	0.0639 (0.57)
<i>Log(Total assets)</i>	-0.0004 (-1.33)	<i>Log(Total assets)</i>	0.0566*** (9.06)
<i>Log(Total assets) · Crisis</i>	0.0015*** (12.48)	<i>Log(Total assets) · Crisis</i>	0.0317*** (10.54)
<i>Log(Total assets) · Post</i>	0.0029*** (25.54)	<i>Log(Total assets) · Post</i>	0.0058*** (2.96)
<i>ROA</i>	-0.0866*** (-3.71)	<i>ROA</i>	1.8389*** (4.02)
<i>ROA · Crisis</i>	-0.1010 (-1.18)	<i>ROA · Crisis</i>	0.6344 (1.06)
<i>ROA · Post</i>	-0.5826*** (-13.76)	<i>ROA · Post</i>	0.1786 (0.37)
<i>BIS Ratio</i>	-0.0192*** (-9.77)	<i>BIS Ratio</i>	-0.3032*** (-6.29)
<i>BIS Ratio · Crisis</i>	0.0028 (1.35)	<i>BIS Ratio · Crisis</i>	-0.2019*** (-3.43)
<i>BIS Ratio · Post</i>	-0.0055** (-2.43)	<i>BIS Ratio · Post</i>	0.1086*** (2.78)
<i>Core deposit Ratio</i>	0.0067***	<i>Core deposit Ratio</i>	-0.1630***

	(7.48)		(-8.03)
<i>Core deposit Ratio · Crisis</i>	-0.0104***	<i>Core deposit Ratio · Crisis</i>	-0.0199
	(-9.90)		(-0.76)
<i>Core deposit Ratio · Post</i>	-0.0178***	<i>Core deposit Ratio · Post</i>	0.0529**
	(-14.59)		(2.53)
<i>Log(HPI)</i>	-0.0371***	<i>Log(HPI)</i>	0.1497***
	(-38.87)		(7.98)
<i>Log(Total RGDP)</i>	0.0002	<i>Log(Total RGDP)</i>	-0.0320***
	(0.49)		(-3.79)
<i>HHI</i>	-0.0487***	<i>HHI</i>	-0.3742***
	(-7.76)		(-3.11)
<i>T-Bill</i>	-1.6028	<i>T-Bill</i>	-6.3252
	(0.00)		(0.00)
<i>M2/GDP</i>	0.0135	<i>M2/GDP</i>	-2.3168
	(0.00)		(0.00)
<i>Crisis</i>	0.0053	<i>Crisis</i>	-6.8860
	(0.00)		(0.00)
<i>Post Crisis</i>	-0.1117	<i>Post Crisis</i>	7.3015
	(0.00)		(0.00)
Observations	367,396	Observations	316,224
R-squared	0.5285	R-squared	0.0200

**Table 6. Effects of banks' lending behavior on Bank Profitability**

This table shows the effects of banks' lending behavior to the profitability controlling bank-specific characteristics and macro-economic conditions. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies to control for time and MSA fixed effects. T-statistics in parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*, \*\*, \*\*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Panel A		Panel B	
Variable	ROA	variable	Excess Return Growth
<i>Total loan ratio1</i>	0.0036*** (3.49)	<i>Excess total loan growth1</i>	-0.0988*** (-4.61)
<i>Total loan ratio1</i> · <i>Crisis</i>	-0.0040* (-1.94)	<i>Excess total loan growth1</i> · <i>Crisis</i>	0.0039 (0.07)
<i>Total loan ratio1</i> · <i>Post</i>	0.0067*** (4.63)	<i>Excess total loan growth1</i> · <i>Post</i>	-0.0022 (-0.04)
<i>Total loan ratio2</i>	-0.0008 (-0.70)	<i>Excess total loan growth2</i>	-0.0504*** (-2.92)
<i>Total loan ratio2</i> · <i>Crisis</i>	-0.0066*** (-2.75)	<i>Excess total loan growth 2</i> · <i>Crisis</i>	0.0442 (0.69)
<i>Total loan ratio2</i> · <i>Post</i>	0.0018 (1.22)	<i>Excess total loan growth 2</i> · <i>Post</i>	0.0397 (0.94)
<i>Total loan ratio3</i>	0.0014 (1.26)	<i>Excess total loan growth 3</i>	-0.0055 (-0.33)
<i>Total loan ratio3</i> · <i>Crisis</i>	-0.0046** (-2.49)	<i>Excess total loan growth 3</i> · <i>Crisis</i>	-0.0872** (-2.02)
<i>Total loan ratio3</i> · <i>Post</i>	-0.0058*** (-3.96)	<i>Excess total loan growth 3</i> · <i>Post</i>	-0.2190*** (-5.77)
<i>Total loan ratio4</i>	0.0052*** (5.25)	<i>Excess total loan growth 4</i>	0.0384* (1.65)
<i>Total loan ratio4</i> · <i>Crisis</i>	0.0132*** (5.14)	<i>Excess total loan growth 4</i> · <i>Crisis</i>	0.0519 (0.97)
<i>Total loan ratio4</i> · <i>Post</i>	-0.0044*** (-3.11)	<i>Excess total loan growth 4</i> · <i>Post</i>	0.1143*** (2.63)
<i>Log(Total assets)</i>	0.0021*** (7.39)	<i>Log(Total assets)</i>	-0.0241*** (-5.58)
<i>Log(Total assets)</i> · <i>Crisis</i>	-0.0002 (-1.55)	<i>Log(Total assets)</i> · <i>Crisis</i>	-0.0082*** (-4.54)
<i>Log(Total assets)</i> · <i>Post</i>	0.0000 (-0.53)	<i>Log(Total assets)</i> · <i>Post</i>	0.0076*** (6.14)
<i>BIS Ratio</i>	0.0136*** (5.39)	<i>BIS Ratio</i>	-0.4145*** (-15.84)
<i>BIS Ratio</i> · <i>Crisis</i>	0.0106 (1.24)	<i>BIS Ratio</i> · <i>Crisis</i>	0.0196 (0.73)
<i>BIS Ratio</i> · <i>Post</i>	0.0079*** (2.87)	<i>BIS Ratio</i> · <i>Post</i>	-0.1316*** (-6.31)
<i>Core deposit Ratio</i>	0.0011 (1.45)	<i>Core deposit Ratio</i>	0.0598*** (4.99)
<i>Core deposit Ratio</i> · <i>Crisis</i>	0.0030*** (2.93)	<i>Core deposit Ratio</i> · <i>Crisis</i>	0.1466*** (8.75)
<i>Core deposit Ratio</i> · <i>Post</i>	-0.0008 (-0.87)	<i>Core deposit Ratio</i> · <i>Post</i>	0.0042 (0.31)
<i>NPL Ratio</i>	-0.0537*** (-12.15)	<i>NPL Ratio</i>	-0.6533*** (-5.05)

<i>NPL Ratio · Crisis</i>	-0.0922*** (-14.53)	<i>NPL Ratio · Crisis</i>	-1.9046*** (-7.39)
<i>NPL Ratio · Post</i>	-0.0678*** (-14.75)	<i>NPL Ratio · Post</i>	0.4292*** (2.78)
<i>Log(HPI)</i>	0.0029*** (5.98)	<i>Log(HPI)</i>	-0.0877*** (-8.97)
<i>Log(Total RGDP)</i>	-0.0009*** (-2.95)	<i>Log(Total RGDP)</i>	0.0221*** (4.00)
<i>HHI</i>	-0.0116*** (-2.79)	<i>HHI</i>	0.6243*** (8.38)
<i>T-Bill</i>	-0.1952 (0.00)	<i>T-Bill</i>	-0.0753 (0.00)
<i>M2/GDP</i>	-0.0220 (0.00)	<i>M2/GDP</i>	-0.0110 (0.00)
<i>Crisis</i>	-0.4523 (0.00)	<i>Crisis</i>	-0.2244 (0.00)
<i>Post Crisis</i>	0.0526 (0.00)	<i>Post Crisis</i>	0.0329 (0.00)
Observations	367,396	Observations	323,327
R-squared	0.5750	R-squared	0.7643

**Table 7. Effects of bank-specific characteristics on loan ratios and excess loan growths across subsamples based on bank size I**

We sorted banks in five groups according to banks' Total assets. The SMALL is banks with the lowest total assets and the BIG size group is banks with the highest total asset. Dependent variable is total loan ratio and growth. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Total loans Ratio			Excess Total Loan Growth		
Size Group	SMALL(1)	MIDDLE(2)	BIG(3)	SMALL(4)	MIDDLE(5)	BIG(6)
<i>Log(Total assets)</i>	-0.0015 (-0.28)	-0.0288*** (-6.04)	-0.0074** (-2.02)	0.0646*** (10.70)	0.0319*** (10.64)	0.0127*** (2.96)
<i>Log(Total assets) · Crisis</i>	0.0030 (0.81)	0.0094 (1.59)	0.0005 (0.29)	0.0031 (0.74)	0.0071* (1.80)	0.0050*** (3.28)
<i>Log(Total assets) · Post</i>	-0.0011 (-0.29)	0.0207*** (3.35)	0.0059*** (3.74)	-0.0077*** (-2.92)	0.0058* (1.78)	-0.0017 (-1.33)
<i>ROA</i>	0.0046 (0.24)	1.0957*** (6.98)	1.1078*** (4.21)	-0.5126*** (-5.32)	-1.2954*** (-4.40)	-1.1555*** (-3.19)
<i>ROA · Crisis</i>	0.0740** (2.30)	-0.9641*** (-4.61)	-0.7643*** (-2.95)	0.3600*** (2.94)	0.8437*** (2.73)	0.6735* (1.93)
<i>ROA · Post</i>	0.2985*** (4.25)	-0.3539** (-1.97)	-1.1990*** (-4.25)	0.2845** (2.13)	0.7877*** (2.68)	0.9621*** (2.72)
<i>BIS Ratio</i>	-0.4219*** (-37.75)	-0.6486*** (-26.70)	-0.6460*** (-18.68)	0.5271*** (30.98)	0.2350*** (8.80)	0.0748 (0.97)
<i>BIS Ratio · Crisis</i>	0.0457*** (4.01)	0.0182 (0.90)	0.0966*** (3.10)	-0.0018 (-0.09)	0.0243 (0.60)	0.1791** (2.48)
<i>BIS Ratio · Post</i>	-0.0762*** (-4.92)	-0.1094*** (-5.57)	0.1301*** (4.68)	0.0035 (0.27)	0.0118 (0.59)	-0.0306 (-0.58)
<i>Core deposit Ratio</i>	-0.0522*** (-4.49)	-0.0714*** (-8.89)	-0.0276*** (-3.08)	0.0441*** (2.60)	0.0369*** (7.37)	0.0077 (0.64)
<i>Core deposit Ratio · Crisis</i>	-0.0303** (-2.23)	0.0075 (0.87)	0.0319*** (3.34)	-0.0124 (-0.58)	-0.0065 (-1.13)	0.0220* (1.86)
<i>Core deposit Ratio · Post</i>	-0.0828*** (-4.18)	0.0154 (1.58)	-0.0284** (-2.45)	-0.0292** (-2.16)	-0.0147** (-2.44)	0.0046 (0.41)
<i>NPL Ratio</i>	-0.2777*** (-5.07)	-0.0001 (0.00)	-0.6435*** (-4.91)	-0.2742*** (-7.12)	-0.4101*** (-9.59)	-0.2081 (-0.56)
<i>NPL Ratio · Crisis</i>	0.1086 (1.46)	-0.2644*** (-3.05)	0.3897*** (2.79)	0.0339 (0.59)	0.0385 (0.73)	-0.0749 (-0.21)
<i>NPL Ratio · Post</i>	-0.1082 (-1.60)	-0.3943*** (-5.25)	0.1921 (1.42)	0.1452*** (3.02)	0.2337*** (5.18)	0.0173 (0.05)
<i>Log(HPI)</i>	0.0412*** (3.33)	0.0280*** (3.92)	0.0200*** (2.96)	0.0062 (0.75)	-0.0019 (-0.46)	-0.0030 (-0.50)
<i>Log(Total RGDP)</i>	0.0268*** (4.29)	-0.0099** (-2.08)	0.0066* (1.70)	-0.0045 (-0.99)	0.0052* (1.76)	-0.0086** (-2.44)
<i>HHI</i>	0.0885 (1.24)	0.0102 (0.20)	0.1217*** (2.61)	0.1013* (1.70)	0.0996*** (3.85)	0.0363 (1.02)
<i>T-Bill</i>	6.6822 (0.00)	0.8384 (0.00)	-1.1940 (0.00)	2.6527 (0.00)	-0.9544 (0.00)	-1.0070 (0.00)
<i>M2/GDP</i>	-0.0119 (0.00)	0.0189 (0.00)	-0.0156 (0.00)	-0.0119 (0.00)	0.0019 (0.00)	0.0099 (0.00)
<i>Crisis</i>	0.7523 (0.00)	-0.1096 (0.00)	0.2426 (0.00)	0.7320 (0.00)	-0.0649 (0.00)	-0.3014 (0.00)
<i>Post Crisis</i>	0.7989 (0.00)	-0.0816 (0.00)	0.2363 (0.00)	0.5429 (0.00)	-0.0243 (0.00)	-0.1110 (0.00)
Observations	80,238	80,369	80,688	80,238	80,369	80,688
R-squared	0.8450	0.8775	0.8371	0.2796	0.1440	0.0745

**Table 8. Effects of bank-specific characteristics on loan ratios and excess loan growth rates across subsamples based on bank size II**

We first sorted banks in two groups according to whether bank's total assets are greater than 1 billion or not. Then we divide the group less than 1 billion into two groups according to bank's total assets. Dependent variable is total loan ratio and growth. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Total loans Ratio				Excess Total Loan Growth			
	<1Bil. & SMALL (1)	<1Bil. & BIG (2)	<1Bil. (3)	>=1Bil. (4)	<1Bil. & SMALL (5)	<1Bil. & BIG (6)	<1Bil. (7)	>=1Bil. (8)
<i>Log(Total assets)</i>	0.0002 (0.06)	-0.0139*** (-6.45)	-0.0028* (-1.79)	-0.0092* (-1.82)	0.0378*** (14.33)	0.0194*** (9.23)	0.0234*** (12.58)	-0.0050 (-0.28)
<i>Log(Total assets) · Crisis</i>	0.0030* (1.81)	0.0113*** (8.74)	0.0085*** (12.77)	0.0007 (0.22)	0.0019 (1.15)	0.0032*** (3.04)	0.0022*** (3.12)	0.0166*** (3.92)
<i>Log(Total assets) · Post</i>	-0.0003 (-0.17)	0.0138*** (9.67)	0.0069*** (10.13)	0.0135*** (4.41)	-0.0056*** (-5.22)	0.0024*** (2.70)	-0.0028*** (-5.76)	0.0080 (1.48)
<i>ROA</i>	0.0535* (1.73)	1.3823*** (7.88)	0.1670** (2.55)	2.0800*** (4.17)	-0.5416*** (-6.01)	-1.0877*** (-3.45)	-0.6772*** (-7.16)	-2.8252** (-2.48)
<i>ROA · Crisis</i>	0.0089 (0.26)	-1.0776*** (-5.62)	-0.1192* (-1.69)	-2.3481*** (-3.89)	0.3360*** (2.85)	0.6916** (2.38)	0.3666*** (2.62)	1.8375 (1.61)
<i>ROA · Post</i>	0.3080*** (5.25)	-0.8433*** (-4.74)	0.1523* (1.92)	-2.5409*** (-4.39)	0.3271*** (3.29)	0.5005* (1.73)	0.2912*** (2.96)	2.9484** (2.57)
<i>BIS Ratio</i>	-0.4450*** (-55.38)	-0.6804*** (-33.95)	-0.4806*** (-68.38)	-0.5171*** (-9.33)	0.4922*** (38.33)	0.1371*** (4.15)	0.4308*** (37.56)	0.1530 (0.92)
<i>BIS Ratio · Crisis</i>	0.0415*** (4.64)	0.0584*** (2.99)	0.0559*** (6.84)	0.0895* (1.83)	-0.0116 (-0.76)	0.0951** (2.21)	0.0023 (0.15)	0.2618* (1.71)
<i>BIS Ratio · Post</i>	-0.1001*** (-9.17)	0.0084 (0.58)	-0.0831*** (-9.40)	0.1502*** (3.11)	-0.0139 (-1.33)	0.0201 (0.93)	-0.0231** (-2.29)	-0.0754 (-0.58)
<i>Core deposit Ratio</i>	-0.0726*** (-10.43)	-0.0487*** (-8.58)	-0.0645*** (-14.73)	-0.0145 (-0.91)	0.0348*** (4.21)	0.0238*** (3.41)	0.0254*** (4.69)	-0.0139 (-0.48)
<i>Core deposit Ratio · Crisis</i>	-0.0106 (-1.30)	0.0202*** (3.44)	0.0077 (1.55)	0.0498*** (3.12)	-0.0011 (-0.10)	0.0048 (0.56)	0.0067 (1.04)	0.0383* (1.80)
<i>Core deposit Ratio · Post</i>	-0.0168 (-1.62)	-0.0244*** (-3.39)	-0.0192*** (-3.19)	0.0185 (1.06)	-0.0292*** (-3.75)	-0.0033 (-0.50)	-0.0176*** (-3.07)	-0.0074 (-0.28)
<i>NPL Ratio</i>	-0.2288*** (-5.92)	-0.1829*** (-2.87)	-0.2408*** (-6.59)	-0.9474*** (-3.27)	-0.2658*** (-10.65)	-0.5162*** (-7.05)	-0.3767*** (-13.22)	1.1827 (1.03)
<i>NPL Ratio · Crisis</i>	0.0815 (1.58)	-0.0588 (-0.80)	0.0074 (0.17)	0.7547** (2.49)	0.0177 (0.49)	0.2502*** (2.86)	0.0979** (2.36)	-1.4022 (-1.30)
<i>NPL Ratio · Post</i>	-0.1910*** (-4.20)	-0.2476*** (-3.66)	-0.1874*** (-4.62)	0.5718** (1.96)	0.1362*** (4.33)	0.3352*** (4.78)	0.2265*** (7.95)	-1.3420 (-1.20)
<i>Log(HPI)</i>	0.0389*** (6.30)	0.0331*** (7.62)	0.0384*** (10.51)	-0.0154 (-1.20)	0.0006 (0.13)	-0.0003 (-0.12)	0.0028 (1.19)	0.0195 (1.13)
<i>Log(Total RGDP)</i>	0.0172*** (5.01)	0.0133*** (3.64)	0.0142*** (5.62)	0.0121* (1.88)	-0.0013 (-0.62)	-0.0032* (-1.69)	-0.0022 (-1.47)	-0.0177** (-2.16)
<i>HHI</i>	0.0697* (1.72)	0.0462 (1.47)	0.1606*** (6.13)	0.1498 (1.57)	0.0963*** (3.26)	0.0423*** (2.63)	0.0980*** (6.29)	-0.0126 (-0.13)
<i>T-Bill</i>	0.2138 (0.00)	0.0911 (0.00)	0.0920 (0.00)	4.2508 (0.00)	0.5113 (0.00)	0.1370 (0.00)	-0.0078 (0.00)	11.9450 (0.00)
<i>M2/GDP</i>	0.0014 (0.00)	-0.0011 (0.00)	-0.0056 (0.00)	-0.0342 (0.00)	-0.0014 (0.00)	0.0003 (0.00)	0.0026 (0.00)	-0.1106 (0.00)
<i>Crisis</i>	-0.2858 (0.00)	0.0453 (0.00)	-0.0564 (0.00)	0.1910 (0.00)	0.0024 (0.00)	-0.0267 (0.00)	0.0284 (0.00)	-0.7964 (0.00)
<i>Post Crisis</i>	0.0152 (0.00)	0.0072 (0.00)	0.0271 (0.00)	0.0791 (0.00)	-0.0049 (0.00)	-0.0069 (0.00)	-0.0125 (0.00)	0.2767 (0.00)
Observations	187,633	187,678	375,810	28,358	187,633	187,678	375,810	28,358
R-squared	0.8434	0.8539	0.8397	0.8331	0.2192	0.1212	0.1476	0.0819

**Table 9. Effects of the degree of Prudence on loan ratios and excess loan growths**

Dependent variables are lending level and growth of total loan, household loan and C&I loan as a proxy for banks' lending behaviors. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Total loan Ratio (1)	Household loan Ratio (2)	C&I loan Ratio (3)		Excess Total loan Growth(4)	Excess Household loan Growth (5)	Excess C&I loan Growth(6)
			Selection Model	C&I loan Ratio			
<i>Prudent Rank</i>	-0.0082*** (-27.13)	-0.0057*** (-19.93)	-0.0449*** (-14.20)	-0.0002 (-0.61)	0.0033*** (15.14)	0.0037*** (12.62)	0.0022** (2.27)
<i>Prudent Rank · Crisis</i>	-0.0016*** (-3.98)	-0.0041*** (-10.79)	0.0395*** (6.50)	0.0003 (0.89)	0.0028*** (9.22)	0.0045*** (11.32)	-0.0001 (-0.05)
<i>Prudent Rank · Post</i>	-0.0001 (-0.24)	-0.0039*** (-10.59)	-0.0143*** (-3.18)	0.0004 (1.11)	0.0012*** (5.00)	0.0015*** (5.00)	0.0007 (0.67)
<i>Log(HPI)</i>	0.0473*** (12.36)	0.0693*** (19.43)	-0.7517*** (-35.43)	-0.0176*** (-6.20)	0.0211*** (7.88)	0.0298*** (8.17)	-0.0044 (-0.51)
<i>Log(Total RGDP)</i>	0.0171*** (6.47)	0.0110*** (4.57)	0.2609*** (91.18)	0.0037** (2.37)	-0.0019 (-1.06)	-0.0033 (-1.39)	0.0108** (2.30)
<i>HHI</i>	0.1475*** (5.05)	0.0659** (2.33)	11.8845*** (182.62)	0.0699*** (3.67)	0.1278*** (7.65)	0.1416*** (6.31)	0.0962 (1.46)
<i>T-Bill</i>	0.0694 (0.00)	0.0886 (0.00)	-0.6957 (0.00)	-1.0200 (0.00)	0.0932 (0.00)	0.1677 (0.00)	-4.0430 (0.00)
<i>M2/GDP</i>	-0.0035 (0.00)	-0.0039 (0.00)	-0.2870 (0.00)	0.0043 (0.00)	-0.0037 (0.00)	-0.0055 (0.00)	-0.0107 (0.00)
<i>Crisis</i>	-0.0251 (0.00)	-0.0280 (0.00)	-3.7682*** (-19.72)	0.0094 (0.00)	-0.0302 (0.00)	-0.0429 (0.00)	0.1468 (0.00)
<i>Post Crisis</i>	0.0105 (0.00)	0.0119 (0.00)	-1.4093*** (-13.14)	-0.0469 (0.00)	0.0103 (0.00)	0.0155 (0.00)	-0.0070 (0.00)
<i>Deposit rank</i>			-0.1927*** (-296.16)				
Observations	404,298	404,298	404,298	404,298	404,298	404,298	404,298
R-squared	0.8027	0.8486		0.8512	0.0464	0.0418	0.0479

**Table 10. Effects of the degree of Prudence on loan ratios and excess loan growths across subsamples based on bank size**

We first sorted banks in two groups according to whether bank's total assets are greater than 1 billion or not. Then we divide the group less than 1 billion into two groups according to bank's total assets. Dependent variable is total loan ratio and growth. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Total loans Ratio				Excess Total Loan Growth			
	<1Bil. & SMALL (1)	<1Bil. & BIG (2)	<1Bil. (3)	>=1Bil. (4)	<1Bil. & SMALL (5)	<1Bil. & BIG (6)	<1Bil. (7)	>=1Bil. (8)
<i>Prudent Rank</i>	-0.0084*** (-19.05)	-0.0071*** (-17.84)	- 0.0082*** (-26.87)	-0.0031** (-2.04)	0.0054*** (16.74)	0.0013*** (6.04)	0.0037*** (18.32)	-0.0027 (-1.08)
<i>Prudent Rank · Crisis</i>	-0.0046*** (-7.88)	0.0018*** (3.41)	- 0.0021*** (-5.25)	0.0018 (0.94)	0.0013*** (3.04)	0.0023*** (6.00)	0.0025*** (8.15)	0.0053** (2.08)
<i>Prudent Rank · Post</i>	-0.0016*** (-2.84)	0.0024*** (4.41)	-0.0005 (-1.29)	-0.0018 (-0.95)	0.0008** (2.41)	0.0005** (2.02)	0.0011*** (5.28)	0.0034 (1.26)
<i>Log(HPI)</i>	0.0407*** (5.75)	0.0553*** (12.01)	0.0527*** (13.04)	-0.0010 (-0.07)	0.0414*** (7.84)	0.0080*** (3.54)	0.0221*** (8.10)	0.0206 (1.47)
<i>Log(Total RGDP)</i>	0.0199*** (5.02)	0.0147*** (3.35)	0.0189*** (6.54)	0.0037 (0.51)	0.0004 (0.19)	-0.0003 (-0.14)	-0.0007 (-0.43)	-0.0139* (-1.69)
<i>HHI</i>	-0.0196 (-0.42)	0.1149*** (3.34)	0.1151*** (3.90)	0.1867* (1.86)	0.2290*** (7.25)	0.0335** (2.20)	0.1551*** (9.12)	-0.0237 (-0.25)
<i>T-Bill</i>	0.4745 (0.00)	-0.1196 (0.00)	0.0497 (0.00)	1.2734 (0.00)	0.2820 (0.00)	0.1380 (0.00)	0.0303 (0.00)	8.6464 (0.00)
<i>M2/GDP</i>	-0.0059 (0.00)	0.0004 (0.00)	-0.0063 (0.00)	-0.1284 (0.00)	0.0058 (0.00)	0.0004 (0.00)	0.0024 (0.00)	-0.0687 (0.00)
<i>Crisis</i>	0.6550 (0.00)	-0.0118 (0.00)	-0.0650 (0.00)	0.0427 (0.00)	-0.9265 (0.00)	-0.0541 (0.00)	0.0274 (0.00)	-0.8603 (0.00)
<i>Post Crisis</i>	-0.0491 (0.00)	0.0014 (0.00)	0.0311 (0.00)	0.2824 (0.00)	0.0582 (0.00)	-0.0036 (0.00)	-0.0125 (0.00)	0.1947 (0.00)
Observations	187,645	187,690	375,822	28,370	187,645	187,690	375,822	28,370
R-squared	0.8093	0.8346	0.8083	0.8178	0.1164	0.1115	0.0694	0.0762



**Table 11. Effects of Prudence and Lending Behavior to Bank Performance**

Dependent variables are NPL Ratio and ROA and their growths. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	NPL Ratio (1)	ROA (2)	Variable	Excess NPL Growth (3)	Excess Return Growth(4)
<i>Prudent Rank</i>	-0.0041*** (-66.16)	0.0015*** (55.58)	<i>Prudent Rank</i>	0.1870*** (75.75)	-0.0540*** (-51.99)
<i>Prudent Rank · Crisis</i>	-0.0028*** (-29.43)	0.0009*** (23.28)	<i>Prudent Rank · Crisis</i>	-0.0064** (-1.97)	0.0174*** (9.32)
<i>Prudent Rank · Post</i>	-0.0051*** (-54.61)	0.0010*** (30.53)	<i>Prudent Rank · Post</i>	-0.0333*** (-14.11)	-0.0193*** (-14.27)
<i>Total loan ratio1</i>	-0.0213*** (-19.27)	0.0028*** (2.62)	<i>Excess total loan growth1</i>	-0.0173 (-0.19)	-0.0668*** (-3.08)
<i>Total loan ratio1 · Crisis</i>	-0.0087*** (-3.50)	-0.0008 (-0.41)	<i>Excess total loan growth1 · Crisis</i>	0.0002 (0.00)	-0.0115 (-0.19)
<i>Total loan ratio1 · Post</i>	-0.0193*** (-8.57)	0.0100*** (6.62)	<i>Excess total loan growth1 · Post</i>	0.0508 (0.39)	-0.0068 (-0.12)
<i>Total loan ratio2</i>	-0.0031*** (-4.06)	-0.0002 (-0.18)	<i>Excess total loan growth2</i>	0.0538 (1.22)	-0.0173 (-1.02)
<i>Total loan ratio2 · Crisis</i>	-0.0025 (-1.23)	-0.0061** (-2.39)	<i>Excess total loan growth 2 · Crisis</i>	0.1249 (1.49)	0.0408 (0.65)
<i>Total loan ratio2 · Post</i>	0.0066*** (4.08)	0.0014 (0.87)	<i>Excess total loan growth 2 · Post</i>	-0.0038 (-0.06)	0.0347 (0.87)
<i>Total loan ratio3</i>	0.0019*** (2.65)	0.0018 (1.56)	<i>Excess total loan growth 3</i>	0.2862*** (4.60)	0.0162 (0.99)
<i>Total loan ratio3 · Crisis</i>	0.0027 (1.28)	-0.0048** (-2.08)	<i>Excess total loan growth 3 · Crisis</i>	0.0842 (0.86)	-0.1132*** (-2.70)
<i>Total loan ratio3 · Post</i>	0.0025 (1.61)	-0.0064*** (-4.19)	<i>Excess total loan growth 3 · Post</i>	-0.1530*** (-2.02)	-0.2061*** (-5.35)
<i>Total loan ratio4</i>	0.0076*** (7.36)	0.0063*** (6.17)	<i>Excess total loan growth 4</i>	-0.0678 (-0.69)	0.0515** (2.35)
<i>Total loan ratio4 · Crisis</i>	0.0144*** (6.42)	0.0080*** (4.44)	<i>Excess total loan growth 4 · Crisis</i>	0.2967** (2.34)	0.0069 (0.13)
<i>Total loan ratio4 · Post</i>	0.0198*** (9.68)	-0.0068*** (-4.68)	<i>Excess total loan growth 4 · Post</i>	0.0624 (0.58)	0.1273*** (3.12)
<i>Log(HPI)</i>	-0.0297*** (-34.75)	0.0042*** (8.43)	<i>Log(HPI)</i>	-0.1179*** (-5.69)	0.0338*** (3.39)
<i>Log(Total RGDP)</i>	0.0025*** (5.76)	-0.0007** (-2.36)	<i>Log(Total RGDP)</i>	-0.0111 (-1.17)	0.0193*** (3.31)
<i>HHI</i>	-0.0384*** (-6.73)	-0.0098*** (-2.77)	<i>HHI</i>	-0.4684*** (-3.48)	0.7420*** (9.34)
<i>T-Bill</i>	-0.0240 (0.00)	0.0022 (0.00)	<i>T-Bill</i>	-0.2855 (0.00)	-0.0708 (0.00)
<i>M2/GDP</i>	0.0004 (0.00)	-0.0003 (0.00)	<i>M2/GDP</i>	-0.0084 (0.00)	-0.0104 (0.00)
<i>Crisis</i>	0.0046 (0.00)	-0.0058 (0.00)	<i>Crisis</i>	-0.3121 (0.00)	-0.2115 (0.00)
<i>Post Crisis</i>	-0.0022 (0.00)	0.0010 (0.00)	<i>Post Crisis</i>	0.4412 (0.00)	0.0327 (0.00)
Observations	367,435	367,435	Observations	316,233	323,336
R-squared	0.5635	0.5711	R-squared	0.0435	0.7668

**Table 12. Effects of Prudence & Banks' lending behavior to Bank Performance across subsamples based on bank size**

We first sorted banks in two groups according to whether bank's total assets are greater than 1 billion or not. Then we divide the group less than 1 billion into two groups according to bank's total assets. Dependent variable are NPL Ratio and ROA. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	NPL Ratio				ROA			
	<1Bil. & SMALL (1)	<1Bil. & BIG (2)	<1Bil. (3)	>=1Bil. (4)	<1Bil. & SMALL (5)	<1Bil. & BIG (6)	<1Bil. (7)	>=1Bil. (8)
<i>Prudent Rank</i>	-0.0038*** (-48.88)	-0.0032*** (-34.55)	-0.0041*** (-65.81)	-0.0022*** (-7.59)	0.0014*** (26.73)	0.0014*** (42.63)	0.0015*** (50.85)	0.0014*** (18.51)
<i>Prudent Rank · Crisis</i>	-0.0022*** (-16.44)	-0.0037*** (-25.51)	-0.0027*** (-27.53)	-0.0045*** (-12.05)	0.0008*** (12.12)	0.0010*** (18.38)	0.0009*** (21.84)	0.0010*** (9.47)
<i>Prudent Rank · Post</i>	-0.0039*** (-32.27)	-0.0074*** (-49.55)	-0.0050*** (-52.70)	-0.0068*** (-17.30)	0.0009*** (15.77)	0.0014*** (31.67)	0.0010*** (29.52)	0.0013*** (12.39)
<i>Total loan ratio1</i>	-0.0224*** (-16.05)	-0.0184*** (-10.53)	-0.0219*** (-19.10)	-0.0136*** (-3.77)	0.0059*** (6.06)	0.0016 (0.87)	0.0035*** (3.16)	0.0005 (0.33)
<i>Total loan ratio1 · Crisis</i>	0.0007 (0.23)	-0.0243*** (-5.55)	-0.0079*** (-3.08)	-0.0111 (-1.13)	-0.0073*** (-3.20)	0.0100*** (3.36)	-0.0011 (-0.55)	-0.0019 (-0.52)
<i>Total loan ratio1 · Post</i>	-0.0090*** (-3.14)	-0.0317*** (-8.97)	-0.0192*** (-8.36)	-0.0139 (-1.54)	0.0090*** (5.28)	0.0113*** (4.82)	0.0110*** (7.15)	-0.0026 (-0.71)
<i>Total loan ratio2</i>	-0.0010 (-0.97)	-0.0028** (-2.52)	-0.0031*** (-3.96)	-0.0017 (-0.65)	-0.0022 (-1.38)	0.0019 (1.01)	-0.0003 (-0.26)	0.0034* (1.76)
<i>Total loan ratio2 · Crisis</i>	-0.0038 (-1.44)	-0.0045 (-1.32)	-0.0018 (-0.85)	-0.0059 (-0.72)	-0.0057 (-1.37)	-0.0050 (-1.37)	-0.0066** (-2.25)	-0.0007 (-0.16)
<i>Total loan ratio2 · Post</i>	0.0057*** (2.60)	0.0041 (1.53)	0.0072*** (4.29)	0.0012 (0.20)	0.0026 (1.20)	0.0009 (0.35)	0.0018 (1.07)	-0.0047 (-1.04)
<i>Total loan ratio3</i>	0.0034*** (3.33)	-0.0001 (-0.07)	0.0021*** (2.75)	0.0003 (0.12)	0.0017 (1.43)	0.0030 (1.17)	0.0021* (1.66)	-0.0005 (-0.32)
<i>Total loan ratio3 · Crisis</i>	-0.0014 (-0.53)	0.0051 (1.38)	0.0014 (0.65)	0.0153 (1.62)	-0.0033 (-1.42)	-0.0057 (-1.61)	-0.0048** (-2.15)	-0.0022 (-0.69)
<i>Total loan ratio3 · Post</i>	-0.0004 (-0.18)	0.0070*** (2.59)	0.0030* (1.86)	-0.0024 (-0.43)	-0.0067*** (-3.62)	-0.0077*** (-2.59)	-0.0071*** (-4.42)	0.0016 (0.43)
<i>Total loan ratio4</i>	0.0108*** (8.26)	0.0078*** (5.09)	0.0085*** (8.06)	0.0010 (0.32)	0.0072*** (5.89)	0.0042** (2.47)	0.0068*** (6.19)	0.0005 (0.32)
<i>Total loan ratio4 · Crisis</i>	0.0054* (1.87)	0.0270*** (6.99)	0.0137*** (5.86)	0.0100 (1.35)	0.0095*** (4.19)	0.0014 (0.54)	0.0085*** (4.67)	0.0035 (1.23)
<i>Total loan ratio4 · Post</i>	0.0083*** (3.27)	0.0212*** (6.47)	0.0184*** (8.78)	0.0219*** (3.23)	-0.0077*** (-4.09)	-0.0048** (-2.36)	-0.0075*** (-5.18)	0.0023 (0.41)
<i>Log(HPI)</i>	-0.0304*** (-21.99)	-0.0254*** (-21.10)	-0.0301*** (-33.20)	-0.0167*** (-6.09)	0.0039** (2.55)	0.0057*** (13.77)	0.0046*** (7.97)	0.0018* (1.83)
<i>Log(Total RGDP)</i>	0.0007 (0.93)	0.0024*** (3.26)	0.0015*** (3.17)	0.0021** (2.31)	-0.0013 (-1.64)	-0.0002 (-0.92)	-0.0005 (-1.42)	-0.0005** (-2.22)
<i>HHI</i>	-0.0369*** (-3.92)	-0.0536*** (-6.74)	-0.0456*** (-7.55)	-0.0322** (-2.16)	-0.0236** (-2.11)	0.0026 (1.08)	-0.0117*** (-2.73)	0.0088** (2.06)
<i>T-Bill</i>	-0.0070 (0.00)	-0.1903 (0.00)	-0.0320 (0.00)	-2.3280 (0.00)	0.1478 (0.00)	0.0921 (0.00)	-0.0066 (0.00)	2.3061 (0.00)
<i>M2/GDP</i>	-0.0001 (0.00)	0.0002 (0.00)	0.0009 (0.00)	0.1048 (0.00)	0.0000 (0.00)	0.0011 (0.00)	0.0008 (0.00)	-0.0087 (0.00)
<i>Crisis</i>	0.0206 (0.00)	0.0721 (0.00)	0.0127 (0.00)	0.3266 (0.00)	-0.1523 (0.00)	-0.1495 (0.00)	0.0112 (0.00)	0.1098 (0.00)
<i>Post Crisis</i>	0.0013 (0.00)	-0.0090 (0.00)	-0.0130 (0.00)	-0.0803 (0.00)	0.0446 (0.00)	0.0054 (0.00)	-0.0068 (0.00)	0.0730 (0.00)
Observations	170,039	170,112	340,658	26,639	170,039	170,112	340,658	26,639
R-squared	0.5438	0.6260	0.5599	0.6809	0.5907	0.5284	0.5737	0.6059

**Table 13. Effects of Prudence and banks' lending behavior on Excess NPL growth and Excess Return Growth across subsamples based on bank size**

We first sorted banks in two groups according to whether bank's total assets are greater than 1 billion or not. Then we divide the group less than 1 billion into two groups according to bank's total assets. Dependent variable are NPL Ratio Growth and ROA Growth. Variables are defined in Table 1. Pre-crisis is from 2001:1Q to 2007:2Q, during crisis is from 2007:3Q to 2009:2Q and the post-crisis is from the 2009:3Q to 2014:4Q. Each regression includes quarterly dummies and MSA dummies. T-statistics in the parentheses are based on standard errors clustered by MSA and robust to heteroskedasticity. \*\*\*, \*\*, \* represent significance at the 1%, 5%, 10% levels, respectively.

Variable	Excess NPL Growth				Excess Return Growth			
	<1Bil. & SMALL (1)	<1Bil. & BIG (2)	<1Bil. (3)	>=1Bil. (4)	<1Bil. & SMALL (5)	<1Bil. & BIG (6)	<1Bil. (7)	>=1Bil. (8)
<i>Prudent Rank</i>	0.2637*** (62.35)	0.1602*** (46.97)	0.1992*** (75.90)	0.0804*** (11.64)	-0.0635*** (-40.78)	-0.0496*** (-32.92)	-0.0546*** (-50.88)	-0.0565*** (-11.90)
<i>Prudent Rank · Crisis</i>	-0.0159*** (-2.90)	-0.0093** (-2.10)	-0.0060* (-1.75)	0.0024 (0.27)	0.0037 (1.39)	0.0266*** (9.74)	0.0158*** (8.19)	0.0347*** (4.76)
<i>Prudent Rank · Post</i>	-0.0447*** (-10.65)	-0.0328*** (-10.13)	-0.0327*** (-12.98)	-0.0207*** (-3.10)	-0.0220*** (-10.65)	-0.0171*** (-8.52)	-0.0192*** (-13.63)	-0.0268*** (-4.37)
<i>Excess Total Loan Growth1</i>	-0.1712** (-2.13)	-0.0929 (-1.22)	-0.1614*** (-2.92)	0.3515*** (2.82)	-0.0025 (-0.09)	-0.1026** (-2.34)	-0.0691*** (-2.66)	-0.0553** (-2.04)
<i>Excess Total Loan Growth1 · Crisis</i>	0.0203 (0.14)	0.1093 (0.85)	0.0860 (0.88)	-0.1142 (-0.68)	-0.0592 (-0.85)	0.0197 (0.18)	-0.0109 (-0.16)	0.0056 (0.04)
<i>Excess Total Loan Growth1 · Post</i>	0.1301 (1.25)	0.0508 (0.54)	0.0974 (1.35)	0.1456 (0.55)	0.1301*** (2.59)	0.1089 (1.63)	0.0636 (1.11)	-0.0526 (-0.81)
<i>Excess Total Loan Growth2</i>	-0.0811 (-1.12)	0.1642** (2.22)	0.0302 (0.59)	0.2526** (2.41)	0.0142 (0.51)	-0.0402* (-1.80)	-0.0250 (-1.44)	-0.0033 (-0.07)
<i>Excess Total Loan Growth2 · Crisis</i>	0.2005 (1.45)	0.1114 (0.89)	0.1853** (1.98)	-0.2920* (-1.83)	-0.1150** (-1.97)	0.1803 (1.55)	0.0349 (0.50)	0.1220 (1.13)
<i>Excess Total Loan Growth2 · Post</i>	0.0948 (0.99)	-0.0246 (-0.27)	0.0226 (0.34)	-0.1629 (-1.30)	-0.1066** (-2.43)	0.0506 (1.27)	0.0020 (0.06)	-0.0024 (-0.03)
<i>Excess Total Loan Growth3</i>	0.2721*** (3.77)	0.1507** (2.13)	0.2312*** (4.62)	0.3927*** (3.09)	0.0559** (2.09)	0.0369 (1.45)	0.0439** (2.44)	-0.0629** (-1.96)
<i>Excess Total Loan Growth3 · Crisis</i>	0.0554 (0.42)	0.1319 (0.95)	0.0944 (0.98)	0.1778 (0.71)	-0.1730*** (-2.90)	-0.1044 (-1.63)	-0.1384*** (-3.15)	-0.0326 (-0.18)
<i>Excess Total Loan Growth3 · Post</i>	-0.0614 (-0.61)	-0.1240 (-1.36)	-0.0896 (-1.32)	-0.3570** (-2.49)	-0.1767*** (-3.30)	-0.1650*** (-3.74)	-0.2104*** (-5.85)	-0.0237 (-0.42)
<i>Excess Total Loan Growth4</i>	0.1142 (1.59)	0.0370 (0.61)	0.0846* (1.78)	-0.2737 (-1.44)	0.1383*** (4.55)	0.0158 (0.62)	0.0756*** (3.33)	-0.0367 (-1.56)
<i>Excess Total Loan Growth4 · Crisis</i>	0.0305 (0.22)	0.2271 (1.49)	0.1316 (1.30)	0.5510** (2.54)	-0.0469 (-0.55)	-0.0088 (-0.14)	-0.0355 (-0.63)	0.2393** (2.27)
<i>Excess Total Loan Growth4 · Post</i>	-0.1775* (-1.85)	0.0267 (0.30)	-0.0992 (-1.51)	0.2770 (1.40)	0.0109 (0.20)	0.0986** (2.14)	0.0848** (2.13)	0.1017* (1.92)
<i>Log(HPI)</i>	-0.2346*** (-5.59)	-0.0695** (-2.40)	-0.1713*** (-7.39)	0.1745*** (3.95)	0.0732*** (3.83)	0.0356** (2.56)	0.0478*** (4.33)	0.0096 (0.32)
<i>Log(Total RGDP)</i>	-0.0096 (-0.48)	0.0026 (0.16)	-0.0133 (-1.14)	-0.0352** (-2.10)	0.0161 (1.31)	0.0125 (1.28)	0.0191*** (2.66)	0.0022 (0.17)
<i>HHI</i>	-0.0561 (-0.22)	-0.7262*** (-3.72)	-0.3877** (-2.53)	-0.4807 (-1.64)	0.7870*** (4.72)	0.7507*** (7.25)	0.8078*** (9.00)	0.3977** (1.99)
<i>T-Bill</i>	-7.0410 (0.00)	-9.1370 (0.00)	1.9903 (0.00)	9.6671 (0.00)	2.2889 (0.00)	-2.5790 (0.00)	-0.7424 (0.00)	5.4980 (0.00)
<i>M2/GDP</i>	-0.0139 (0.00)	0.0125 (0.00)	-0.1093 (0.00)	-1.9700 (0.00)	-0.0018 (0.00)	0.0065 (0.00)	0.0001 (0.00)	1.5249 (0.00)
<i>Crisis</i>	-0.3241 (0.00)	-1.6980 (0.00)	5.1618 (0.00)	0.0042 (0.00)	0.0806 (0.00)	-0.2463 (0.00)	-0.0911 (0.00)	1.8149 (0.00)
<i>Post Crisis</i>	-0.2519 (0.00)	-0.3404 (0.00)	5.3983 (0.00)	3.4721 (0.00)	0.1486 (0.00)	-0.0965 (0.00)	0.0174 (0.00)	2.9301 (0.00)
Observations	144,749	144,840	290,101	25,869	149,403	149,469	299,398	23,738
R-squared	0.0545	0.0451	0.0441	0.0938	0.7407	0.7956	0.7642	0.8156