

# **Bank Funding Structure, Market Discipline, and Credit Supply**

Sung Wook Joh (SNU) and Jeongsim Kim (SKKU)

## Abstract

This paper examines how wholesale funding affects the extent to which banks supply credit to their borrowers depending on macroeconomic conditions. We find that banks relying more heavily on wholesale funds provided more credit during the pre-crisis period. This result implies that the increase in credit supply by high wholesale-funded banks led to the lending boom, and thus increased the financial fragility in the banking system during the boom. High wholesale-funded banks, however, cut their lending more significantly during the crisis, suggesting that they contributed to the severe credit crunch. We also find that riskier banks with high wholesale dependence increased risky lending during the crisis and post-crisis periods.

JEL classification: G21, G28

Keywords: Bank Lending, Wholesale Funding, Market Discipline, Financial Crisis, Regulation

Sung Wook Joh: Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 151-916, Republic of Korea, Tel: +82-2-880-9384, E-mail: swjoh@snu.ac.kr

Jeongsim Kim: Sungkyunkwan University 25-2, Sungkyunkwan-ro, Jongno-gu, Seoul 110-745, Republic of Korea, Tel: +82-2-740-1852, E-mail: js.kim@skku.edu

## 1. Introduction

The financial crisis of 2008 shed new light on the volatile nature of wholesale funds as a funding source. During the crisis, wholesale financiers withdrew their money en masse, leading to a severe credit contraction<sup>1</sup>. Prior to the crisis, wholesale financiers dramatically increased their investments in banks, which allowed banks to increase the supply of credit, resulting in accumulated vulnerabilities in the financial system (Demirgüç-Kunt and Huizinga 2010; Hahm, Shin, and Shin 2013). Figure 1 supports this fact: banks' balance sheets in terms of total assets expanded greatly until the Lehman Brothers failure in 2008:Q3. Similarly, bank loans significantly increased during the pre-crisis period, but decreased during the crisis period. These trends in assets and loans may be attributed to wholesale funds rather than core deposits because wholesale funds show similar trends to those of assets and loans. Core deposits were stable until 2008:Q3, and increased significantly after the crisis, consistent with the findings of previous studies (Ivashina and Scharfstein 2010; Acharya and Mora 2014).

[Insert Figure 1 around here]

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<sup>1</sup> In contrast, demand deposits flowed into banks to seek a safe haven during the same time period, mainly attributable to government safety nets for deposits in the form of deposit insurance (Kashyap, Rajan, and Stein 2002; Gatev and Strahan 2006; Gatev, Schuermann, and Strahan 2009; Cornett, McNutt, Strahan, and Tehranian 2011; Acharya and Mora 2014).

Wholesale funds have conflicting effects on banks' financial stability depending on market conditions (Diamond and Rajan 2009; Shin 2009; Huang and Ratnovski 2011; He and Xiong 2012)<sup>2</sup>. In good times, short-term wholesale debt is less expensive than long-term debt, and makes up for the shortage of retail deposits so banks need not give up profitable investments while disciplining banks against excessive risks. In bad times, however, these wholesale financiers, rather than demand depositors, run regardless of a bank's financial health<sup>3</sup>. Furthermore, they seem not to discipline banks for increased risks by demanding higher interest rates or withdrawing funds during the 2008 financial crisis (Joh and Kim 2014). Recently, a great deal of literature has examined the relationship between the type of funding sources and credit supply, especially concerning the credit crunch during the 2008 crisis (e.g., Allen and Paligorova 2011). However, there is no explicit research on the effect of wholesale funding on the credit supply considering the change in wholesale financiers' disciplining role in the aftermath of the crisis. This study aims to fill this gap in the growing literature on the relationship between bank funding structure and credit supply by constructing a panel dataset for US commercial banks between 2002 and 2012 to examine the impact of the 2008 financial crisis.

The main purpose of this study is to investigate whether wholesale financiers

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<sup>2</sup> There is extensive literature discussing disciplinary measures taken by depositors or short-term creditors. See Gilbert (1990) or Flannery (1998) for good reviews.

<sup>3</sup> Traditionally, bank runs were triggered by demand depositors (Bryant 1980; Diamond and Dybvig 1983). However, traditional bank runs have become less likely since the introduction of deposit insurance (Demirgüç-Kunt and Kane 2002; Shin 2009).

discipline banks against excessive risk-taking-in terms of risky lending depending on market conditions: before, during, and after the financial crisis<sup>4</sup>. To this end, our empirical analyses begin by examining the relationship between wholesale funds and credit supply. To our knowledge, there is no direct research examining whether wholesale funds are positively associated with bank lending during both good times (pre-crisis period) and bad times (crisis and post-crisis period), although there is evidence that banks with more core deposits or equity capital cut their lending less during the 2008 crisis (Ivashina and Scharfstein 2010; Cornett, McNutt, Strahan, and Tehranian 2011). Hahm, Shin, and Shin (2013) show that a high reliance on wholesale funding serves as an indicator of vulnerability to a financial crisis using a panel dataset of around 20-70 developing countries from 2000 to 2010.

We find that banks which rely more on wholesale funding granted more credit, short-term loans, real estate loans, and commercial and industrial (C&I) loans during the pre-crisis period. This suggests that accumulating vulnerability in the banking system stems from the increase in the supply of credit by banks relying on high wholesale funding during the pre-crisis period. During the crisis, however, banks with more wholesale funds reduced their supply of loans, loan commitments, short-term loans, real estate loans, and C&I loans to a greater extent than those with less wholesale funds. This

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<sup>4</sup> Regarding market discipline by wholesale financiers, the previous literature argues that wholesale financiers play an essential role in monitoring and disciplining banks for excessive risk-taking behavior (Calomiris and Kahn 1991; Diamond and Rajan 2001; Ellis and Flannery 1992; Flannery 2001; Hannan and Hanweck 1988). However, recent studies report that market discipline by wholesale financiers was limited during the financial crisis of 2008 (Afonso, Kovner, and Schoar 2011; Huang and Ratnovski 2011; Joh and Kim 2014).

resulting credit contraction by banks with high levels of wholesale funding is prominent during the post-Lehman crisis period, and continues during the post-crisis period for all types of loans and commitments.

After providing evidence that banks with high levels of wholesale funding reduced their supply of credit during the crisis and post-crisis period, We examine how risky banks with high wholesale funding dependence adjusted their credit supply in response to the increased market-wide liquidity risk during the crisis. We consider credit supply in the form of on-balance sheet total loans, off-balance sheet undrawn loan commitments<sup>5</sup>, and credits (sum of loans and loan commitments) to control for the effects of the drawdown of preexisting commitments, since loan commitments become loans after the takedown. We also consider risky lending in order to examine how banks adjust risky lending depending on macroeconomic conditions. If market discipline exists, risky banks with more wholesale funds decrease risky lending than those with fewer wholesale funds.

Risky lending can be defined along the following four dimensions: quantity, price, risk components, and maturity. First, for the quantity and price dimensions, if a bank increases loans with higher interest rates, it can be assumed that these are riskier, since risky borrowers are more willing to pay higher interest rates (Stiglitz and Weiss 1981; Pagaon and Jappelli 1993; Berger and Udell 1995). Second, loan components, such as real estate and C&I loans can be considered a factor to determine whether the loan is

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<sup>5</sup> In this paper, we use loan commitments and lines of credit interchangeably.

riskier. Riskier loans have greater exposure to real estate. Santos (2010) and Acharya and Mora (2014) argue that real estate loans were a primary cause of banks' insolvency during the 2008 crisis. Blaško and Sinkey (2006) provide evidence that banks with high real estate exposure are more likely to fail using US commercial bank data between 1989 and 1996. In addition, some argue that C&I loans are riskier than other loans. Samolyk (1994) shows that C&I loans are positively related to non-performing loans and net charge-offs. Demsetz and Strahan (1997) report that banks with more C&I loans have higher firm-specific risk. Finally, regarding risky lending from the maturity perspective, short-term loans are more likely to be riskier than long-term loans since banks grant loans with short-term maturity for riskier borrowers.

In terms of market discipline, we find conflicting results about the disciplining role of wholesale financiers in terms of preventing banks from granting more risky loans depending on market conditions. Market discipline occurs during stable economic periods, though there is little evidence of market discipline during the crisis period after the Lehman Brothers bankruptcy. This lack of market discipline continues, and even sometimes intensifies, during the post-crisis period. Specifically, risky banks with more wholesale funds decreased the supply of credit and risky loans, with lower spreads on total loans, real estate loans, and C&I loans during the boom period. However, risky banks with more wholesale funds increased the supply of credit and risky loans with higher spreads on total loans, real estate loans, and C&I loans during the post-Lehman period when the government intervened with protections such as quantitative easing (QE) or the Troubled Asset Relief Program (TARP). This result implies that a lack of market

discipline is possible even during a severe crisis if extensive government rescue programs are implemented to stabilize the economy. Interestingly, this continued during the post-crisis period when the Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd- Frank Act) was enacted in 2010.

The remainder of this paper proceeds as follows. Section 2 briefly shows the relationship between wholesale funding and bank lending through a graphical analysis. Section 3 describes the data and econometric methods. Section 4 presents the empirical evidence. Section 5 checks the robustness of the results. Finally, Section 6 concludes the paper.

## **2. Descriptive Analysis of the Relationship between Bank Funding Structure and Credit Supply**

This section offers a brief analysis of how wholesale funding affects the extent that banks provide credit to borrowers using a graphical analysis. Bank funding structures have changed significantly over the past decades. Figure 2 shows the trends of bank funding structures at US commercial banks between 2002 and 2012. Core deposits include transaction accounts, savings deposits, and fully insured time deposits of less than \$100,000 (less than \$250,000 after 2008). Wholesale funds include federal funds purchased, securities sold under agreements to repurchase, subordinated notes and debentures, other borrowed money, brokered deposits, and uninsured large time deposits.

Equity is bank equity capital. The funding structure data are quarterly averages. Until 2008, the ratio of wholesale funding to total assets grew quickly while the core funding ratio decreased. However, the trend reversed after the 2008 financial crisis. In other words, the wholesale funding ratio decreased after the crisis while the core funding ratio dramatically increased. The equity capital ratio has remained around 10% over the sample period, although it increased slightly after the crisis.

[Insert Figure 2 around here]

Figure 3 shows the relationship between wholesale funding and loan supply at the aggregate level for US commercial banks between 2002 and 2012. Banks are divided into three categories: banks with high, medium, and low wholesale funding ratios (*WF*). The wholesale funding ratio is defined as the ratio of wholesale funding to total assets. Figure 3.1 shows the trends of the aggregate loan supply by the level of wholesale funding ratio. High wholesale-funded banks significantly decreased the loan supply during the crisis period, while banks with medium or low wholesale funding ratios increased lending during the same time period. This result suggests that the decrease in lending by high wholesale-funded banks was the main cause of credit contraction in the economy during the crisis. In Figures 3.2 and 3.3, banks are divided by size to examine which types of banks mainly contributed to the credit contraction. Banks are classified based on total assets: large (greater than \$1 billion in assets) and small banks (less than or equal to \$1 billion in assets). Figures 3.2 and 3.3 show the aggregate loan supply



depending on the level of the wholesale funding ratio for large and small banks, respectively. The axis on the left-hand side of Figure 3.3 shows the aggregate loans of small banks, while the axis on the right-hand side of the graph shows the aggregate loans of small banks with high/medium/low wholesale funding ratios. Figures 3.1 and 3.2 show that the changes in the total amount of loans stem mostly from large banks because they move together closely. This result also implies that large banks are more likely to attract funding from the capital market, such as the fed funds or debenture markets than small banks (Park and Pennacchi 2009; Afonso, Kovner, and Schoar 2011). Figure 3.2 shows consistent results regarding the decrease in the loan supply from high wholesale-funded banks. Large high wholesale-funded banks reduced lending during the crisis period, while large, medium wholesale-funded banks provided more credit during the same time period. Figure 3.3 for small banks shows similar results: small high wholesale-funded banks most dramatically cut their lending during the 2008 crisis.

[Insert Figure 3 around here]

Figure 4 shows the relation between wholesale funding and credit supply at the bank level. Three types of credit supply are defined in this figure: loans, loan commitments, and credits (loans plus loan commitments). Figures 4.1 and 4.2 show the difference in the ratio of loans to total assets (*Loans*) between high wholesale-funded banks and low wholesale-funded banks (Large banks with high WF – Large banks with low WF) for large (Figure 4.1) and small banks (Figure 4.2), respectively. Figures 4.3 and 4.4 show

the difference in the ratio of loan commitments to total assets plus loan commitments (*Loan commitments*) between high wholesale-funded banks and low wholesale-funded banks for large and small banks, respectively. Figures 4.5 and 4.6 show the difference in the ratio of loans plus loan commitments to total assets plus loan commitments (*Credits*) between high wholesale-funded banks and low wholesale-funded banks for large and small banks, respectively. All figures show that banks with high wholesale funding dependence decreased the average credit supply during the financial crisis, which is prominent for loan commitments and total credits.

[Insert Figure 4 around here]

### **3. Data and Econometric Methods**

#### **3.1 Data**

The quarterly data from the financial statements of insured US commercial banks are obtained from the Federal Financial Institutions Examination Council (FFIEC) Consolidated Reports of Condition and Income (Call Reports) during the period 2002:Q1-2012:Q4. The Call Reports include detailed information for both on- and off-

balance sheet assets, loans, deposits, wholesale funds, equity, and loan commitments. Data on market concentrations for the Metropolitan Statistical Area (MSA) where a bank operates are collected from the FDIC's Summary of Deposits (SOD) database. Data on income growth and real GDP at the MSA level are obtained from the Bureau of Economic Analysis (BEA). Information about monetary aggregates (M2) is collected from the Federal Reserve Board (FRB). The house price index is obtained from the Federal Housing Finance Agency (FHFA). Banks with zero total assets, zero total loans, and zero total deposits were removed, as it is difficult for these banks to realistically operate. Financial statement variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles to eliminate the impact of outliers in the estimations. The final sample consists of 155,980 bank-quarter observations for 5,068 U.S. commercial banks during the period from 2002:Q1 to 2012:Q4.

### 3.2 Methodology and Variables

To investigate whether wholesale funding impacts the supply of credit that contributed to the lending boom in the pre-crisis period, and the credit crunch during the 2008 crisis, we employ the following fixed effects model:

$$\Delta Credits_{it} = \alpha_0 + \alpha_1 Wholesale\ Funding_{it-1} + \alpha_2 Crisis_t + \alpha_3 Wholesale\ Funding_{it-1} * Crisis_t + \alpha_4 Other\ Controls_{it-1} + \mu_{1i} + \tau_{1t} + \varepsilon_{it} \quad (1)$$

Where  $\Delta Credits_{it}$  is the change in credits during the quarter divided by the start of quarter total assets.  $\Delta Credits_{it}$  includes loans ( $\Delta Loans_{it}$ ), loan commitments ( $\Delta Commitments_{it}$ ), and loan components (short-term loans, real estate loans, and C&I loans). Specifically,  $\Delta Loans_{it}$  (including short-term loans, real estate loans, and C&I loans) indicates the change in loans as a fraction of the start of quarter total assets for bank  $i$  in quarter  $t$ .  $\Delta Commitments_{it}$  and  $\Delta Credits_{it}$  refer to the change in loan commitments and total credits as a fraction of the start of quarter total assets plus loan commitments for bank  $i$  in quarter  $t$ , respectively.

*Wholesale Funding* $_{it-1}$  is the main variable of interest. We focus on two components of wholesale funding depending on maturity: *WF* (total wholesale funds) and *SWF* (short-term wholesale funds). As mentioned above, *WF* consists of fed funds, repos, subordinated debentures, brokered deposits, other borrowed money, deposits in foreign offices, and large time deposits (over \$100,000 until 2009:Q4 and \$250,000 from 2010:Q1)<sup>6</sup>. *SWF* refers to short-term wholesale funds with a remaining maturity of one year or less as a fraction of total assets. By definition, *SWF* includes fed funds and repos.

We include the interactions between wholesale funding (*WF* or *SWF*) and Crisis (*CrisisI* and *CrisisII*) to examine the effect of wholesale funding on the credit supply

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<sup>6</sup> Deposit insurance limits were raised to \$250,000 in October 2008. However, reporting thresholds on time deposits in Call Reports reflect this change in deposit insurance coverage from 2010Q1.

during the crisis. Macroeconomic risk is measured through an indicator variable ( $Crisis_t$ ) for the 2008 financial crisis. Following Acharya and Mora (2014) and Joh and Kim (2014), we divide the crisis period into two sub-sample periods taking the Lehman Brothers bankruptcy as the watershed. The Lehman failure has different implications from the perspective of government support. Extensive government emergency actions to stabilize the economy immediately after the Lehman failure could lead to the problem of moral hazard for both wholesale financiers and banks (Calomiris 1999; Flannery and Sorescu 1996). These types of strong government guarantees may diminish investors' incentives to monitor banks. The pre-Lehman crisis periods ( $CrisisI$ ) covers the third quarter of 2007 to the second quarter of 2008 (2007:Q3-2008:Q2), and the post-Lehman crisis period ( $CrisisII$ ) starts from the third quarter of 2008 to the second quarter of 2009 (2008:3Q-2009:2Q).

Information on other control variables ( $Other\ Controls_{it-1}$ ) is described in detail below. Explanatory variables related to a bank's financial data take values lagged by one quarter to avoid the potential endogeneity problem.  $\mu_1$  is bank fixed effects to control for time-invariant unobserved heterogeneity at the bank level ( $i$ ), and  $\tau_1$  is time-fixed effects to account for changes in the economic environment across quarters ( $t$ ).  $\varepsilon_{it}$  is the error term. All panel regressions are estimated with robust standard errors clustered at the bank level to account for within-bank serial correlation.

In addition, we employ the following two fixed effect models to examine how risky banks with more wholesale funding adjust risky lending depending on macroeconomic conditions. Specifically, we include the interaction term  $WF(SWF)*NPL*Crisis$ :

wholesale funding, bank risk, and market conditions, respectively. Risky lending is defined as an increase in credit with higher rates. Equations (2) and (3) are models for quantity and price, respectively.

$$\begin{aligned}
\Delta Credits_{it} = & \beta_0 + \beta_1 Wholesale\ Funding_{it-1} + \beta_2 Bank\ Risk_{it-1} + \beta_3 Crisis_t + \\
& \beta_4 Wholesale\ Funding_{it-1} * Bank\ Risk_{it-1} + \\
& \beta_5 Wholesale\ Funding_{it-1} * Crisis_t + \\
& \beta_6 Wholesale\ Funding_{it-1} * Bank\ Risk_{it-1} * Crisis_t + \\
& \beta_7 Other\ Controls_{it-1} + \mu_{2i} + \tau_{2t} + \omega_{it}
\end{aligned} \tag{2}$$

$$\begin{aligned}
Loan\ Spreads_{it} = & \gamma_0 + \gamma_1 Wholesale\ Funding_{it-1} + \gamma_2 Bank\ Risk_{it-1} + \\
& \gamma_3 Crisis_t + \gamma_4 Wholesale\ Funding_{it-1} * Bank\ Risk_{it-1} + \\
& \gamma_5 Wholesale\ Funding_{it-1} * Crisis_t + \\
& \gamma_6 Wholesale\ Funding_{it-1} * Bank\ Risk_{it-1} * Crisis_t + \\
& \gamma_7 Other\ Controls_{it-1} + \mu_{3i} + \tau_{3t} + \eta_{it}
\end{aligned} \tag{3}$$

Where  $\mu_2$  and  $\mu_3$  are bank-fixed effects, and  $\tau_2$  and  $\tau_3$  are time-fixed effects that are common to all banks during the quarter.  $\omega_{it}$  and  $\eta_{it}$  are error terms. Like Equation (1), explanatory variables related to a bank's financial data take values lagged by one quarter. All panel regressions are estimated with robust standard errors clustered at the bank level. Variables in the estimations as defined in detail in Table 1. Variables except

for  $M2/GDP$  are winsorized at the top and bottom 1% of the distribution.

[Insert Table 1 around here]

$Loan\ Spreads_{it}$  include spreads on total loans, C&I loans, and real estate loans<sup>7</sup>. The spread on total loans (C&I loans) are the difference between the implicit interest rates on total loans (C&I loans) and the three-year treasury constant maturity rate<sup>8</sup>, expressed in annual terms. The implicit interest rates on total loans (C&I loans) are calculated as the quarterly average interest incomes of total loans divided by the quarterly average amounts of total loans. *Spreads on real estate loans* indicates the spread between the implicit interest rates on real estate loans and the ten-year treasury constant maturity rate, also expressed in annual terms. The imputed interest rates on real estate loans are calculated as the quarterly average interest incomes of real estate loans divided by the quarterly average amounts of real estate loans.

$Bank\ Risk_{it-1}$  refers to a bank-specific risk. Since sophisticated wholesale

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<sup>7</sup> We calculate spreads on total loans, C&I loans, and real estate loans for the price Equation (2) based on data availability, although we calculate the changes in loans, loan commitments, short-term loans, real estate loans, and C&I loans for the quantity Equations (1) and (3). The income statements of the Call Report do not provide the price information on loan commitments and short-term loans.

<sup>8</sup> We also employ the one-year treasury constant maturity rate or the five-year treasury constant maturity rate to calculate the spreads on total loans or C&I loans. Our results are the same regardless of the treasury rates used.

investors make a lending decision based on bank-specific and macroeconomic factors, we include bank-specific risk variables ( $Bank\ Risk_{it-1}$ ) and the macroeconomic crisis ( $Crisis_t$ ) in our models. We employ non-performing loans (NPL) and the Z-score as proxies for bank risk. *NPL* indicates the ratio of non-performing loans to total loans. Non-performing loans are those that a bank classifies as 90-days or more past due or nonaccrual in the Call Reports. The Z-score indicates a bank's distance to default, calculated as the sum of the return on assets and the equity capital ratio divided by the standard deviation of the return on assets. A higher value indicates a lower risk of default.

$Other\ Controls_{it-1}$  refer to explanatory variables affecting the supply of bank credit, including bank-specific control variables and general macroeconomic condition variables. Bank-level control variables include bank size ( $Ln(total\ assets)$ ), capital ratio ( $Capital\ ratios$ ), and profitability ( $Return\ on\ assets$ ).  $Ln(total\ assets)$  is measured as the natural logarithm of total assets in millions of dollars.  $Capital\ ratios$  is calculated as the ratio of bank equity to total assets. Market- or macroeconomic condition variables include the level of money supply ( $M2/GDP$ ), each MSA's deposit market concentration (Herfindahl–Hirschman Index, HHI), each MSA's income growth, and each MSA's house price index (HPI).  $M2/GDP$  is calculated as M2 divided by GDP to account for the effect of the quantitative easing policy. HHI is constructed using branch-level deposit data from the FDIC's SOD database. When a bank operates in multiple-MSA markets, we weight the MSA-level variables using the proportion of a bank's deposits in each MSA. Therefore, HHI, income growth, and HPI are weighted variables at the MSA



level.

Table 2 shows the summary statistics for the variables employed in the estimations, though level variables of the quantity variables and interest rates on loans are not reported because we use change variables of the quantity variables and spreads on loans in the estimations. For more information about our data, we provide summary statistics for the level variables and interest rates. For quantity variables, the ratio of loans to total assets is 0.6625, the ratio of loan commitments to total assets plus loan commitments is 0.1006, the ratio of short-term loans to total loans is 0.3049, the ratio of real estate loans to total loans is 0.7077, and the ratio of C&I loans to total loans is 0.1551. For price variables, interest on total loans is 6.92%, interest on real estate loans is 6.80%, and interest on C&I loans is 7.12%.

[Insert Table 2 around here]

## **4. Empirical Results**

### **4.1 Relationship between Credit Supply and Wholesale Funding**

Table 3 reports how high wholesale-funded banks adjust their credit depending on macroeconomic conditions. The dependent variables in columns (1), (2), and (3) are the

quarterly growth of loans, loan commitments, and total credits, respectively. Panel A shows the result for total wholesale funding and Panel B shows the result for short-term wholesale funding. In columns (1) and (3) of Panel A, the coefficients of *WF* are positive and significant at the 1% level, suggesting that banks with more wholesale funds provided more loans and loan commitments to borrowers prior to the 2008 crisis. This increase in credit could have led to the lending boom in the pre-crisis period. However, most coefficients of *WF\*CrisisI* and *WF\*CrisisII* are negative and significant at the 1% level. Banks with more wholesale funds provided fewer loans and loan commitments during the crisis period, implying that high wholesale-funded banks contributed to the credit crunch during the crisis. Ivashina and Scharfstein (2010) and Cornett, McNutt, Strahan, and Tehranian (2011) provide evidence that banks with more stable funding (deposits or equity) cut their lending less during the crisis. The credit contraction by high wholesale-funded banks continued during the post-crisis period. Panel B for short-term wholesale funding shows the same results. Banks with high short-term wholesale dependence provided more credits during the good period. However, they reduced lending more during the crisis and post-crisis periods.

[Insert Table 3 around here]

Table 4 reports the effect of wholesale funding on the quarterly growth of short-term loans, real estate loans, and C&I loans. The dependent variables in columns (1), (2), and (3) are the growth of short-term loans, real estate loans, and C&I loans, respectively. In

all columns,  $WF(SWF)$  are positively associated with  $\Delta Short-term\ loans$ ,  $\Delta Real\ estate\ loans$ , and  $\Delta C\&I\ loans$ . Banks with more wholesale funding increased their short-term, real estate, and C&I loans during the pre-crisis period. Also, all coefficients of  $WF(SWF)$  are statistically significant at the 1% level. During the crisis period, however, those high wholesale-funded banks reduced short-term, real estate, and C&I loans more. This credit contraction is more severe during the post-Lehman crisis period (*CrisisII*) than the pre-Lehman crisis period (*CrisisI*). High wholesale-funded banks decreased during only short-term loans during *CrisisI*. The coefficient of  $WF*CrisisI$  for short-term loans is significantly negative (-0.0096) and that of  $SWF*CrisisI$  is also significantly negative (-0.0070). However, the coefficients of  $WF*CrisisI$  for real estate and C&I loans are insignificant. On the other hand, during *CrisisII*, the coefficients of  $WF*CrisisII$  and  $SWF*CrisisII$  for all types of loans are negative and significant at the 1% level. The decrease in the supply of short-term, real estate, and C&I loans continued during the post-crisis period. In other words, high wholesale-funded banks did not increase any of these types of loans, even after the crisis.

[Insert Table 4 around here]

#### 4.2 Controlling for the Impact of the TARP

Table 5 tests whether the findings in Tables 3 and 4 are robust after controlling for the

impact of government intervention during the crisis period. In this table, we include the variable *TARP amounts*, which indicates the ratio of the amount of received TARP funds to total assets. Recall that we already control for the impact of QE by using *M2/GDP* in our earlier findings. Although this variable applies only to TARP-funded banks, if TARP significantly contributes to the supply of loans, our results become insignificant due to the inclusion of TARP variable. Panel A reports regression estimates for total wholesale funding (WF), and Panel B reports those for short-term wholesale funding (SWF). In columns (1)-(6), the dependent variables are  $\Delta Loans$ ,  $\Delta Loan commitments$ ,  $\Delta Credits$ ,  $\Delta Short-term loans$ ,  $\Delta Real estate loans$ , and  $\Delta C\&I loans$ , respectively. Our results are robust after controlling for the impact of the TARP. *WF (SWF)* is positively related to the growth of loans, credits, short-term, real estate, and C&I loans. In all columns, *WF (SWF)\*CrisisII* and *WF (SWF)\*Postcrisis* have negative and significant coefficients at the 1% level. Taken together, high (short-term) wholesale-funded banks provided more loans during the pre-crisis period, but decreased their lending during the crisis and post-crisis periods after controlling for the effect for TARP-funded banks.

[Insert Table 5 around here]

#### 4.3 Relationship between Credit Supply, Wholesale Funding, and Bank Risk

Table 6 shows regression estimates for how risky banks with more wholesale funds

adjust their supply of credit depending on macroeconomic conditions. To this end, we include the interaction terms between wholesale funding, bank risk, and market risk:  $WF$  ( $SWF$ )\* $NPL$ \* $CrisisI$ ,  $WF$  ( $SWF$ )\* $NPL$ \* $CrisisII$ , and  $WF$  ( $SWF$ )\* $NPL$ \* $Postcrisis$ . Earlier results reported in Tables 3 and 4 show that a bank with more wholesale funds increased its lending before the crisis while decreasing lending during and after the crisis. If we consider bank risk as an additional explanatory variable of interest, we can test the assumption that risky banks rely more on wholesale funds change their lending decisions during good or bad times. If weak banks with high wholesale dependence increase their loans, especially the risky loan components (short-term, real estate, and C&I loans), it can be assumed that they take more risks. In this case, it is difficult to say that wholesale financiers effectively monitor banks. Furthermore, Joh and Kim (2014) show that wholesale financiers discipline banks for increasing risk only during stable economic periods, and provide evidence that wholesale financiers did not punish risky banks during the 2008 crisis and post-crisis period.

[Insert Table 6 around here]

The results reported in Table 6 are consistent with Joh and Kim (2014)'s results. That is, (short-term) wholesale financiers discipline banks against increased risky lending during boom times. However, they do not discipline banks to be prudent in their lending decisions during the crisis and post-crisis periods. Furthermore, this lack of market discipline is more severe during the post-Lehman crisis period when the

government implements rescue programs than for the pre-Lehman crisis period. Uninsured market investors may have little incentive to discipline banks because they do not have to bear the losses from bank failures. Interestingly, the increase in risky lending of weak banks with high wholesale funding ratio continued and sometime even intensified during the post-crisis period when the Dodd-Frank Act was introduced, suggesting that the Dodd-Frank Act's aim to reduce expectations of a too-big-to-fail policy and bank bailouts was not met. If the Dodd-Frank Act was effective, wholesale financiers should monitor banks and discourage greater risk because they must bear the losses in case of bank failures.

Specifically, in Panel A, *WF* is positively associated with the changes in loans, loan commitments, total credits, short-term, real estate, and C&I loans in columns (1)-(6). However, the coefficients of *WF\*NPL* in columns (1)-(6) have negative values, implying that riskier banks with more wholesale funds decrease total credit and risky loans during boom times while high wholesale-funded banks increase total credit and risky loans during good times. For the crisis period, the coefficients of *WF\*CrisisI* and *NPL\*CrisisI* have negative values. However, the coefficients of *WF\*NPL\*CrisisI* are positive in all columns and statistically significant for the changes in loans (column (1)), total credit (column (3)), and real estate loans (column (5)), implying a small measure of evidence for market discipline. The evidence of the lack of market discipline intensified during *CrisisII* and *Postcrisis*. All coefficients of *WF\*NPL\*CrisisII* and *WF\*NPL\*Postcrisis* are positive, while the coefficients of *NPL\*CrisisII* or *NPL\*Postcrisis* have negative values.

In Panel B, regression estimates for short-term wholesale funding provide similar, though stronger, results than for total wholesale funding in Panel A. All coefficients of  $SWF*NPL$  in columns (1)-(6) have negative and statistically significant values. In the crisis period (2007:Q3-2008:Q2) prior to the Lehman failure, there was uncertainty about the probability of government intervention (Acharya and Mora 2014) because extensive explicit and implicit government guarantees did not exist until after the Lehman Brothers bankruptcy. Our results support this argument because all coefficients of  $SWF*NPL*CrisisII$  are positive and significant (except for the growth of short-term loans), while all coefficients for  $SWF*NPL*CrisisI$  are insignificant. The statistical significance of the positive coefficients of  $SWF*NPL*Postcrisis$  are even stronger during the post-crisis period, implying that the expectation of bank bailouts and government guarantees during the severe recession intensified in the aftermath of the 2008 crisis. This result is inconsistent with Martinez Peria and Schmukler (2001), who argue that a banking crisis plays a role in improving market discipline as a warning of bank insolvency using bank data for Argentina, Chile, and Mexico during the 1980s and 1990s.

Table 7 confirms the findings reported in Table 6 (quantity) in the price context. Recall that risky lending is defined as an increase in credit (or risky loan components) with higher interest rates. In this table, we attempt to confirm the earlier results for the quantity equation (Equation (2)), using the price equation (Equation (3)). Panel A presents estimates for total wholesale funding, and Panel B reports those for short-term wholesale funding. The dependent variables in columns (1)-(3) are the spreads on total

loans (*Spreads on total loans*), real estate loans (*Spreads on real estate*), and C&I loans (*Spreads on C&I loans*), respectively. Although we use the interest rates on total loans, real estate loans, and C&I loans instead of the spreads, the results are the same whether interest rates or spreads are used. Spreads on total loans and C&I loans (real estate loans) are defined as the difference between the implicit loan rates and the three-year (ten-year) treasury constant maturity rate.

[Insert Table 7 around here]

The results in the price equation also confirm the earlier results for the quantity equation. That is, risky banks with high wholesale funding dependence lower their interest rates on total loans, real estate loans, and C&I loans during boom times. In Panel A,  $WF*NPL$  is negatively associated with *Spreads on total loans*, *real estate loans*, and *C&I loans*. Combining this result with  $WF*NPL$  in Panel A of Table 6, risky banks with more wholesale funds increased risky loans less and provided lower interest rates on their credit during good times, suggesting that risky banks relying more on wholesale funding invested more prudently than risky banks with less wholesale funding during the pre-crisis period because of the disciplinary role of wholesale financiers, implying that weak banks with more wholesale funds pursue prudent lending during boom periods. During the crisis, the coefficients of  $WF*NPL*CrisisII$  for *Spreads on total loans* and *Spreads on C&I loans* were significantly positive, while all coefficients of  $WF*NPL*CrisisI$  are insignificant. Combining this result with  $WF*NPL*CrisisI$  and



$WF*NPL*CrisisII$  in Panel A of Table 6 indicates that risky banks with more wholesale funds engaged in risky lending (more credit, short-term loans, real estate loans, and C&I loans with higher prices) during the post-Lehman crisis period. This result questions the effectiveness of market discipline during the post-Lehman crisis period when strong government guarantees protected uninsured bank creditors. Consistent with the earlier results, this lack of market discipline continued during the post-crisis period, also questioning the effectiveness of the Dodd-Frank Act. Panel B for short-term wholesale funds shows the same results as Panel A. The coefficients of  $SWF$  in columns (1)-(3) are positive and statistically significant. All coefficients of  $SWF*NPL*CrisisI$  are insignificant, while all coefficients of  $SWF*NPL*CrisisII$  are significantly positive. Furthermore,  $SWF*NPL*Postcrisis$  in all columns have positive and significant coefficients.

In short, combining the results of Table 6 with those of Table 7, we find that risky banks with more wholesale funding lent prudently during the lending boom period, providing evidence of market discipline. However, risky banks with more wholesale funds increased risky lending during the crisis period, implying little evidence for the disciplinary role of wholesale financiers during the 2008 crisis when strong government protections took effect. Even after the crisis, market discipline does not improve, despite the Dodd-Frank Act. This result also seems to stem from strong government guarantees for banks, which eliminate the incentives for uninsured wholesale financiers to monitor banks.

## 5. Robustness Checks

Tables 8 and 9 provide the results of robustness tests for the presence of market discipline in terms of preventing risky bank lending by employing the Z-score as a proxy of bank risk. Tables 8 and 9 report the results for quantity and price on the relationship between wholesale funding, bank risk, and macroeconomic conditions, respectively. Note that the Z-score is negatively associated with bank risk. Therefore, we expect the opposite signs on the estimated coefficients. The results are qualitatively similar to the earlier findings, although the statistical significance is weaker.

[Insert Table 8 around here]

In Panel A of Table 8,  $WF*Z\text{-score}$  of  $\Delta Commitments$  and  $\Delta Credits$  are positive and significant, providing evidence of market discipline for preventing banks from pursuing risky lending during boom times. On the other hand, all coefficients of  $WF*Z\text{-score}*CrisisI$  are insignificant.  $WF*Z\text{-score}*CrisisII$  of  $\Delta Commitments$ ,  $\Delta Credits$ , and  $\Delta C\&I$  loans has significantly negative coefficients. Additionally, the coefficient of  $WF*Z\text{-score}*Postcrisis$  of  $\Delta Commitments$  is negative and statistically significant at the 5% level. Panel B for short-term wholesale funding also shows qualitatively similar results. There is evidence of market discipline during stable economic periods, while there is

little evidence of market discipline during the crisis and post-crisis periods.

[Insert Table 9 around here]

Table 9 for the price equation complements the results of Table 8 for the quantity equation. The coefficients of  $WF*Z-score$  of the spreads on total loans and real estate loans in Panel A are positive and significant at the 5% level. Combining this result with the  $WF*Z-score$  result in Table 8 suggests that risky banks with more wholesale funds lower their interest rates and reduce credit during boom times. All coefficients of  $WF*Z-score*CrisisI$  are insignificant, suggesting that risky banks relying more on wholesale funding did not increase risky investments in terms of both quantity (Table 8) and price (Table 9) during the pre-Lehman crisis period. The coefficients of  $WF*Z-score*CrisisII$  of the spreads on total loans and C&I loans are negative and statistically significant. In addition, all coefficients of  $WF*Z-score*Postcrisis$  have statistically negative coefficients for the post-crisis period. Combining this with the results for the quantity dimension ( $WF*Z-score*CrisisII$  and  $WF*Z-score*Postcrisis$  of Table 8), risky banks increased risky lending (a higher quantity with a higher price) during the crisis and post-crisis period. In short, Our findings support the presence of market discipline, in the form of decreased risky lending during boom times, and provide little evidence of market discipline during the crisis and post-crisis periods, which are robust after employing the Z-score as an additional proxy for bank risk.

## 6. Conclusion

Using a panel dataset for US commercial banks between 2002:Q1 and 2012:Q4, we find that banks which rely more on wholesale funding granted more credit during the pre-crisis period, implying an accumulation of financial vulnerability in the banking system. However, high wholesale-funded banks reduced their credit to a greater extent than low wholesale-funded banks during the financial crisis of 2008, especially after the Lehman Brothers bankruptcy. The credit contraction continued even after the crisis. From the loan component perspective, high wholesale-funded banks increased short-term, real estate, and C&I loans during the pre-crisis period, though they decreased these in the crisis and the post-crisis periods.

We also find that riskier banks with more wholesale funds do not pursue risky lending during boom times, suggesting the presence of market discipline. Specifically, riskier banks with high wholesale funding dependence decrease the supply of loans, loan commitments, short-term loans, real estate loans, and C&I loans. In addition, they lowered the interest rates charged on total loans, real estate loans, and C&I loans during the credit boom period, while they increased risky lending during the crisis. That is, they increased the supply of loans, loan commitments, short-term loans, real estate loans, and C&I loans, charging higher interest rates. This result implies a lack of market discipline in periods of market stress when governments implement extensive support programs to stabilize the economy. Furthermore, the increase in risky lending continued during the

post-crisis period, suggesting the ineffectiveness of the Dodd-Frank Act that aimed to remove the expectation of implicit government protection.

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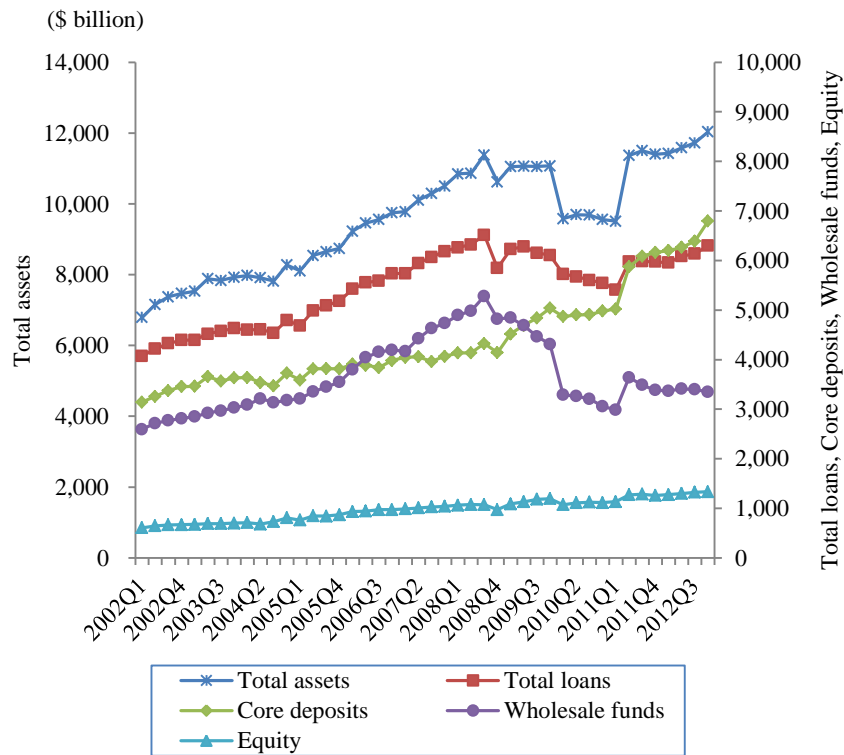
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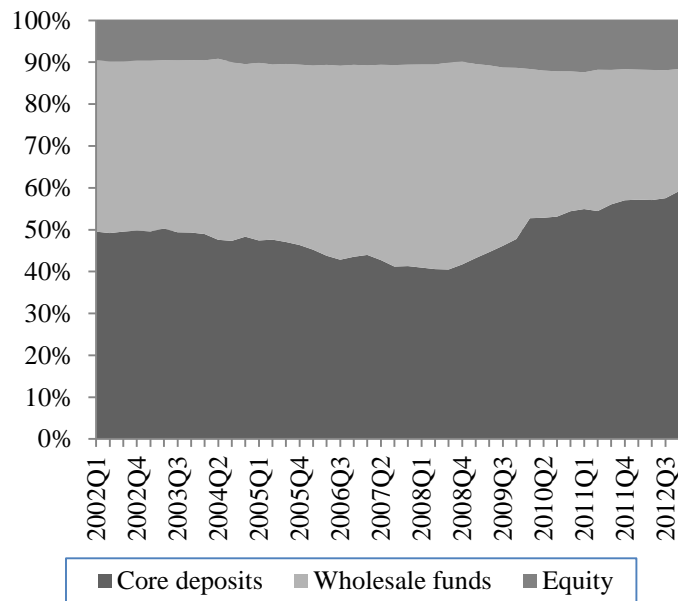
**Figure 1 Trends in Total Assets, Total Loans, Core Deposits, Wholesale Funds, and Equity**

This figure shows the trends of the quarterly dollar amount of total assets, total loans, core deposits, wholesale funds, and equity at US commercial banks from 2002:Q1 through 2012:Q4. Core deposits include transaction accounts, savings deposits, and fully insured time deposits of less than \$100,000 (less than \$250,000 from 2008:Q4). Wholesale funds include federal funds purchased, securities sold under agreements to repurchase, subordinated notes and debentures, other borrowed money, brokered deposits, and uninsured large time deposits. The axis on the left-hand side of the graph shows the trend of total assets. The axis on the right-hand side of the graph shows the trends of total loans, core deposits, wholesale funds, and equity. The data are obtained from Call Reports.



**Figure 2 Trends in Bank Funding Structure**

This figure shows the trend of bank funding structure at US commercial banks during the period 2002-2012. Core deposits include transaction accounts, savings deposits, and fully insured time deposits of less than \$100,000 (less than \$250,000 from 2008:Q4). Wholesale funds include federal funds purchased, securities sold under agreements to repurchase, subordinated notes and debentures, other borrowed money, brokered deposits, and uninsured large time deposits. Equity is bank equity capital. The funding structure data are quarterly averages. The data are obtained from Call Reports.



**Figure 3 Bank Wholesale Funding and Loan Supply: Aggregate Level**

This figure shows the relation between wholesale funding and loan supply at the aggregate level for US commercial banks between 2002 and 2012. The data are obtained from Call Reports. Figure 3.1 shows the trends of the aggregate loan supply across the level of the wholesale funding ratio (WF). Banks are divided into three categories: banks with high, medium, and low wholesale funding ratio (WF), which is the ratio of wholesale funding to total assets. Wholesale funds include federal funds purchased, securities sold under agreements to repurchase, subordinated notes and debentures, other borrowed money, brokered deposits, and uninsured large time deposits. Figures 3.2 and 3.3 show the aggregate loan supply across the wholesale funding ratio in large banks and in small banks, respectively. The axis on the left-hand side of Figure 3.3 shows aggregate loans of small banks while the axis on the right-hand side of the graph shows aggregate loans of small banks with high/medium/low wholesale funding ratios. Banks are classified as large and small banks based on total assets: large banks (greater than \$1 billion in assets) and small banks (less than or equal to \$1 billion in assets).

Figure 3.1 Total amount of loans by wholesale funds

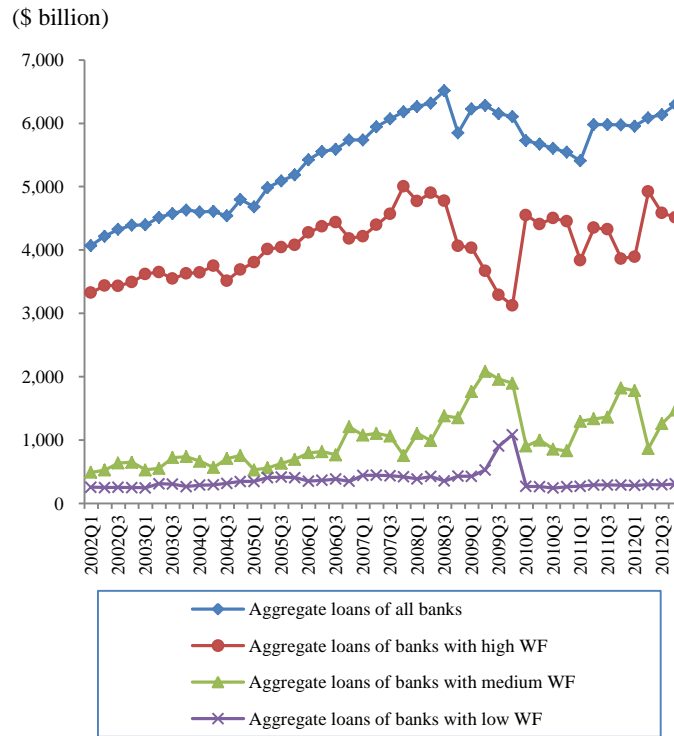


Figure 3.2 Total amount of loans by wholesale funds among large banks

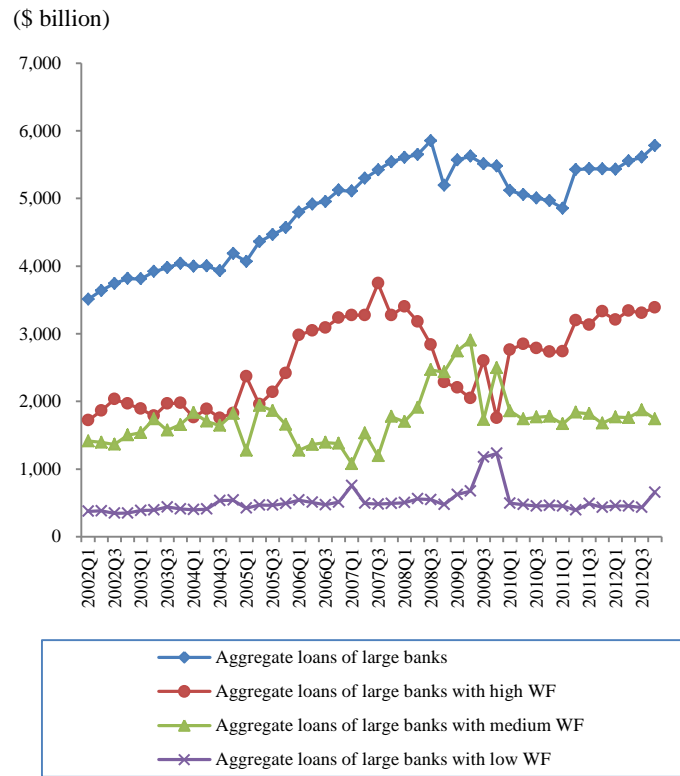
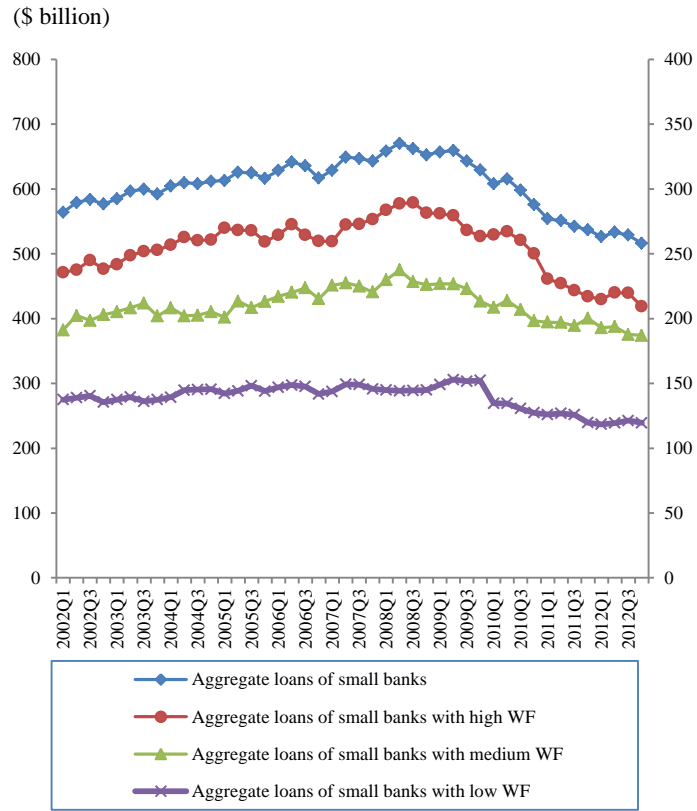


Figure 3.3 Total amount of loans by wholesale funds among small banks



**Figure 4 Bank Wholesale Funding and Credit Supply: Bank Level**

This figure shows the relation between wholesale funding and credit supply at the bank level depending on bank size (large or small banks). Three types of credit supply are defined in this figure: loans, loan commitments, and credits (loans plus loan commitments). Figures 4.1 and 4.2 show the difference in the ratio of loans to total assets (*Loans*) between high wholesale funding banks (high *WF*) and low wholesale funding banks (low *WF*) in the group of large banks and in the group of small banks, respectively. Figures 4.3 and 4.4 show the difference in the ratio of loan commitments to total assets plus loan commitments (*Loan commitments*) between high wholesale funding banks and low wholesale funding banks in the group of large banks and in the group of small banks, respectively. Figures 4.5 and 4.6 show the difference in the ratio of credits (loans plus loan commitments) to total assets plus loan commitments (*Credits*) between high wholesale funding banks and low wholesale funding banks in the group of large banks and in the group of small banks, respectively.

Figure 4.1 Difference in average *Loans* between large banks with high *WF* and those with low *WF*

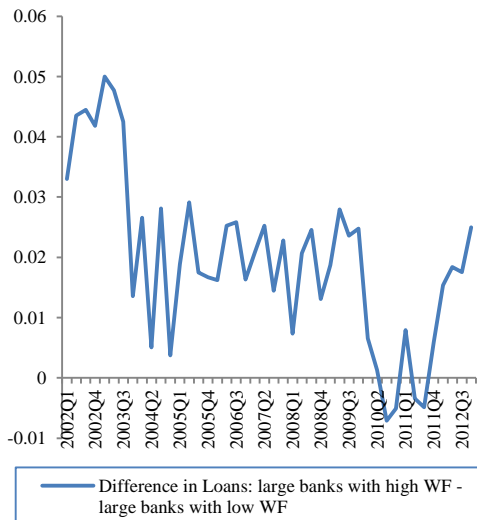


Figure 4.2 Difference in average *Loans* between small banks with high *WF* and those with low *WF*

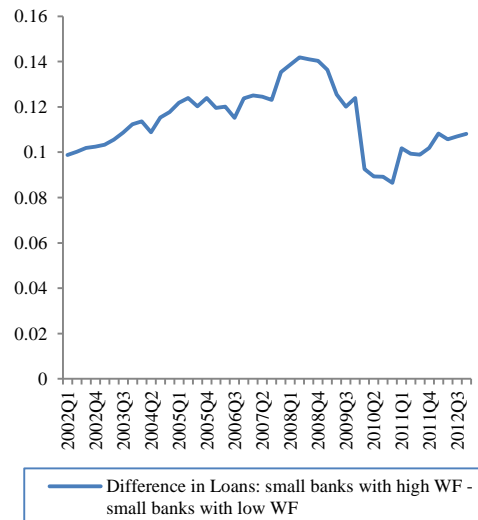


Figure 4.3 Difference in average *Loan commitments* between large banks with high *WF* and those with low *WF*

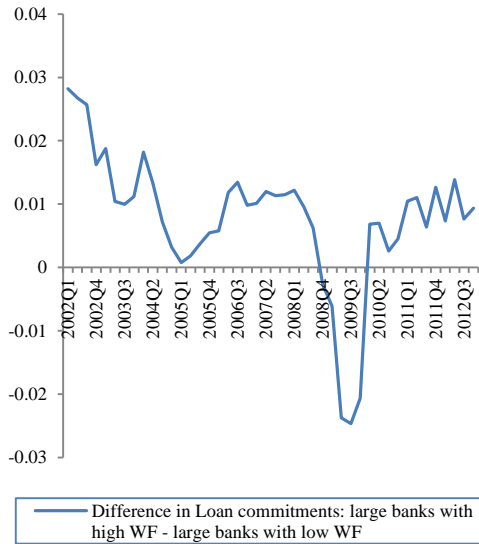


Figure 4.4 Difference in average *Loan commitments* between small banks with high *WF* and those with low *WF*

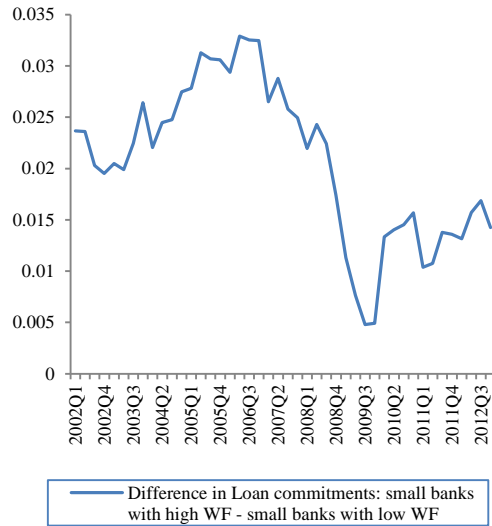


Figure 4.5 Difference in average *Credits* between large banks with high *WF* and those with low *WF*

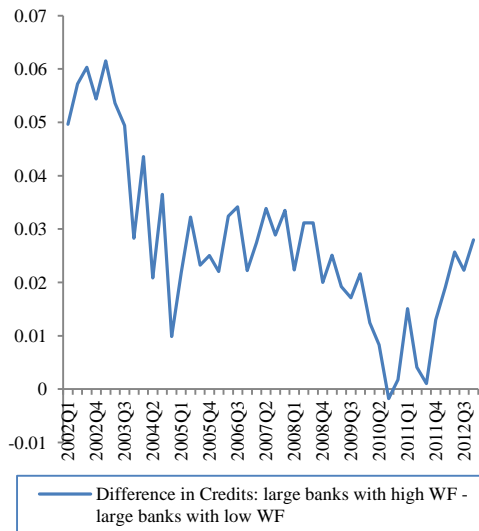
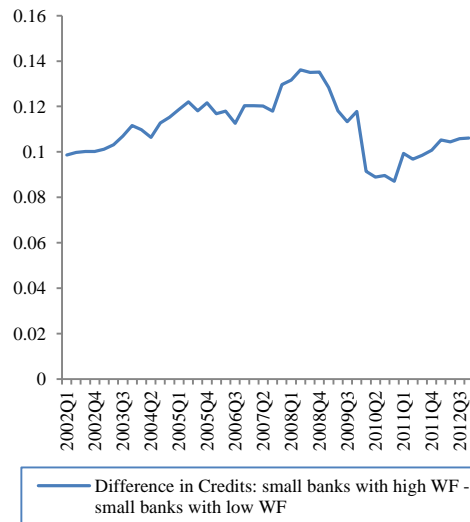


Figure 4.6 Difference in *Credits* between small banks with high *WF* and those with low *WF*





**Table 1 Variable Definitions and Data Sources**

This table presents the variable definitions and data sources.

Variable	Definition	Source
<i>Dependent variables</i>		
<i>Quantity variables</i>		
$\Delta Loans$	Changes in total loans during the quarter divided by beginning of quarter total assets. $(Total\ loans_t - Total\ loans_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations
$\Delta Loan\ commitments$	Changes in undrawn loan commitments during the quarter divided by beginning of quarter total assets. $(Loan\ commitments_t - Loan\ commitments_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations
$\Delta Credits$	Changes in loans and unused loan commitments during the quarter as a fraction of beginning of quarter total assets plus undrawn credit lines. $(Credits_t - Credits_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations
$\Delta Short-term\ loans$	Changes in short-term loans during the quarter divided by beginning of quarter total assets. $(Short-term\ loans_t - Short-term\ loans_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations
$\Delta Real\ estate\ loans$	Changes in real estate loans during the quarter divided by beginning of quarter total assets. $(Real\ estate\ loans_t - Real\ estate\ loans_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations
$\Delta C\&I\ loans$	Changes in commercial and industrial (C&I) loans during the quarter divided by beginning of quarter total assets. $(C\&I\ loans_t - C\&I\ loans_{t-1})/Total\ assets_{t-1}$	Call Reports. Authors' calculations

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*Price variables*

<i>Spreads on total loans</i>	Spreads between the implicit interest rates on total loans and the three-year treasury constant maturity rate, and expressed in annual terms. The implicit rates are calculated as the quarterly average interest incomes of total loans divided by the quarterly average amounts of total loans	Call Reports. Authors' calculations
<i>Spreads on C&amp;I loans</i>	Spreads between the implicit interest rates on C&I loans and the three-year treasury constant maturity rate, expressed in annual terms. The imputed rates are calculated as the quarterly average interest incomes of C&I loans divided by the quarterly average amounts of C&I loans.	Call Reports. Authors' calculations
<i>Spreads on real estate loans</i>	Spreads between the implicit interest rates on real estate loans and the ten-year treasury constant maturity rate, expressed in annual terms. The imputed rates are calculated as the quarterly average interest incomes of real estate loans divided by the quarterly average amounts of real estate loans.	Call Reports. Authors' calculations

*Explanatory variables*

<i>Wholesale funds (WF)</i>	Total amount of wholesale funding divided by total assets; wholesale funding is the sum of 1) federal funds purchased, 2) securities sold under agreements to repurchase 3) subordinated notes and debentures, 4) brokered deposits, 5) other borrowed money, 6) the estimated amount of deposits obtained through the use of deposit listing services that are not brokered deposits 7) deposits in foreign offices, and 8) uninsured time deposits (over \$100,000 until 2009:Q4 and \$250,000 from 2010:Q1)	Call Reports. Authors' calculations
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<i>Short-term wholesale funds (SWF)</i>	Short-term wholesale funds with a remaining maturity of one year or less(including fed funds and repos) divided by total assets	Call Reports. Authors' calculations
<i>NPL</i>	Non-performing loans divided by total loans; non-performing loans are defined as the sum of loans past due 90days or more and nonaccrual loans. A higher ratio indicates a riskier loan portfolio.	Call Reports. Authors' calculations
<i>Z-score</i>	A bank's distance to default, calculated as the sum of the return on assets and the equity capital ratio divided by the standard deviation of the return on assets. A higher value indicates lower risk of default.	Call Reports. Authors' calculations
<i>Return on assets</i>	Return on assets (ROA)	Call Reports
<i>Ln(total assets)</i>	Natural logarithm of total assets in \$ million	Call Reports
<i>Capital ratios</i>	Equity capital divided by total assets	Call Reports
<i>Deposit-weighted HHI</i>	Bank-level Herfindahl–Hirschman Index, weighted by the proportion of the bank's deposits in each MSA where the bank operates.	FDIC SOD Authors' calculations
<i>Deposit-weighted Income growth</i>	Bank-level income growth rate, weighted by the proportion of the bank's deposits in each MSA where the bank operates.	BEA Authors' calculations
<i>Deposit-weighted HPI</i>	Quarterly house price index at the MSA level, weighted by the proportion of the bank's deposits in each MSA where the bank operates.	FHFA Authors' calculations
<i>M2/GDP</i>	Money supply, calculated as M2 as a fraction of GDP	FRB

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## Table 2 Summary Statistics

This table shows summary statistics for variables employed estimations. Quantity variables are scaled by beginning of period total assets ( $\Delta Loans$ ) or beginning of period total assets plus unused loan commitments ( $\Delta Loan commitments$  and  $\Delta Credits$ ). *Credits* are defined as the sum of loans and undrawn loan commitments. Detailed information on the variables is provided in Table 1. Spreads on total loans are defined as the implicit interest rates on total loans and the three-year treasury constant maturity rate. Spreads on C&I loans are defined as the implicit interest rates on C&I loans and the three-year treasury constant maturity rate. Spreads on real estate loans are defined as the implicit interest rates on real estate loans and the ten-year treasury constant maturity rate. Variables except for  $M2/GDP$  are winsorized at the top and bottom 1% of the distribution.

Variables	Observations	Mean	SD	Min	Max
<i>Dependent variables</i>					
<i>Quantity variables</i>					
$\Delta Loans$	155,980	0.0136	0.0390	-0.0738	0.1979
$\Delta Loan commitments$	155,980	0.0025	0.0194	-0.0545	0.0832
$\Delta Credits$	155,980	0.0141	0.0426	-0.0822	0.2140
$\Delta Short-term loans$	155,980	0.0040	0.0311	-0.1003	0.1349
$\Delta C\&I loans$	155,980	0.0020	0.0130	-0.0398	0.0588
$\Delta Real estate loans$	155,980	0.0114	0.0318	-0.0568	0.1624
<i>Price variables</i>					
<i>Spreads on total loans</i>	155,980	0.0444	0.0124	-0.0064	0.1094
<i>Spreads on C&amp;I loans</i>	155,980	0.0465	0.0202	-0.0346	0.1617
<i>Spreads on real estate loans</i>	155,980	0.0302	0.0106	-0.0087	0.0932
<i>Explanatory variables</i>					
<i>Wholesale funds (WF)</i>	155,980	0.2174	0.1411	0.0079	0.7355
<i>Short-term wholesale funds (SWF)</i>	155,980	0.1532	0.1058	0.0034	0.5676
$Ln(total assets)$	155,980	5.2899	1.3167	2.6983	10.047
<i>NPL</i>	155,980	0.0168	0.0228	0	0.1237
<i>Extremely high NPL</i>	155,980	0.1497	0.3541	0	1
<i>High NPL</i>	155,980	0.1043	0.3057	0	1
<i>Z-score</i>	103,502	32.112	16.967	5.2882	100.32
<i>Return on assets</i>	155,980	0.0046	0.0075	-0.0309	0.0234
<i>Capital ratios</i>	155,980	0.1041	0.0343	0.0540	0.3127
<i>TARP amounts</i>	155,980	0.0015	0.0074	0	0.0625
<i>Deposit-weighted HHI</i>	155,980	0.7020	0.0628	0.2848	0.8399
<i>Deposit-weighted income growth</i>	155,980	0.0416	0.0319	-0.0583	0.1184
<i>Deposit-weighted HPI</i>	155,980	4.9024	0.8116	0.3950	5.6110
$M2/GDP$	155,980	0.5397	0.0430	0.4934	0.6340

**Table 3 Relationship between Credit Supply and Wholesale Funding**

This table shows the effect of wholesale funds on the loan, commitment (line of credit), and credit supply growth using the fixed effects model. The quarterly growth in loan supply is scaled by beginning of period total assets. The quarterly growth in loan commitment and credit (loan plus undrawn loan commitments) supply are scaled by beginning of period total assets plus unused loan commitments. *Crisis I*, *Crisis II*, and *Postcrisis* are respectively defined as periods 2007:Q3 through 2008:Q2, 2008:Q3 through 2009:Q2, and 2009:Q3 through 2012:Q4. Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank to control for heteroskedasticity and within-bank serial correlations. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Total wholesale funding (WF)			Panel B: Short-term wholesale funding (SWF)		
	$\Delta Loans$	$\Delta Commitments$	$\Delta Credits$	$\Delta Loans$	$\Delta Commitments$	$\Delta Credits$
	(1)	(2)	(3)	(1)	(2)	(3)
<i>WF (SWF)</i>	0.0160*** (5.29)	-0.0007 (-0.55)	0.0158*** (3.97)	0.0189*** (5.01)	0.0011 (0.71)	0.0220*** (4.53)
<i>CrisisI</i>	0.0410*** (19.18)	0.0012 (0.79)	0.0434*** (15.22)	0.0401*** (18.69)	0.0015 (1.00)	0.0430*** (15.07)
<i>WF (SWF)*CrisisI</i>	-0.0012 (-0.34)	-0.0098*** (-5.24)	-0.0121*** (-2.61)	0.0054 (1.15)	-0.0152*** (-6.01)	-0.0121* (-1.95)
<i>CrisisII</i>	0.6054*** (20.30)	0.0060 (0.26)	0.6202*** (15.44)	0.6081*** (20.39)	0.0063 (0.27)	0.6239*** (15.52)
<i>WF (SWF)*CrisisII</i>	-0.0169*** (-4.76)	-0.0197*** (-10.53)	-0.0396*** (-8.25)	-0.0180*** (-3.66)	-0.0269*** (-10.61)	-0.0492*** (-7.59)
<i>Postcrisis</i>	2.9055*** (20.07)	0.0406 (0.37)	2.9839*** (15.33)	2.9207*** (20.17)	0.0437 (0.39)	3.0052*** (15.42)
<i>WF (SWF)*Postcrisis</i>	-0.0340*** (-8.76)	-0.0062*** (-4.30)	-0.0433*** (-9.24)	-0.0359*** (-7.47)	-0.0079*** (-3.88)	-0.0468*** (-7.65)
<i>Ln(total assets)</i>	-0.0256*** (-17.70)	-0.0076*** (-17.80)	-0.0347*** (-18.81)	-0.0259*** (-17.91)	-0.0077*** (-18.28)	-0.0352*** (-19.16)
<i>Capital ratios</i>	0.2611*** (20.91)	0.0434*** (9.32)	0.3235*** (20.24)	0.2606*** (20.82)	0.0451*** (9.71)	0.3252*** (20.41)
<i>NPL</i>	-0.4725*** (-44.36)	-0.0617*** (-16.30)	-0.5360*** (-40.92)	-0.4773*** (-44.86)	-0.0629*** (-16.78)	-0.5424*** (-41.48)
<i>Return on assets</i>	-0.1360*** (-4.17)	0.0485*** (3.50)	-0.1054*** (-2.64)	-0.1337*** (-4.09)	0.0488*** (3.52)	-0.1024** (-2.56)
<i>Deposit-weighted HHI</i>	0.0018 (0.17)	0.0141*** (3.30)	0.0226* (1.72)	0.0017 (0.16)	0.0138*** (3.24)	0.0222* (1.69)
<i>Deposit-weighted income growth</i>	0.0521*** (8.04)	0.0314*** (10.90)	0.0838*** (10.11)	0.0522*** (8.08)	0.0316*** (11.02)	0.0843*** (10.18)
<i>Deposit-weighted HPI</i>	0.0007 (0.59)	-0.0013** (-2.33)	-0.0008 (-0.51)	0.0007 (0.64)	-0.0013** (-2.29)	-0.0008 (-0.46)
<i>M2/GDP</i>	-26.0653*** (-20.00)	-0.3277 (-0.33)	-26.7274*** (-15.25)	-26.2141*** (-20.11)	-0.3556 (-0.36)	-26.9305*** (-15.35)
<i>Constant</i>	13.2743*** (20.16)	0.1989 (0.39)	13.6445*** (15.42)	13.3510*** (20.28)	0.2131 (0.42)	13.7490*** (15.52)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.2116	0.0437	0.1924	0.2110	0.0438	0.1918
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

**Table 4 Relationship between Credit Supply and Wholesale Funding: Loan Components**

This table shows the effect of wholesale funding on the short-term loan, real estate loan, and C&I loan supply growth using the fixed effects model. The quarterly growth in short-term loans, real estate loans, and corporate loans is scaled by beginning of period total assets. *Crisis I*, *Crisis II*, and *Postcrisis* are respectively defined as periods 2007:Q3 through 2008:Q2, 2008:Q3 through 2009:Q2, and 2009:Q3 through 2012:Q4. Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank to control for heteroskedasticity and within-bank serial correlation. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Total wholesale funding (WF)			Panel B: Short-term wholesale funding (SWF)		
	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(1)	(2)	(3)
<i>WF (SWF)</i>	0.0098*** (5.20)	0.0138*** (5.69)	0.0037*** (4.21)	0.0095*** (4.02)	0.0161*** (5.23)	0.0047*** (4.46)
<i>CrisisI</i>	0.0325*** (16.35)	0.0205*** (10.90)	0.0068*** (7.63)	0.0315*** (15.92)	0.0197*** (10.43)	0.0067*** (7.60)
<i>WF (SWF)*CrisisI</i>	-0.0096*** (-3.88)	-0.0028 (-0.95)	0.0002 (0.16)	-0.0070** (-2.13)	0.0025 (0.62)	0.0005 (0.35)
<i>CrisisII</i>	0.4557*** (15.18)	0.2844*** (10.74)	0.0882*** (6.56)	0.4562*** (15.20)	0.2870*** (10.84)	0.0885*** (6.58)
<i>WF (SWF)*CrisisII</i>	-0.0133*** (-5.42)	-0.0142*** (-4.78)	-0.0028*** (-2.74)	-0.0174*** (-5.17)	-0.0132*** (-3.25)	-0.0046*** (-3.48)
<i>Postcrisis</i>	2.2132*** (15.17)	1.3507*** (10.52)	0.4224*** (6.48)	2.2147*** (15.18)	1.3666*** (10.64)	0.4233*** (6.48)
<i>WF (SWF)*Postcrisis</i>	-0.0224*** (-10.07)	-0.0268*** (-8.99)	-0.0061*** (-5.24)	-0.0251*** (-8.81)	-0.0265*** (-6.98)	-0.0081*** (-5.65)
<i>Ln(total assets)</i>	-0.0103*** (-15.10)	-0.0189*** (-16.46)	-0.0046*** (-12.49)	-0.0104*** (-15.24)	-0.0192*** (-16.70)	-0.0046*** (-12.29)
<i>Capital ratios</i>	0.0930*** (12.93)	0.1809*** (18.08)	0.0529*** (15.25)	0.0924*** (12.88)	0.1804*** (18.02)	0.0526*** (15.13)
<i>NPL</i>	-0.2053*** (-28.25)	-0.3846*** (-44.83)	-0.0626*** (-20.08)	-0.2089*** (-28.72)	-0.3886*** (-45.27)	-0.0631*** (-20.37)
<i>Return on assets</i>	0.0557*** (2.58)	-0.0832*** (-3.22)	-0.0107 (-1.05)	0.0553** (2.55)	-0.0803*** (-3.10)	-0.0112 (-1.09)
<i>Deposit-weighted HHI</i>	0.0081 (1.27)	0.0039 (0.46)	-0.0026 (-0.85)	0.0079 (1.23)	0.0038 (0.45)	-0.0026 (-0.86)
<i>Deposit-weighted income growth</i>	0.0284*** (6.28)	0.0483*** (8.86)	0.0026 (1.30)	0.0278*** (6.16)	0.0487*** (8.94)	0.0024 (1.20)
<i>Deposit-weighted HPI</i>	-0.0010 (-1.37)	0.0021** (2.24)	-0.0002 (-0.72)	-0.0009 (-1.27)	0.0021** (2.28)	-0.0002 (-0.70)
<i>M2/GDP</i>	-19.8510*** (-15.11)	-12.0923*** (-10.47)	-3.7937*** (-6.46)	-19.8734*** (-15.13)	-12.2447*** (-10.60)	-3.8029*** (-6.47)
<i>Constant</i>	10.0647*** (15.18)	6.1828*** (10.60)	1.9388*** (6.54)	10.0767*** (15.19)	6.2614*** (10.73)	1.9434*** (6.55)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.0674	0.1856	0.0491	0.0671	0.1849	0.0491
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

**Table 5 Relationship between Credit Supply and Wholesale Funding: TARP**

This table reports the effect of wholesale funding on credit supply growth (total loans, loan commitments, credits, short-term, real estate, and C&I loans), controlling for the impact of the TARP. The quarterly growth in (short-term, real estate, C&I, and total) loan supply is scaled by beginning of period total assets. The quarterly growth in loan commitment and credit (loan plus loan commitment) supply are scaled by beginning of period total assets plus unused loan commitments. Detailed information on variables is provided in Table 1. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Total wholesale funding (WF)						
	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>WF</i>	0.0152*** (5.04)	-0.0010 (-0.80)	0.0147*** (3.70)	0.0097*** (5.14)	0.0132*** (5.44)	0.0035*** (3.99)
<i>CrisisI</i>	0.0409*** (19.12)	0.0011 (0.75)	0.0433*** (15.15)	0.0324*** (16.34)	0.0204*** (10.84)	0.0068*** (7.60)
<i>WF*CrisisI</i>	-0.0012 (-0.36)	-0.0098*** (-5.26)	-0.0122*** (-2.63)	-0.0096*** (-3.88)	-0.0028 (-0.97)	0.0002 (0.15)
<i>CrisisII</i>	0.6038*** (20.24)	0.0054 (0.23)	0.6180*** (15.38)	0.4555*** (15.17)	0.2832*** (10.69)	0.0878*** (6.53)
<i>WF*CrisisII</i>	-0.0159*** (-4.49)	-0.0193*** (-10.36)	-0.0382*** (-7.99)	-0.0132*** (-5.35)	-0.0134*** (-4.52)	-0.0026** (-2.51)
<i>Postcrisis</i>	2.8982*** (20.01)	0.0377 (0.34)	2.9737*** (15.27)	2.2123*** (15.17)	1.3452*** (10.47)	0.4206*** (6.45)
<i>WF*Postcrisis</i>	-0.0325*** (-8.33)	-0.0056*** (-3.89)	-0.0412*** (-8.77)	-0.0222*** (-9.89)	-0.0257*** (-8.56)	-0.0057*** (-4.89)
<i>Ln(total assets)</i>	-0.0254*** (-17.47)	-0.0075*** (-17.49)	-0.0344*** (-18.55)	-0.0103*** (-15.00)	-0.0187*** (-16.24)	-0.0046*** (-12.38)
<i>Capital ratios</i>	0.2638*** (21.03)	0.0445*** (9.53)	0.3273*** (20.38)	0.0933*** (12.93)	0.1830*** (18.21)	0.0536*** (15.36)
<i>NPL</i>	-0.4697*** (-44.16)	-0.0605*** (-15.91)	-0.5319*** (-40.69)	-0.2049*** (-28.07)	-0.3824*** (-44.50)	-0.0618*** (-19.85)
<i>Return on assets</i>	-0.1401*** (-4.30)	0.0469*** (3.39)	-0.1111*** (-2.78)	0.0552** (2.55)	-0.0863*** (-3.34)	-0.0118 (-1.15)
<i>Deposit-weighted HHI</i>	0.0019 (0.18)	0.0141*** (3.31)	0.0227* (1.73)	0.0082 (1.27)	0.0039 (0.46)	-0.0026 (-0.84)
<i>Deposit-weighted income growth</i>	0.0519*** (8.01)	0.0313*** (10.89)	0.0835*** (10.08)	0.0284*** (6.27)	0.0482*** (8.83)	0.0026 (1.28)
<i>Deposit-weighted HPI</i>	0.0005 (0.42)	-0.0014** (-2.45)	-0.0011 (-0.67)	-0.0010 (-1.39)	0.0020** (2.06)	-0.0003 (-0.88)
<i>M2/GDP</i>	-25.9993*** (-19.94)	-0.3013 (-0.30)	-26.6349*** (-15.19)	-19.8429*** (-15.11)	-12.0418*** (-10.42)	-3.7772*** (-6.43)
<i>TARP amounts</i>	-0.1304*** (-4.72)	-0.0522*** (-4.57)	-0.1826*** (-5.13)	-0.0162 (-1.01)	-0.0997*** (-4.55)	-0.0324*** (-3.41)
<i>Constant</i>	13.2405*** (20.11)	0.1854 (0.37)	13.5972*** (15.36)	10.0605*** (15.17)	6.1570*** (10.55)	1.9304*** (6.51)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.2120	0.0439	0.1928	0.0674	0.1859	0.0493
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

Panel B: Short-term wholesale funding (SWF)

	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SWF</i>	0.0179*** (4.76)	0.0008 (0.49)	0.0207*** (4.26)	0.0094*** (3.96)	0.0154*** (4.99)	0.0044*** (4.25)
<i>CrisisI</i>	0.0400*** (18.62)	0.0014 (0.97)	0.0429*** (15.00)	0.0315*** (15.91)	0.0196*** (10.38)	0.0067*** (7.57)
<i>SWF*CrisisI</i>	0.0053 (1.12)	-0.0152*** (-6.05)	-0.0124** (-1.99)	-0.0070** (-2.14)	0.0024 (0.59)	0.0005 (0.32)
<i>CrisisII</i>	0.6064*** (20.32)	0.0056 (0.25)	0.6215*** (15.46)	0.4560*** (15.19)	0.2857*** (10.78)	0.0881*** (6.55)
<i>SWF*CrisisII</i>	-0.0167*** (-3.39)	-0.0263*** (-10.42)	-0.0474*** (-7.31)	-0.0172*** (-5.09)	-0.0122*** (-2.99)	-0.0043*** (-3.24)
<i>Postcrisis</i>	2.9128*** (20.11)	0.0407 (0.37)	2.9942*** (15.36)	2.2136*** (15.17)	1.3605*** (10.59)	0.4214*** (6.46)
<i>SWF*Postcrisis</i>	-0.0339*** (-7.02)	-0.0071*** (-3.50)	-0.0441*** (-7.17)	-0.0249*** (-8.64)	-0.0250*** (-6.54)	-0.0077*** (-5.28)
<i>Ln(total assets)</i>	-0.0256*** (-17.67)	-0.0076*** (-17.95)	-0.0348*** (-18.89)	-0.0103*** (-15.13)	-0.0190*** (-16.47)	-0.0045*** (-12.17)
<i>Capital ratios</i>	0.2635*** (20.96)	0.0462*** (9.93)	0.3292*** (20.56)	0.0928*** (12.89)	0.1827*** (18.17)	0.0533*** (15.24)
<i>NPL</i>	-0.4741*** (-44.59)	-0.0616*** (-16.35)	-0.5379*** (-41.17)	-0.2084*** (-28.50)	-0.3861*** (-44.85)	-0.0623*** (-20.11)
<i>Return on assets</i>	-0.1380*** (-4.22)	0.0472*** (3.41)	-0.1083*** (-2.70)	0.0547** (2.52)	-0.0836*** (-3.23)	-0.0122 (-1.19)
<i>Deposit-weighted HHI</i>	0.0018 (0.17)	0.0138*** (3.25)	0.0223* (1.70)	0.0080 (1.23)	0.0039 (0.46)	-0.0026 (-0.85)
<i>Deposit-weighted income growth</i>	0.0520*** (8.05)	0.0315*** (11.01)	0.0840*** (10.16)	0.0278*** (6.16)	0.0485*** (8.91)	0.0024 (1.18)
<i>Deposit-weighted HPI</i>	0.0005 (0.45)	-0.0014** (-2.42)	-0.0011 (-0.64)	-0.0010 (-1.30)	0.0020** (2.09)	-0.0003 (-0.86)
<i>M2/GDP</i>	-26.1418*** (-20.05)	-0.3282 (-0.33)	-26.8304*** (-15.29)	-19.8630*** (-15.12)	-12.1887*** (-10.54)	-3.7856*** (-6.44)
<i>TARP amounts</i>	-0.1373*** (-4.97)	-0.0521*** (-4.52)	-0.1901*** (-5.31)	-0.0197 (-1.24)	-0.1064*** (-4.87)	-0.0328*** (-3.44)
<i>Constant</i>	13.3140*** (20.22)	0.1991 (0.39)	13.6977*** (15.46)	10.0714*** (15.18)	6.2328*** (10.68)	1.9346*** (6.52)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.2114	0.0440	0.1923	0.0671	0.1853	0.0493
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980



**Table 6 Relationship between Credit Supply, Wholesale Funding, and Bank Risk: Quantity**

This table shows regression estimates on whether a risky bank with more wholesale funds increases credit supply in term of loans, loan commitments, credits, short-term loans, real estate loans, and C&I loans. *Crisis I*, *Crisis II*, and *Postcrisis* are respectively defined as periods 2007:Q3 through 2008:Q2, 2008:Q3 through 2009:Q2, and 2009:Q3 through 2012:Q4. Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank to control for heteroskedasticity and within-bank serial correlations. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Total wholesale funding (WF)					
	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>WF</i>	0.0267*** (7.36)	0.0010 (0.77)	0.0282*** (6.10)	0.0158*** (7.27)	0.0220*** (7.79)	0.0053*** (5.01)
<i>NPL</i>	-0.3094*** (-6.43)	-0.0558*** (-3.64)	-0.3658*** (-6.13)	-0.0919*** (-3.70)	-0.2181*** (-6.22)	-0.0565*** (-4.30)
<i>WF*NPL</i>	-1.1317*** (-4.42)	-0.1718** (-2.41)	-1.3169*** (-4.17)	-0.6134*** (-4.93)	-0.8758*** (-4.93)	-0.1652** (-2.43)
<i>CrisisI</i>	0.0408*** (18.33)	0.0016 (1.02)	0.0443*** (14.40)	0.0322*** (15.81)	0.0209*** (10.74)	0.0068*** (7.54)
<i>NPL*CrisisI</i>	-0.1312** (-2.04)	-0.0712** (-2.25)	-0.2368** (-2.42)	-0.0950* (-1.92)	-0.1565*** (-3.19)	-0.0199 (-0.83)
<i>WF*CrisisI</i>	-0.0010 (-0.23)	-0.0100*** (-4.23)	-0.0145** (-2.25)	-0.0066** (-2.15)	-0.0027 (-0.76)	-0.0006 (-0.38)
<i>WF*NPL*CrisisI</i>	0.4924* (1.71)	0.1282 (1.08)	0.7981* (1.87)	0.0811 (0.45)	0.3810** (1.98)	0.1335 (1.38)
<i>CrisisII</i>	0.6044*** (20.22)	0.0073 (0.32)	0.6214*** (15.43)	0.4519*** (15.07)	0.2811*** (10.61)	0.0893*** (6.64)
<i>NPL*CrisisII</i>	-0.0714 (-1.25)	-0.0356 (-1.58)	-0.1259* (-1.78)	-0.0857** (-2.32)	-0.0725* (-1.67)	-0.0051 (-0.28)
<i>WF*CrisisII</i>	-0.0173*** (-3.70)	-0.0204*** (-8.49)	-0.0427*** (-6.83)	-0.0088*** (-2.78)	-0.0113*** (-3.02)	-0.0046*** (-3.22)
<i>WF*NPL*CrisisII</i>	0.7704*** (2.86)	0.1799** (2.07)	1.0363*** (3.12)	0.2899** (1.97)	0.4746** (2.56)	0.1796** (2.25)
<i>Postcrisis</i>	2.9067*** (20.03)	0.0457 (0.41)	2.9922*** (15.33)	2.1975*** (15.07)	1.3404*** (10.43)	0.4281*** (6.56)
<i>WF*Postcrisis</i>	-0.0423*** (-8.63)	-0.0091*** (-4.82)	-0.0554*** (-9.20)	-0.0232*** (-8.52)	-0.0320*** (-8.80)	-0.0079*** (-5.11)
<i>NPL*Postcrisis</i>	-0.1086** (-2.18)	0.0108 (0.69)	-0.1059* (-1.73)	-0.0527** (-2.06)	-0.1262*** (-3.49)	0.0024 (0.18)
<i>WF*NPL*Postcrisis</i>	1.0476*** (3.98)	0.1911*** (2.60)	1.2764*** (3.96)	0.4580*** (3.58)	0.7852*** (4.29)	0.1657** (2.32)
<i>Ln(total assets)</i>	-0.0251*** (-17.42)	-0.0073*** (-17.40)	-0.0340*** (-18.54)	-0.0100*** (-14.78)	-0.0186*** (-16.23)	-0.0045*** (-12.17)
<i>Capital ratios</i>	0.2648*** (21.18)	0.0452*** (9.75)	0.3289*** (20.55)	0.0951*** (13.22)	0.1829*** (18.22)	0.0538*** (15.48)
<i>Return on assets</i>	-0.1246*** (-3.84)	0.0574*** (4.13)	-0.0847** (-2.13)	0.0575*** (2.67)	-0.0806*** (-3.13)	-0.0060 (-0.58)
<i>Deposit-weighted HHI</i>	0.0005 (0.05)	0.0134*** (3.13)	0.0207 (1.57)	0.0072 (1.13)	0.0032 (0.38)	-0.0030 (-0.97)
<i>Deposit-weighted income growth</i>	0.0506*** (7.82)	0.0303*** (10.56)	0.0815*** (9.85)	0.0262*** (5.82)	0.0471*** (8.63)	0.0025 (1.23)
<i>Deposit-weighted HPI</i>	0.0009 (0.76)	-0.0012** (-2.16)	-0.0006 (-0.35)	-0.0008 (-1.06)	0.0022** (2.38)	-0.0002 (-0.61)
<i>M2/GDP</i>	-26.0794*** (-19.96)	-0.3779 (-0.38)	-26.8074*** (-15.25)	-19.7166*** (-15.02)	-11.9971*** (-10.37)	-3.8476*** (-6.54)
<i>Constant</i>	13.2769*** (20.12)	0.2229 (0.44)	13.6794*** (15.41)	9.9935*** (15.07)	6.1315*** (10.49)	1.9654*** (6.62)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.2137	0.0444	0.1943	0.0691	0.1875	0.0497
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

Panel B: Short-term wholesale funding (SWF)

	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SWF</i>	0.0299*** (6.56)	0.0033* (1.80)	0.0355*** (6.12)	0.0158*** (5.82)	0.0248*** (6.84)	0.0064*** (5.03)
<i>NPL</i>	-0.3675*** (-9.17)	-0.0598*** (-3.97)	-0.4234*** (-8.47)	-0.1224*** (-5.60)	-0.2596*** (-8.55)	-0.0632*** (-5.54)
<i>SWF*NPL</i>	-1.2466*** (-4.18)	-0.2216** (-2.21)	-1.5177*** (-4.09)	-0.6861*** (-4.49)	-0.9920*** (-4.63)	-0.1928** (-2.26)
<i>CrisisI</i>	0.0395*** (17.64)	0.0016 (1.03)	0.0428*** (14.32)	0.0312*** (15.40)	0.0198*** (10.06)	0.0067*** (7.34)
<i>NPL*CrisisI</i>	-0.0519 (-0.88)	-0.0409 (-1.42)	-0.1101 (-1.44)	-0.0680 (-1.44)	-0.1027** (-2.11)	-0.0048 (-0.23)
<i>SWF*CrisisI</i>	0.0088 (1.47)	-0.0140*** (-4.56)	-0.0097 (-1.23)	-0.0026 (-0.66)	0.0045 (0.93)	0.0002 (0.11)
<i>SWF*NPL*CrisisI</i>	0.2668 (0.76)	0.0334 (0.22)	0.4800 (1.03)	-0.0487 (-0.21)	0.2480 (0.95)	0.1134 (0.98)
<i>CrisisII</i>	0.6080*** (20.34)	0.0071 (0.31)	0.6253*** (15.52)	0.4525*** (15.08)	0.2844*** (10.73)	0.0897*** (6.66)
<i>NPL*CrisisII</i>	-0.0174 (-0.36)	-0.0279 (-1.30)	-0.0643 (-1.07)	-0.0377 (-1.10)	-0.0514 (-1.32)	0.0057 (0.36)
<i>SWF*CrisisII</i>	-0.0157** (-2.50)	-0.0271*** (-8.31)	-0.0496*** (-5.96)	-0.0085** (-2.06)	-0.0090* (-1.77)	-0.0064*** (-3.48)
<i>SWF*NPL*CrisisII</i>	0.7514** (2.41)	0.2025* (1.69)	1.0851*** (2.78)	0.1579 (0.86)	0.5041** (2.23)	0.1981** (1.97)
<i>Postcrisis</i>	2.9285*** (20.17)	0.0464 (0.42)	3.0177*** (15.44)	2.2016*** (15.10)	1.3592*** (10.57)	0.4296*** (6.58)
<i>SWF*Postcrisis</i>	-0.0472*** (-7.99)	-0.0097*** (-3.86)	-0.0617*** (-8.11)	-0.0271*** (-7.76)	-0.0327*** (-7.21)	-0.0104*** (-5.67)
<i>NPL*Postcrisis</i>	-0.0734* (-1.76)	0.0195 (1.27)	-0.0677 (-1.31)	-0.0380 (-1.64)	-0.0966*** (-3.03)	0.0066 (0.54)
<i>SWF*NPL*Postcrisis</i>	1.2472*** (4.09)	0.2058** (2.00)	1.5392*** (4.06)	0.5538*** (3.48)	0.9170*** (4.14)	0.2046** (2.32)
<i>Ln(total assets)</i>	-0.0254*** (-17.55)	-0.0074*** (-17.84)	-0.0345*** (-18.81)	-0.0100*** (-14.85)	-0.0189*** (-16.40)	-0.0045*** (-11.93)
<i>Capital ratios</i>	0.2637*** (21.05)	0.0467*** (10.09)	0.3298*** (20.68)	0.0943*** (13.14)	0.1820*** (18.13)	0.0534*** (15.33)
<i>Return on assets</i>	-0.1192*** (-3.65)	0.0562*** (4.03)	-0.0799** (-2.00)	0.0584*** (2.69)	-0.0766*** (-2.95)	-0.0061 (-0.59)
<i>Deposit-weighted HHI</i>	0.0004 (0.04)	0.0131*** (3.07)	0.0204 (1.56)	0.0069 (1.07)	0.0030 (0.36)	-0.0029 (-0.96)
<i>Deposit-weighted income growth</i>	0.0506*** (7.84)	0.0304*** (10.63)	0.0817*** (9.88)	0.0255*** (5.68)	0.0473*** (8.69)	0.0023 (1.13)
<i>Deposit-weighted HPI</i>	0.0009 (0.78)	-0.0012** (-2.09)	-0.0005 (-0.32)	-0.0007 (-0.97)	0.0023** (2.42)	-0.0002 (-0.60)
<i>M2/GDP</i>	-26.2872*** (-20.11)	-0.3866 (-0.39)	-27.0508*** (-15.38)	-19.7626*** (-15.05)	-12.1778*** (-10.52)	-3.8649*** (-6.57)
<i>Constant</i>	13.3846*** (20.28)	0.2274 (0.45)	13.8052*** (15.54)	10.0179*** (15.11)	6.2251*** (10.65)	1.9742*** (6.64)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.2127	0.0445	0.1934	0.0686	0.1864	0.0497
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

**Table 7 Relationship between Loan Spreads, Wholesale Funding, and Bank Risk: Price**

This table reports regression estimates on whether a risky bank with more wholesale funds raises loan interest rates. Spreads on total loans and C&I loans (real estate loans) are defined as the difference between the implicit loan rates and the 3-year (10-year) treasury constant maturity rate.  $WF*NPL*Crisis$  represents an interaction between  $WF$ ,  $NPL$ , and  $Crisis$ . Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Total wholesale funding (WF)			Panel B: Short-term wholesale funding (SWF)		
	Spreads on total loans	Spreads on real estate loans	Spreads on C&I loans	Spreads on total loans	Spreads on real estate loans	Spreads on C&I loans
	(1)	(2)	(3)	(1)	(2)	(3)
<i>WF (SWF)</i>	0.0015** (2.10)	0.0028*** (3.34)	0.0033* (1.94)	0.0042*** (5.06)	0.0056*** (5.86)	0.0053*** (2.52)
<i>NPL</i>	0.0100 (1.11)	0.0102 (0.89)	0.0459* (1.91)	0.0133 (1.56)	0.0147 (1.39)	0.0275 (1.33)
<i>WF (SWF)*NPL</i>	-0.1224*** (-3.35)	-0.1269*** (-2.87)	-0.3188*** (-2.76)	-0.2035*** (-4.19)	-0.2193*** (-3.75)	-0.3358*** (-2.36)
<i>CrisisI</i>	0.0046*** (13.25)	0.0092*** (21.71)	0.0103*** (10.02)	0.0044*** (12.76)	0.0090*** (21.37)	0.0105*** (10.29)
<i>NPL*CrisisI</i>	-0.0485*** (-3.03)	-0.0465*** (-2.82)	-0.0608* (-1.67)	-0.0504*** (-3.25)	-0.0497*** (-3.18)	-0.0456 (-1.36)
<i>WF (SWF)*CrisisI</i>	0.0006 (0.97)	0.0012 (1.44)	-0.0008 (-0.41)	0.0012 (1.37)	0.0020* (1.87)	-0.0025 (-0.99)
<i>WF (SWF)*NPL*CrisisI</i>	-0.0190 (-0.40)	-0.0633 (-1.12)	0.1798 (1.33)	0.0004 (0.01)	-0.0512 (-0.68)	0.1632 (0.94)
<i>CrisisII</i>	0.0299*** (8.59)	0.0202*** (3.90)	0.0395*** (3.02)	0.0299*** (8.60)	0.0202*** (3.90)	0.0396*** (3.03)
<i>NPL*CrisisII</i>	-0.0853*** (-6.55)	-0.0878*** (-6.19)	-0.0941*** (-2.62)	-0.0881*** (-7.03)	-0.0930*** (-6.80)	-0.0693** (-2.14)
<i>WF (SWF)*CrisisII</i>	-0.0097*** (-11.05)	-0.0111*** (-10.79)	-0.0103*** (-4.49)	-0.0155*** (-13.78)	-0.0169*** (-13.21)	-0.0133*** (-4.36)
<i>WF (SWF)*NPL*CrisisII</i>	0.0905** (2.06)	0.0762 (1.59)	0.3279*** (2.26)	0.1532*** (2.60)	0.1454** (2.26)	0.3184* (1.73)
<i>Postcrisis</i>	0.0880*** (5.21)	0.0607** (2.41)	0.1325** (2.08)	0.0874*** (5.18)	0.0600** (2.38)	0.1345** (2.11)
<i>WF (SWF)*Postcrisis</i>	-0.0054*** (-5.42)	-0.0071*** (-5.49)	-0.0089*** (-3.06)	-0.0101*** (-8.78)	-0.0125*** (-8.80)	-0.0118*** (-3.69)
<i>NPL*Postcrisis</i>	-0.0574*** (-5.75)	-0.0661*** (-5.41)	-0.0676** (-2.51)	-0.0579*** (-6.15)	-0.0675*** (-5.88)	-0.0497** (-2.10)
<i>WF (SWF)*NPL*Postcrisis</i>	0.0868** (2.25)	0.0913** (2.02)	0.3241** (2.56)	0.1366*** (2.72)	0.1483** (2.50)	0.3408** (2.19)
<i>Ln(total assets)</i>	0.0005* (1.83)	0.0008*** (3.12)	-0.0007 (-1.38)	0.0006** (1.97)	0.0009*** (3.38)	-0.0007 (-1.44)
<i>Capital ratios</i>	0.0164*** (7.41)	0.0162*** (6.92)	0.0039 (0.80)	0.0172*** (7.77)	0.0167*** (7.17)	0.0045 (0.92)
<i>Return on assets</i>	0.1426*** (22.82)	0.1335*** (20.02)	0.1227*** (8.88)	0.1405*** (22.60)	0.1311*** (19.90)	0.1223*** (8.80)
<i>Deposit-weighted HHI</i>	0.0096*** (3.55)	0.0049* (1.70)	0.0096 (1.58)	0.0092*** (3.43)	0.0045 (1.56)	0.0095 (1.56)
<i>Deposit-weighted income growth</i>	0.0148*** (10.86)	0.0166*** (10.24)	0.0160*** (4.84)	0.0148*** (11.00)	0.0166*** (10.35)	0.0160*** (4.85)
<i>Deposit-weighted HPI</i>	-0.0008*** (-2.62)	-0.0003 (-1.21)	0.0002 (0.40)	-0.0007*** (-2.58)	-0.0003 (-1.13)	0.0003 (0.40)
<i>M2/GDP</i>	-0.6479*** (-4.27)	-0.3915* (-1.73)	-1.0068* (-1.76)	-0.6419*** (-4.23)	-0.3856* (-1.70)	-1.0258* (-1.79)
<i>Constant</i>	0.3589*** (4.68)	0.2143* (1.87)	0.5410* (1.87)	0.3555*** (4.64)	0.2110* (1.84)	0.5507* (1.90)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.7440	0.4229	0.2122	0.7453	0.4252	0.2121
<i>Observations</i>	155,980	155,980	155,980	155,980	155,980	155,980

**Table 8 Relationship between Credit Supply, Wholesale Funding, and Bank Risk: Z-score**

This table shows the effect of an interaction between wholesale funding and bank risk—proxied by Z-score—on the credit supply growth: loans, loan commitments, credits, short-term loans, real estate loans, and C&I loans. Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Total wholesale funding (WF)						
	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>WF</i>	0.0203*** (2.61)	-0.0069* (-1.69)	0.0085 (0.74)	0.0090* (1.85)	0.0176*** (2.71)	0.0044** (2.01)
<i>Z-score</i>	0.0003 (0.07)	-0.0051* (-1.93)	-0.0056 (-0.79)	-0.0016 (-0.54)	-0.0003 (-0.08)	-0.0003 (-0.20)
<i>WF*Z-score</i>	0.0200 (0.96)	0.0296** (2.37)	0.0641* (1.94)	0.0115 (0.95)	0.0160 (0.90)	0.0039 (0.64)
<i>CrisisI</i>	0.0048** (2.05)	-0.0049*** (-4.00)	0.0008 (0.26)	0.0022 (1.24)	0.0013 (0.70)	0.0011 (1.48)
<i>Z-score*CrisisI</i>	0.0001 (0.05)	0.0059** (2.05)	0.0049 (0.66)	0.0028 (0.65)	0.0012 (0.25)	0.0005 (0.29)
<i>WF*CrisisI</i>	-0.0124 (-1.45)	-0.0043 (-0.97)	-0.0166 (-1.48)	-0.0159** (-2.40)	-0.0109 (-1.52)	-0.0024 (-0.89)
<i>WF*Z-score*CrisisI</i>	0.0018 (0.08)	-0.0203 (-1.64)	-0.0224 (-0.71)	0.0018 (0.10)	0.0037 (0.18)	0.0003 (0.04)
<i>CrisisII</i>	-0.0139*** (-5.65)	-0.0059*** (-4.34)	-0.0204*** (-6.16)	-0.0092*** (-4.82)	-0.0067*** (-3.33)	-0.0050*** (-6.63)
<i>Z-score*CrisisII</i>	0.0096 (1.62)	0.0127*** (3.57)	0.0271*** (3.19)	0.0119*** (2.74)	0.0034 (0.69)	0.0041** (2.16)
<i>WF*CrisisII</i>	-0.0240*** (-2.88)	-0.0086 (-1.64)	-0.0249** (-2.00)	-0.0173*** (-2.87)	-0.0247*** (-3.51)	-0.0007 (-0.30)
<i>WF*Z-score*CrisisII</i>	0.0005 (0.02)	-0.0388** (-2.31)	-0.0708* (-1.84)	0.0055 (0.34)	0.0156 (0.76)	-0.0107* (-1.73)
<i>Postcrisis</i>	-0.0158*** (-7.66)	-0.0060*** (-5.81)	-0.0217*** (-7.64)	-0.0032** (-2.23)	-0.0131*** (-7.60)	-0.0030*** (-4.76)
<i>WF*Postcrisis</i>	-0.0490*** (-6.35)	-0.0008 (-0.19)	-0.0468*** (-4.02)	-0.0311*** (-5.96)	-0.0367*** (-5.46)	-0.0080*** (-3.43)
<i>Z-score*Postcrisis</i>	0.0157*** (3.43)	0.0070*** (2.67)	0.0248*** (3.53)	0.0087*** (3.07)	0.0135*** (3.54)	0.0025* (1.73)
<i>WF*Z-score*Postcrisis</i>	0.0072 (0.33)	-0.0341** (-2.38)	-0.0480 (-1.33)	0.0094 (0.71)	0.0021 (0.12)	-0.0015 (-0.21)
<i>Ln(total assets)</i>	-0.0189*** (-11.03)	-0.0080*** (-12.91)	-0.0283*** (-12.45)	-0.0093*** (-10.19)	-0.0138*** (-10.32)	-0.0036*** (-8.24)
<i>Capital ratios</i>	0.1542*** (8.03)	0.0244*** (3.30)	0.1794*** (7.07)	0.0399*** (3.41)	0.0985*** (6.39)	0.0350*** (6.91)
<i>Return on assets</i>	0.5461*** (16.77)	0.1697*** (11.40)	0.7314*** (18.06)	0.2961*** (11.98)	0.5066*** (19.33)	0.0927*** (9.33)
<i>Deposit-weighted HHI</i>	0.0079 (0.65)	0.0108** (2.13)	0.0202 (1.25)	0.0174** (2.03)	0.0109 (1.02)	-0.0020 (-0.56)
<i>Deposit-weighted income growth</i>	0.0509*** (7.69)	0.0252*** (8.47)	0.0760*** (8.97)	0.0266*** (5.38)	0.0433*** (7.81)	0.0019 (0.92)
<i>Deposit-weighted HPI</i>	0.0045*** (3.20)	-0.0016*** (-2.88)	0.0034* (1.75)	-0.0005 (-0.75)	0.0043*** (3.66)	0.0004 (1.35)
<i>M2/GDP</i>	0.1468*** (13.44)	0.0353*** (7.95)	0.1812*** (13.57)	0.0282*** (3.51)	0.0889*** (10.42)	0.0326*** (9.05)
<i>Constant</i>	-0.0175 (-1.24)	0.0270*** (5.07)	0.0150 (0.83)	0.0204** (2.45)	-0.0089 (-0.76)	-0.0017 (-0.47)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.1275	0.0364	0.1197	0.0474	0.1154	0.0307
<i>Observations</i>	103,502	103,502	103,502	103,502	103,502	103,502

Panel B: Short-term wholesale funding (SWF)

	$\Delta$ Loans	$\Delta$ Commitments	$\Delta$ Credits	$\Delta$ Short-term loans	$\Delta$ Real estate loans	$\Delta$ C&I loans
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SWF</i>	0.0321*** (3.19)	-0.0033 (-0.57)	0.0224 (1.43)	0.0140** (2.19)	0.0272*** (3.17)	0.0053** (2.13)
<i>Z-score</i>	0.0020 (0.43)	-0.0045* (-1.66)	-0.0038 (-0.53)	-0.0009 (-0.34)	0.0006 (0.16)	-0.0008 (-0.61)
<i>SWF*Z-score</i>	0.0162 (0.59)	0.0373** (2.02)	0.0760 (1.61)	0.0109 (0.67)	0.0150 (0.63)	0.0084 (1.26)
<i>CrisisI</i>	0.0042* (1.83)	-0.0046*** (-3.70)	0.0006 (0.19)	0.0013 (0.70)	0.0009 (0.48)	0.0006 (0.86)
<i>Z-score*CrisisI</i>	-0.0032 (-0.57)	0.0057* (1.94)	0.0016 (0.22)	0.0020 (0.47)	-0.0018 (-0.41)	0.0017 (1.05)
<i>SWF*CrisisI</i>	-0.0185 (-1.59)	-0.0082 (-1.27)	-0.0265* (-1.67)	-0.0192** (-2.14)	-0.0161* (-1.67)	-0.0014 (-0.44)
<i>SWF*Z-score*CrisisI</i>	0.0229 (0.73)	-0.0277 (-1.58)	-0.0126 (-0.28)	0.0086 (0.35)	0.0234 (0.93)	-0.0064 (-0.76)
<i>CrisisII</i>	-0.0136*** (-5.70)	-0.0046*** (-3.36)	-0.0183*** (-5.63)	-0.0071*** (-3.85)	-0.0078*** (-3.96)	-0.0046*** (-6.38)
<i>Z-score*CrisisII</i>	0.0086 (1.53)	0.0093*** (2.59)	0.0219*** (2.62)	0.0084** (2.05)	0.0040 (0.87)	0.0036** (2.10)
<i>SWF*CrisisII</i>	-0.0315*** (-2.76)	-0.0184** (-2.41)	-0.0401** (-2.27)	-0.0286*** (-3.46)	-0.0297*** (-3.07)	-0.0023 (-0.75)
<i>SWF*Z-score*CrisisII</i>	0.0096 (0.30)	-0.0362 (-1.49)	-0.0692 (-1.25)	0.0271 (1.24)	0.0219 (0.79)	-0.0130* (-1.80)
<i>Postcrisis</i>	-0.0159*** (-7.51)	-0.0052*** (-4.82)	-0.0208*** (-7.07)	-0.0024 (-1.63)	-0.0143*** (-8.23)	-0.0030*** (-4.77)
<i>SWF*Postcrisis</i>	-0.0499*** (-4.80)	0.0010 (0.15)	-0.0426*** (-2.59)	-0.0314*** (-4.62)	-0.0361*** (-4.05)	-0.0090*** (-3.26)
<i>Z-score*Postcrisis</i>	0.0177*** (4.00)	0.0067** (2.42)	0.0268*** (3.80)	0.0104*** (3.88)	0.0146*** (3.99)	0.0032** (2.56)
<i>SWF*Z-score*Postcrisis</i>	-0.0033 (-0.11)	-0.0446** (-2.13)	-0.0791 (-1.55)	0.0017 (0.10)	-0.0032 (-0.13)	-0.0056 (-0.74)
<i>Ln(total assets)</i>	-0.0194*** (-11.40)	-0.0083*** (-13.43)	-0.0293*** (-12.91)	-0.0096*** (-10.63)	-0.0143*** (-10.72)	-0.0036*** (-8.36)
<i>Capital ratios</i>	0.1567*** (8.15)	0.0276*** (3.71)	0.1858*** (7.30)	0.0422*** (3.61)	0.1006*** (6.52)	0.0352*** (6.92)
<i>Return on assets</i>	0.5581*** (17.00)	0.1719*** (11.57)	0.7467*** (18.32)	0.3027*** (12.17)	0.5155*** (19.63)	0.0928*** (9.27)
<i>Deposit-weighted HHI</i>	0.0075 (0.61)	0.0107** (2.09)	0.0198 (1.22)	0.0169** (1.98)	0.0107 (1.01)	-0.0021 (-0.60)
<i>Deposit-weighted income growth</i>	0.0461*** (6.81)	0.0240*** (7.78)	0.0691*** (7.95)	0.0218*** (4.37)	0.0415*** (7.34)	0.0006 (0.30)
<i>Deposit-weighted HPI</i>	0.0046*** (3.20)	-0.0016*** (-2.94)	0.0034* (1.75)	-0.0005 (-0.69)	0.0043*** (3.68)	0.0005 (1.38)
<i>M2/GDP</i>	0.1216*** (9.36)	0.0286*** (5.05)	0.1448*** (9.08)	0.0022 (0.23)	0.0812*** (8.00)	0.0272*** (6.42)
<i>Constant</i>	-0.0018 (-0.12)	0.0313*** (5.53)	0.0376** (1.99)	0.0353*** (4.06)	-0.0021 (-0.17)	0.0013 (0.35)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.1260	0.0365	0.1183	0.0467	0.1140	0.0305
<i>Observations</i>	103,502	103,502	103,502	103,502	103,502	103,502

**Table 9 Relationship between Loan Spreads, Wholesale Funding, and Bank Risk: Z-score**

This table shows the effect of an interaction between wholesale funding and bank risk—proxied by Z-score—on spreads on total loans, real estate loans, and C&I loans. Spreads on total loans and C&I loans (real estate loans) are defined as the difference between the implicit loan rates and the 3-year (10-year) treasury constant maturity rate.  $WF*NPL*Crisis$  represents an interaction between  $WF$ ,  $NPL$ , and  $Crisis$ . Detailed information on the variables is provided in Table 1. Robust standard errors are clustered by bank. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Total wholesale funding (WF)			Panel B: Short-term wholesale funding (SWF)		
	<i>Spreads on total loans</i>	<i>Spreads on real estate loans</i>	<i>Spreads on C&amp;I loans</i>	<i>Spreads on total loans</i>	<i>Spreads on real estate loans</i>	<i>Spreads on C&amp;I loans</i>
	(1)	(2)	(3)	(1)	(2)	(3)
<i>WF (SWF)</i>	0.0008 (0.40)	0.0026 (1.30)	0.0027 (0.68)	0.0061** (2.55)	0.0093*** (3.91)	0.0069 (1.46)
<i>Z-score</i>	-0.0001*** (-4.31)	-0.0001*** (-4.00)	-0.0000 (-1.50)	-0.0000*** (-4.35)	-0.0001*** (-4.01)	-0.0000 (-1.27)
<i>WF (SWF)*Z-score</i>	0.0001** (2.28)	0.0001** (2.58)	0.0001 (0.69)	0.0001** (2.06)	0.0002** (2.48)	0.0000 (0.27)
<i>CrisisI</i>	0.0225*** (54.72)	0.0149*** (27.42)	0.0224*** (19.02)	0.0219*** (50.59)	0.0144*** (29.21)	0.0218*** (19.36)
<i>Z-score*CrisisI</i>	0.0000*** (3.02)	0.0000* (1.88)	0.0000 (0.91)	0.0000*** (3.41)	0.0000** (2.35)	0.0000 (1.50)
<i>WF (SWF)*CrisisI</i>	-0.0050*** (-2.95)	-0.0067*** (-3.46)	-0.0030 (-0.79)	-0.0057** (-2.11)	-0.0089*** (-3.83)	-0.0026 (-0.52)
<i>WF (SWF)*Z-score*CrisisI</i>	-0.0000 (-0.79)	-0.0000 (-0.39)	-0.0000 (-0.45)	-0.0001 (-1.21)	-0.0000 (-0.74)	-0.0001 (-1.07)
<i>CrisisII</i>	0.0179*** (28.78)	0.0016** (2.16)	0.0127*** (8.91)	0.0193*** (33.16)	0.0024*** (3.34)	0.0140*** (10.32)
<i>Z-score*CrisisII</i>	0.0001*** (6.80)	0.0001*** (4.99)	0.0001*** (3.00)	0.0001*** (7.56)	0.0001*** (5.51)	0.0001*** (2.87)
<i>WF (SWF)*CrisisII</i>	-0.0118*** (-5.32)	-0.0169*** (-7.04)	-0.0059 (-1.33)	-0.0200*** (-7.14)	-0.0254*** (-8.31)	-0.0112** (-1.98)
<i>WF (SWF)*Z-score*CrisisII</i>	-0.0001* (-1.66)	-0.0000 (-0.68)	-0.0002* (-1.75)	-0.0001* (-1.79)	-0.0001 (-0.84)	-0.0002 (-1.41)
<i>Postcrisis</i>	0.0175*** (31.71)	-0.0095*** (-14.80)	0.0169*** (12.76)	0.0203*** (39.12)	-0.0076*** (-12.21)	0.0193*** (14.86)
<i>WF (SWF)*Postcrisis</i>	-0.0076*** (-3.30)	-0.0123*** (-5.54)	-0.0049 (-1.04)	-0.0170*** (-6.20)	-0.0194*** (-7.19)	-0.0124** (-2.26)
<i>Z-score*Postcrisis</i>	0.0001*** (6.97)	0.0001*** (6.57)	0.0001** (2.48)	0.0001*** (7.23)	0.0001*** (6.65)	0.0001** (2.20)
<i>WF (SWF)*Z-score*Postcrisis</i>	-0.0001** (-2.40)	-0.0001** (-2.05)	-0.0002* (-1.84)	-0.0001** (-2.03)	-0.0001* (-1.80)	-0.0002 (-1.25)
<i>Ln(total assets)</i>	-0.0009** (-2.05)	-0.0004 (-0.83)	-0.0023*** (-3.39)	-0.0008* (-1.91)	-0.0005 (-1.10)	-0.0023*** (-3.40)
<i>Capital ratios</i>	0.0162*** (4.68)	0.0180*** (4.95)	-0.0034 (-0.45)	0.0179*** (5.25)	0.0205*** (5.71)	-0.0033 (-0.44)
<i>Return on assets</i>	0.2022*** (25.91)	0.2028*** (23.92)	0.1399*** (9.62)	0.1999*** (26.00)	0.2019*** (24.16)	0.1397*** (9.63)
<i>Deposit-weighted HHI</i>	0.0104*** (2.82)	0.0090** (2.34)	0.0016 (0.21)	0.0096*** (2.63)	0.0079** (2.11)	0.0013 (0.17)
<i>Deposit-weighted income growth</i>	0.0222*** (16.04)	0.0175*** (10.91)	0.0210*** (6.33)	0.0187*** (13.32)	0.0147*** (9.05)	0.0178*** (5.21)
<i>Deposit-weighted HPI</i>	-0.0001 (-0.31)	0.0004 (0.99)	0.0014 (1.54)	-0.0001 (-0.31)	0.0004 (0.96)	0.0015 (1.59)
<i>M2/GDP</i>	0.0621*** (27.15)	0.2545*** (101.77)	0.0808*** (12.51)	0.0395*** (13.81)	0.2368*** (77.81)	0.0608*** (7.94)
<i>Constant</i>	-0.0064* (-1.91)	-0.1170*** (-32.48)	-0.0049 (-0.65)	0.0047 (1.43)	-0.1074*** (-29.97)	0.0050 (0.65)
<i>Bank fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time fixed effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>R-squared</i>	0.7653	0.3855	0.2485	0.7685	0.3886	0.2488
<i>Observations</i>	103,502	103,502	103,502	103,502	103,502	103,502