

In the Shadow of Banks: Wealth Management Products and Bank Risk in China



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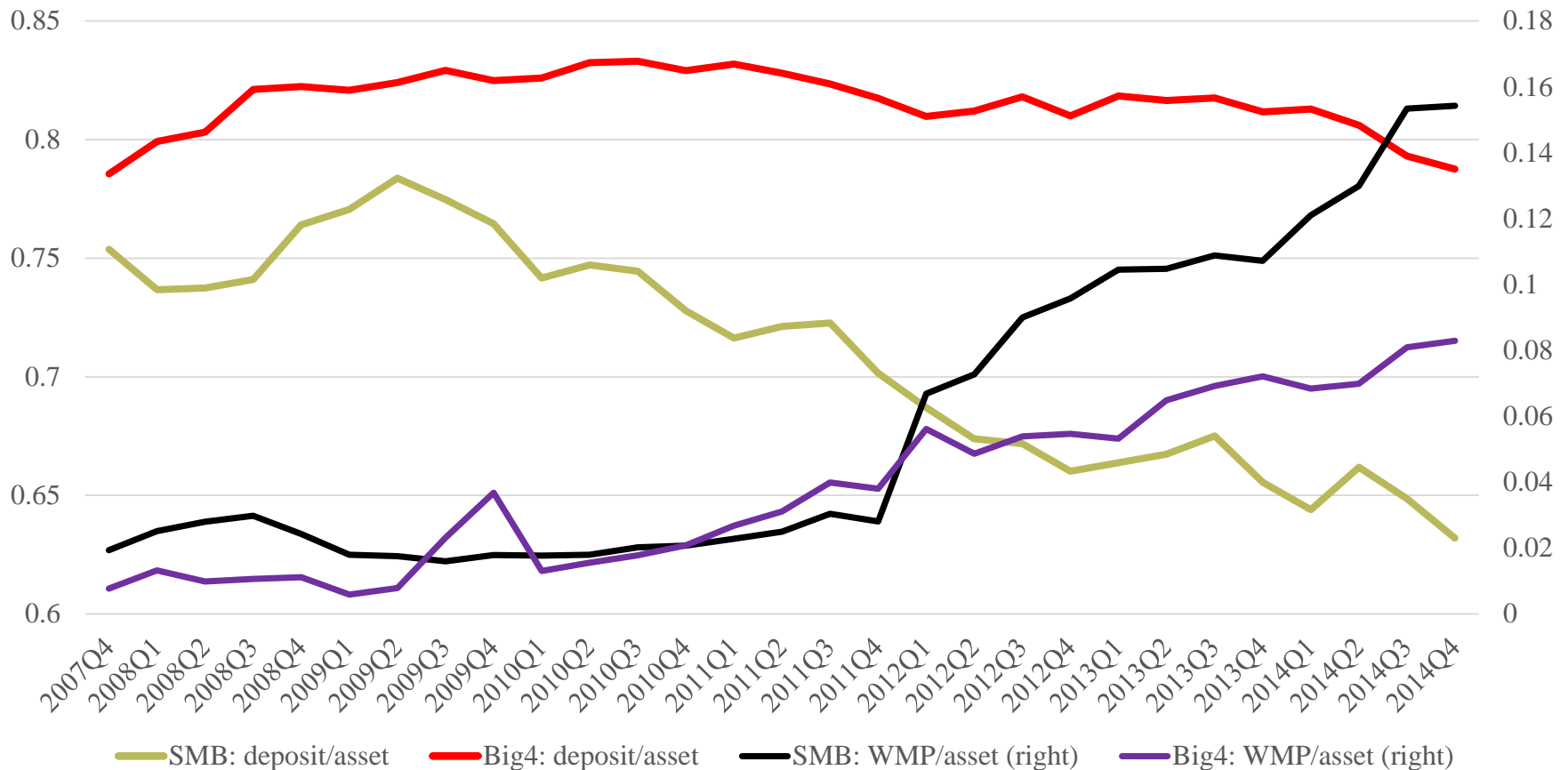
Motivation

- Shadow banking and financial system:
 - Common properties: ‘regulatory arbitrage’ by financial institutions
 - Not as easy to regulate and monitor
 - May increase the overall risk of the financial system
 - “Shadow always touches the feet!”
- Little empirical work to examine the large shadow banking sector in China:
 - Determinants and risks
 - Largest component of shadow banking is “Wealth Management Products” (WMPs) issued by banks
 - Recently believed to have contributed to
 - stock-market “bubble” and “crash” through margin lending

Motivation (cont'd)

- Trend and features of Wealth Management Products:
 - No interest rate control (ceiling on deposit rate), off-balance sheet of banks
 - Sharp rise right after 2009-2010; Appears to be substitutes for deposits for SMBs

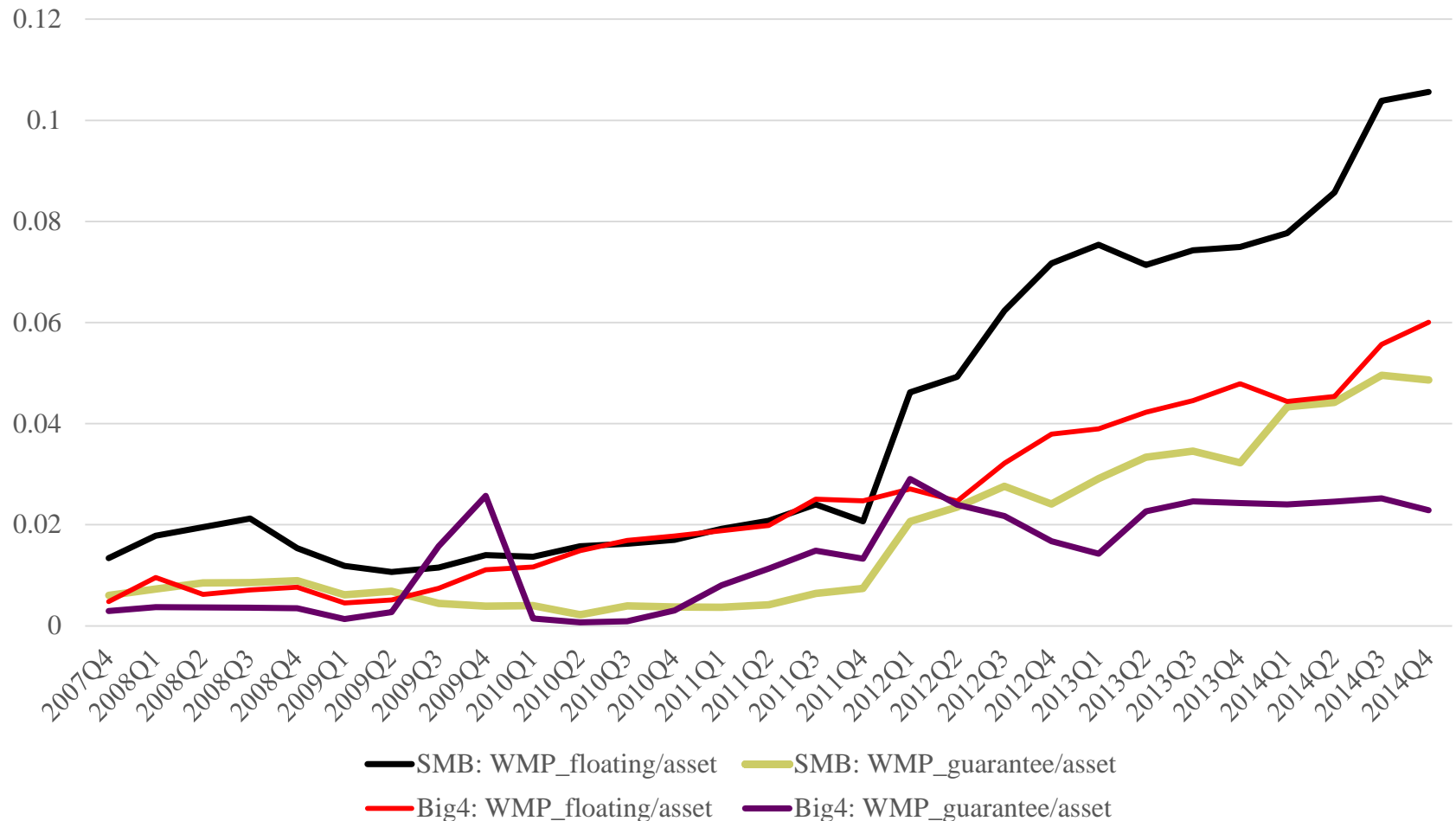
Figure 1.1: Balance of WMP and Deposit over time



Motivation (cont'd)

- Trend and features of Wealth Management Products:
 - SMB issued much more *principal-floating* WMPs.

Figure 1.2: Principal-floating vs. Principal-guaranteed WMPs



Research Questions

- What triggered the rapid growth of WMPs from 2009?
 - Link to the RMB 4-trillion stimulus plan?
 - Regulation arbitrage
- What are the differences in WMPs between Big 4 banks and Small- and medium-sized banks (SMBs)?
- Rollover risk of WMPs; effects on
 - the interbank market?
 - Does the stock market understand these risks?

Main Findings and Implications

- Big 4 banks and the implementation of the massive stimulus plan:
 - Big 4 banks pumped huge volume of new loans into the economy;
 - Attracted more deposits to satisfy the loan-to-deposit (LDR) requirement
 - Bank of China (BOC) was the most aggressive in expansion
- Response of SMBs:
 - Faced increased competition for deposits (and loans);
 - They issued WMPs (especially off-balance sheet products which are more risky) which can offer higher yield to attract savings, and satisfy regulations
 - Pace and scale of issuance are greater for SMBs with more geographic exposure to competition from Bank of China branches.

Main Findings (cont'd)

■ Rollover risk of WMPs:

- WMPs are often short-term and banks need to rollover/refinance;
- SMBs offer higher yields on new WMPs when greater amount of of WMPs mature;
- The interbank market rate is higher when the aggregate amount of WMPs due is larger;
- Stock prices drop more for (listed) banks with more WPMs due in case of a credit crunch.

Outline of the rest of the talk

I. Motivation and Research Questions

II. Data

III. Banking Regulations and the Stimulus Plan

IV. The Deposit Competition Story

V. WMP Rollover Risk

VI. Summary and Implications

Data

- Data on WMPs from 25 large banks from 2008-2014:
 - Quarterly Amount of Issuance and Matured (2008-2014), Source: CBRC
 - Yield type: principal-guaranteed and principal-floating
 - Investment Target: money market assets, deposit, loan, equity
 - Yield and maturity of individual products (2008-2014), Source: WIND

- Information on the 25 banks:
 - equity, asset, deposit, loan balance, Source: CBRC
 - individual branch information, Source: CBRC website
 - Interbank market quoted rates, Source: SHIBOR website
 - Stock prices, Source: WIND

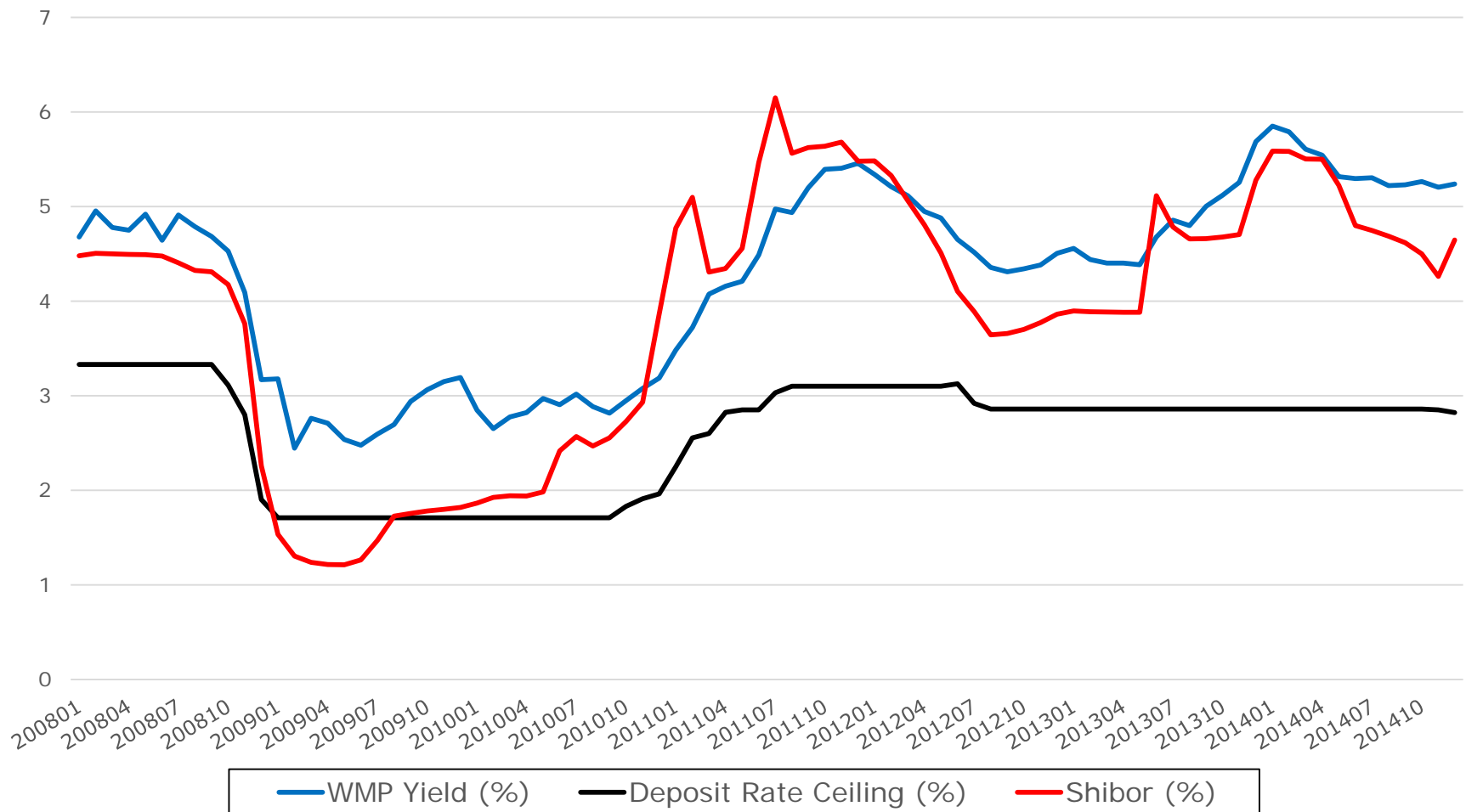
- Other information:
 - Regulated interest rates set by PBOC
 - Interbank offered rates (Shibor)

Banking Regulations

■ Regulation on interest rates:

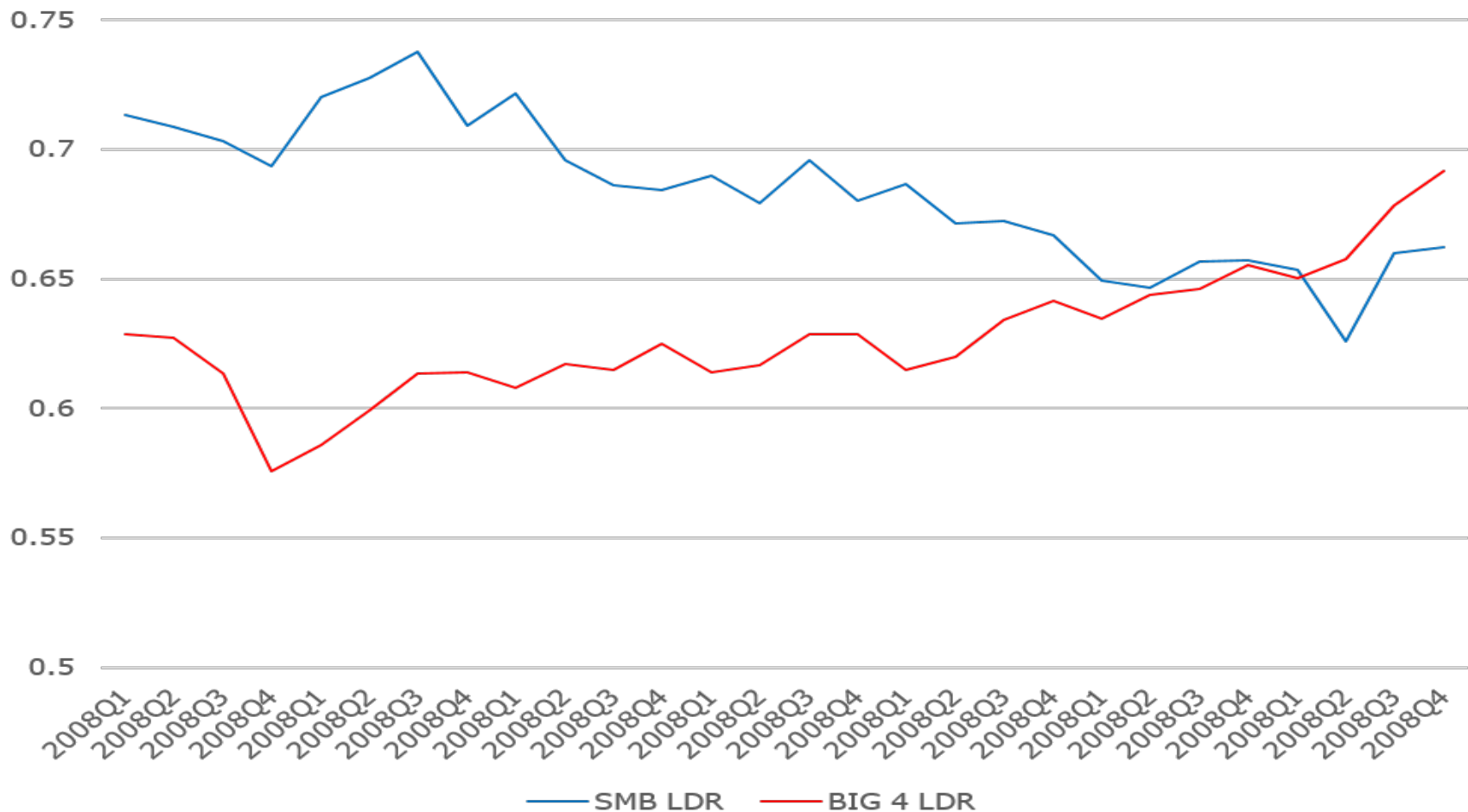
- Lending rates have been liberalized; **upper bound** of deposit rates binding until 2015.

Figure 3.2: 3-month WMP Yield, Shibor and deposit rate ceiling



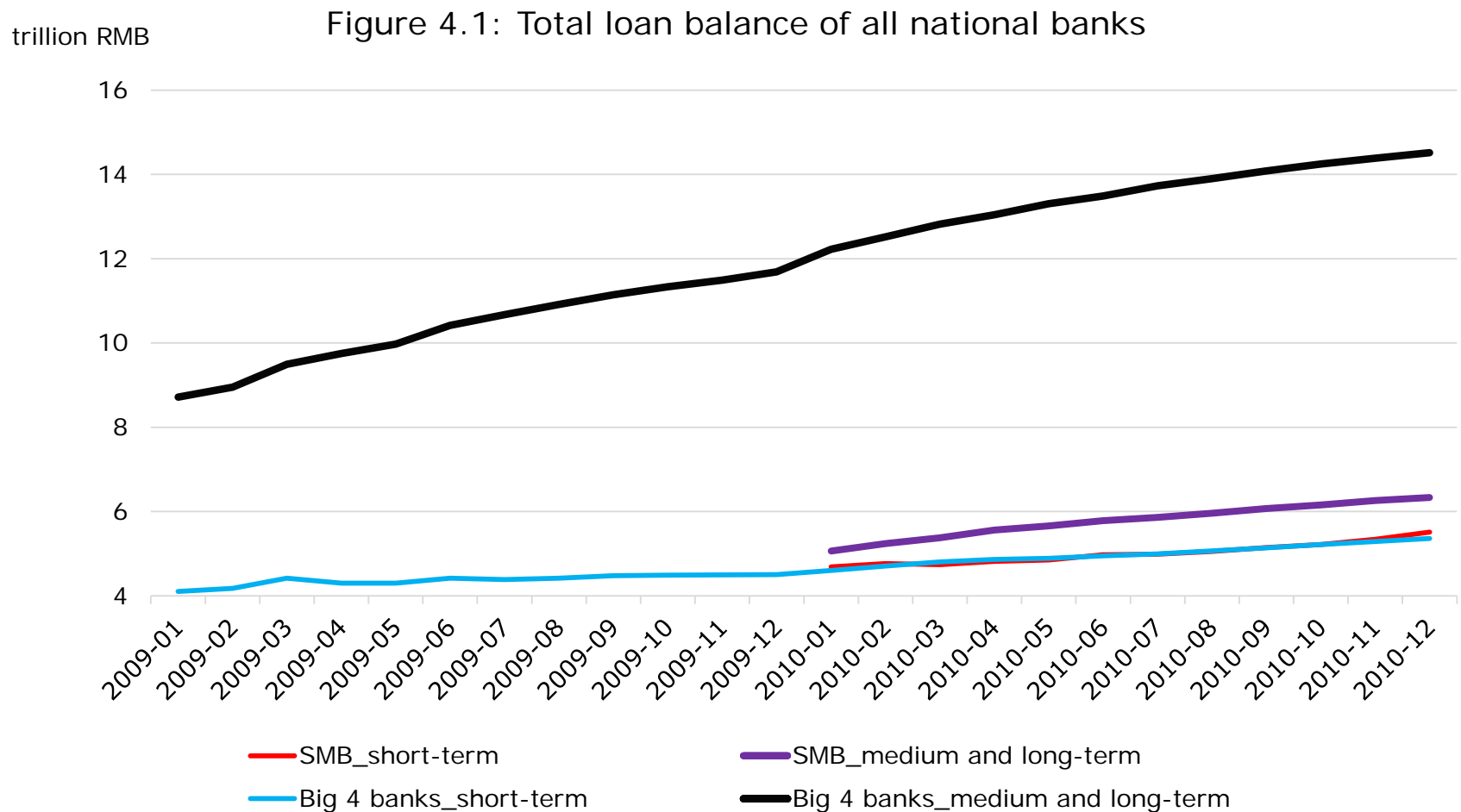
Banking Regulations (cont'd)

- Regulation on on-balance sheet lending:
 - Loan-to-deposit ratio (LDR): lending \leq 75% of deposits
 - SMBs' disadvantages in the deposit and loan markets.



The RMB 4 trillion Stimulus Plan

- Big 4 banks are the main source of new credit expansion:
 - Their medium and long-term loan balance increased by 66%;
 - SMB's loan balances were relatively stable.

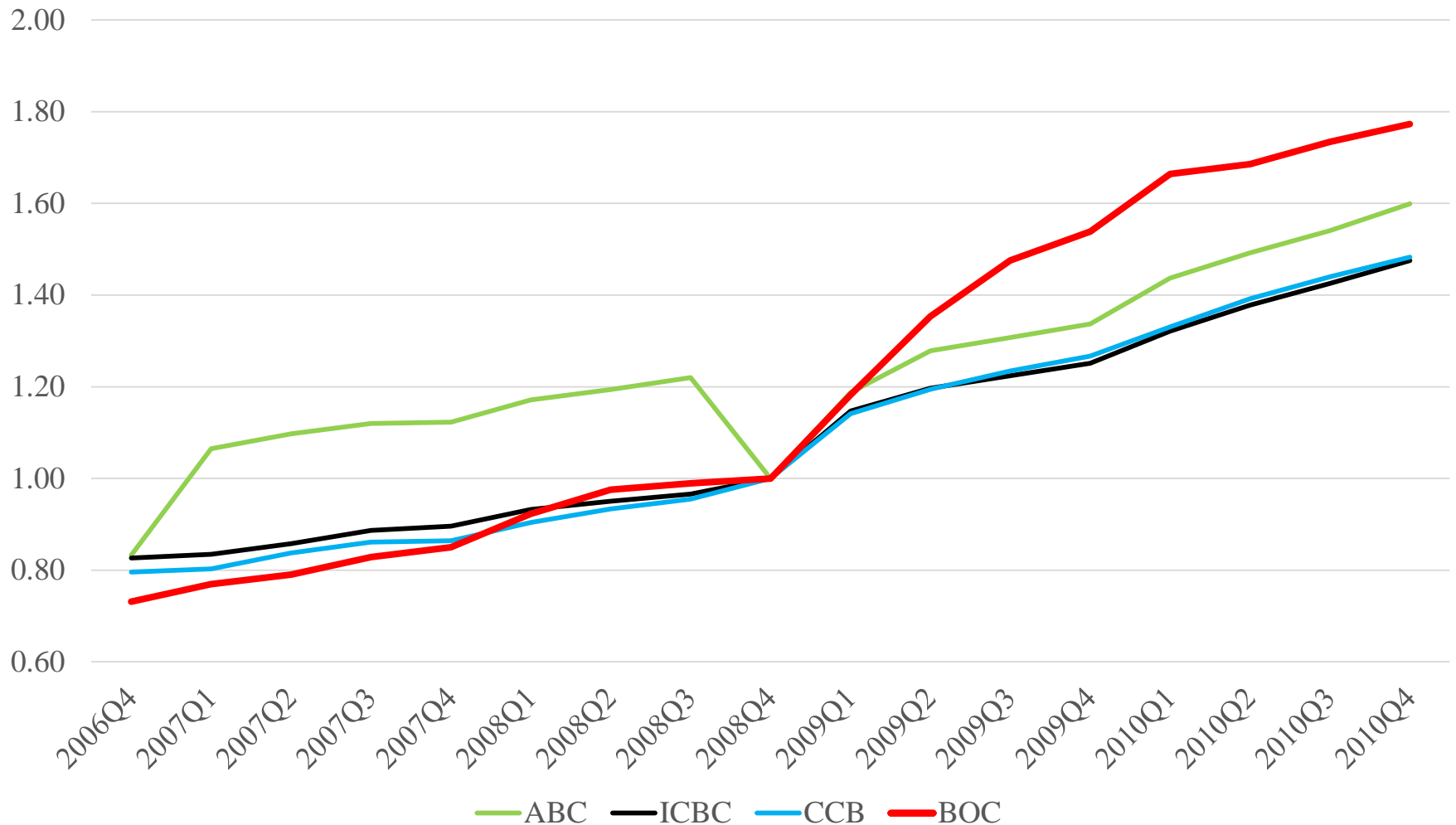


The Stimulus Plan (cont'd)

■ Difference among the Big 4 banks:

- Bank of China (BOC) was most aggressive in increasing its credit supply.

Figure 4.2: **Loan Balance** of the Big 4 during the Plan

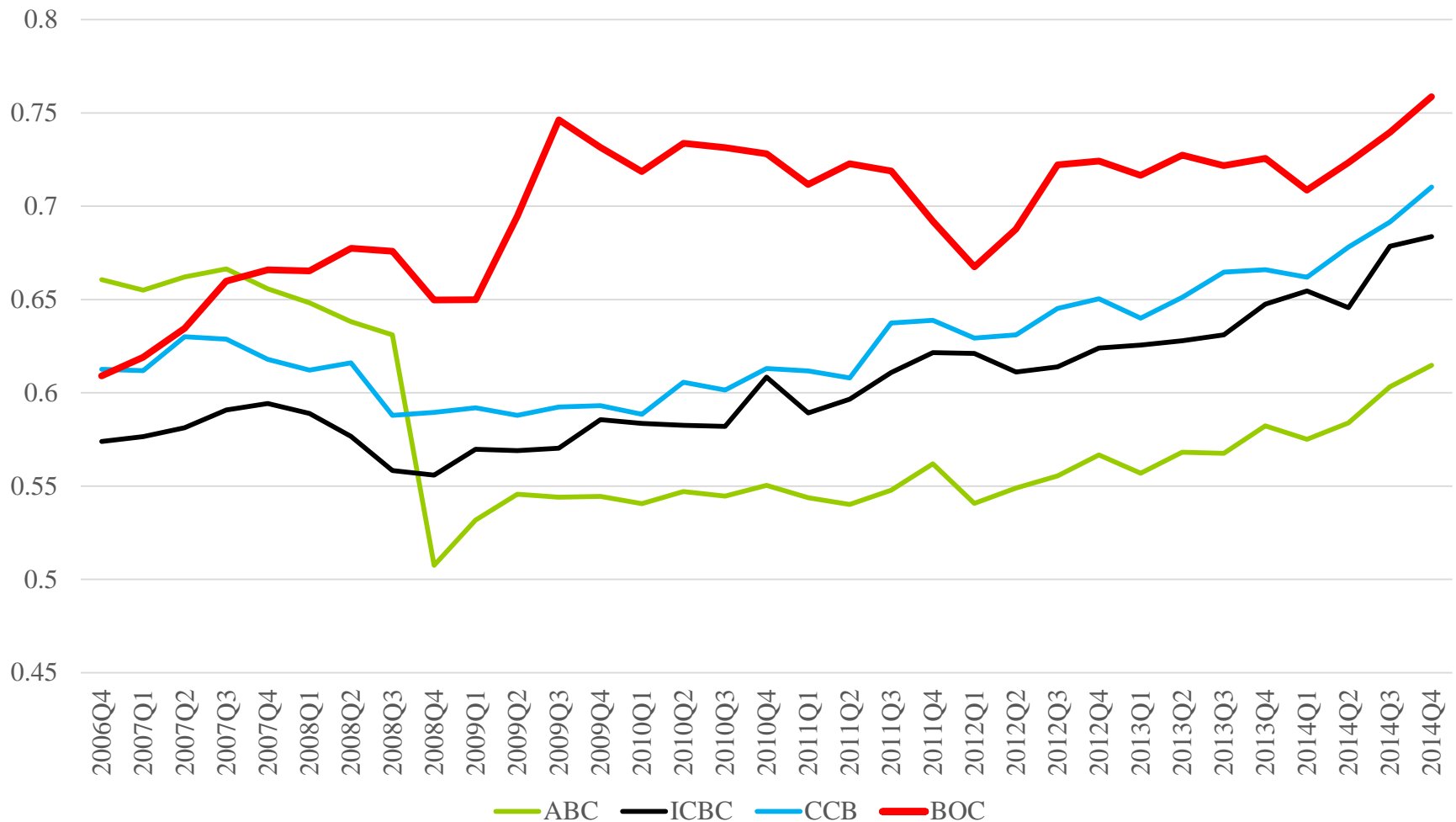


The Stimulus Plan (cont'd)

■ Difference among the Big 4 banks:

- BOC's LDR increased dramatically during the plan and remained high.

Figure 4.3: Change of **LDR** of the Big 4 Banks during the Plan

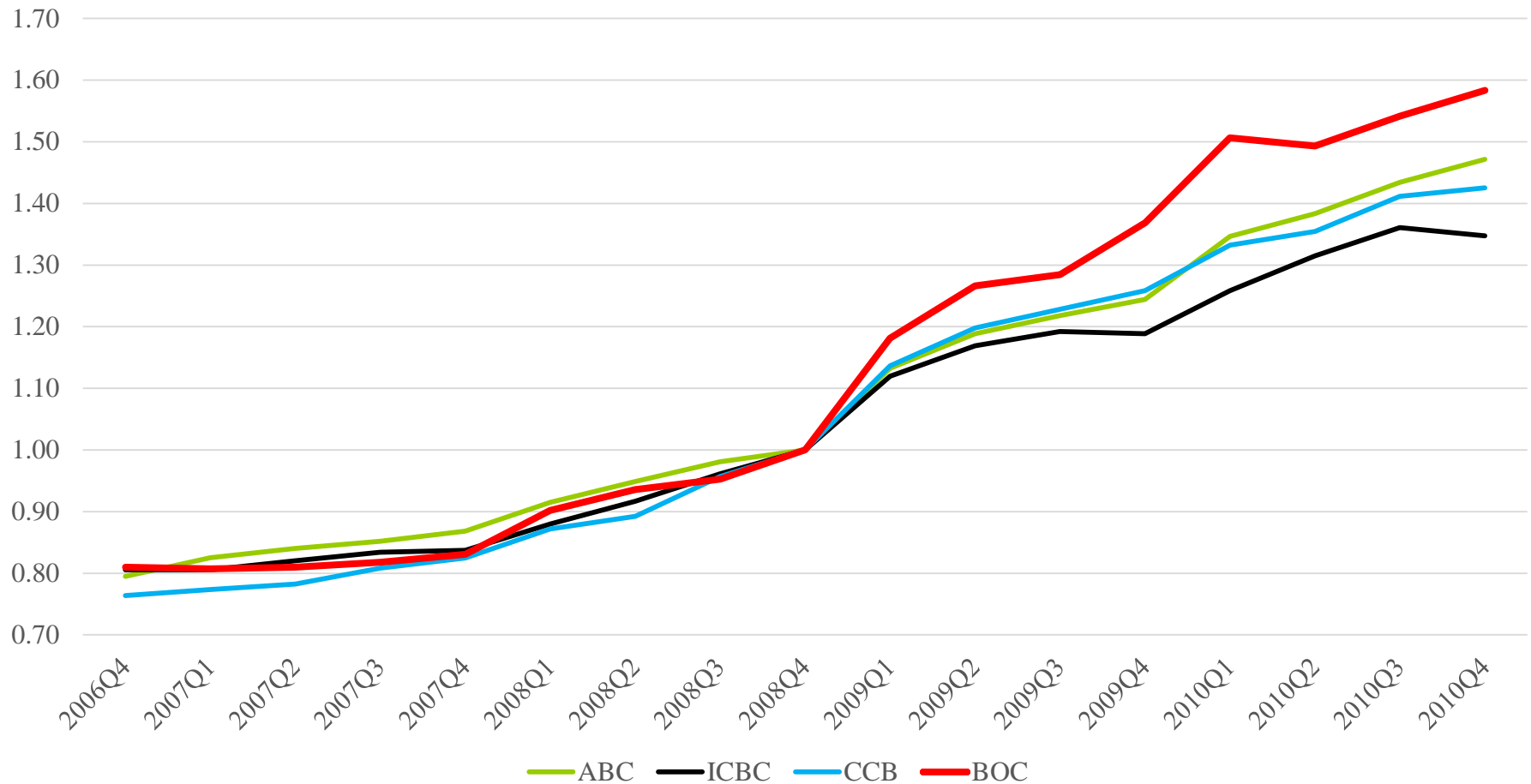


The Stimulus Plan (cont'd)

■ Difference among the Big 4 banks:

- The increase in LDR also put pressure on BOC to compete for more deposits.

Figure 4.4: **Deposit Balance** of the Big 4 during the Plan



Why did BOC act differently?

- President of BOC then was Mr. Gang Xiao
 - Xiao worked in PBC for 22 years before becoming President of BOC in 2003.
 - In 2013, he was promoted as President of CSRC (regulator of the stock market).
- President of ICBC then was Mr. Jianqing Jiang
 - He led ICBC to become the largest and most profitable bank in China.
 - "The government recent decision to boost domestic demand provides great opportunities for banks. But ICBC is a commercial bank, and we should consider these opportunities from a commercial standpoint." Said Jiang during an interview with McKinsey Quarterly in March, 2009.
 - In May, 2016, he retired without any prominent government position.



Competition for Deposits and LDR

- The empirical strategy is to exploit cross-sectional variations in SMBs' exposure to Big 4 competition:
 - The deposit market is local, and SMBs are usually regional.
 - The market share of big 4 banks varies across regions.
- Identification strategy:
 - SMBs more exposed to Big 4's competition will likely have more deposit loss and issue more WMPs;
 - The effect of BOC's competition should be more important than the other three's.

Competition for Deposit (cont'd)

- Measure of big 4 competition:

- Denote $n_{i,j,t}$ as the number of bank i 's branches in city j at the beginning of quarter t .
- First, calculate the market share of each big bank in each city:

$$MarSha_{b,j,t} = \frac{n_{b,j,t}}{\sum_i n_{i,j,t}}$$

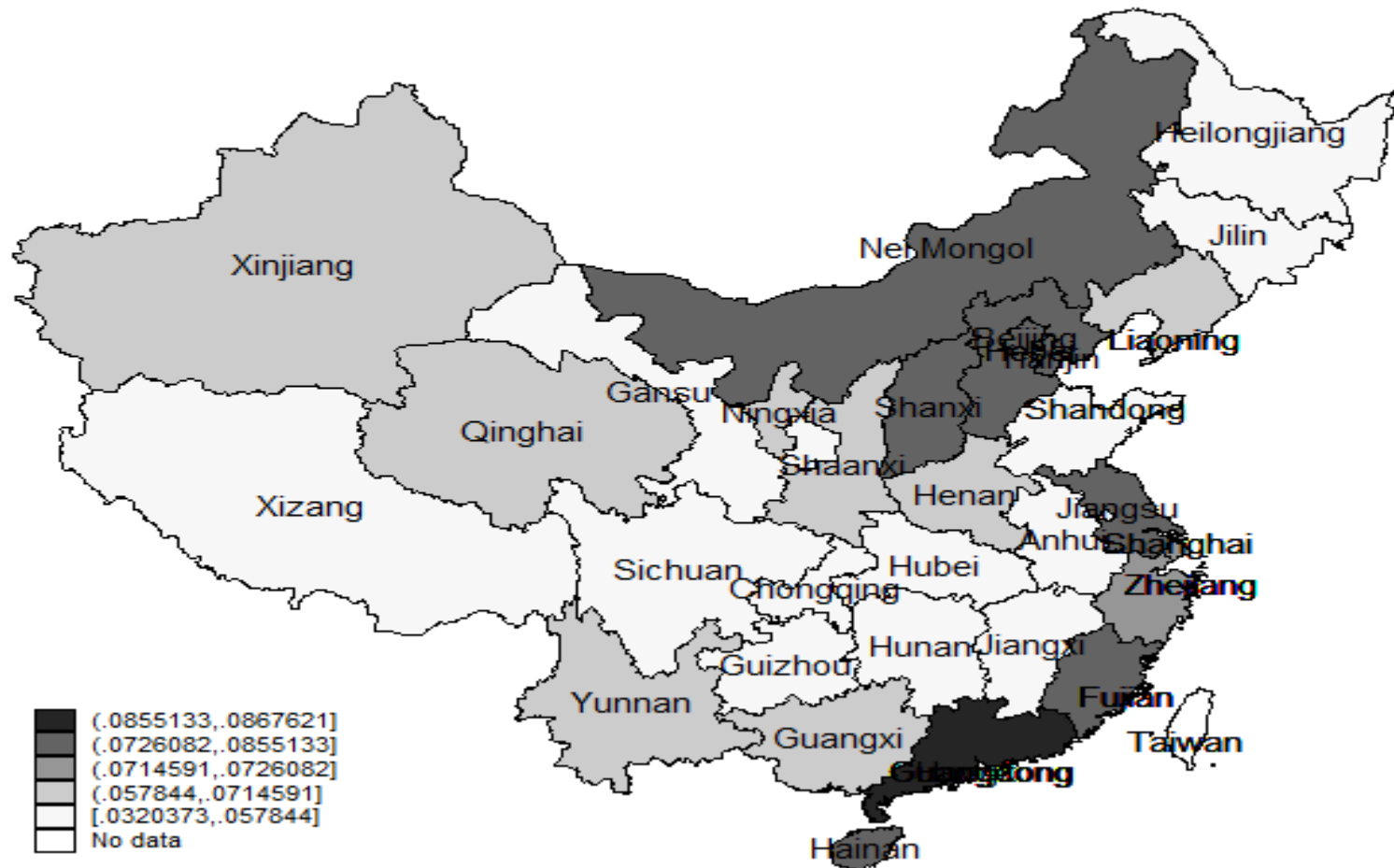
- Second, calculate the weighted average of $MarSha_{b,j,t}$ for each SMB:

$$banknm_{i,t} = \frac{\sum_j MarSha_{b,j,t} n_{i,j,t}}{\sum_j n_{i,j,t}}$$

Branching strategies of Big 4 banks

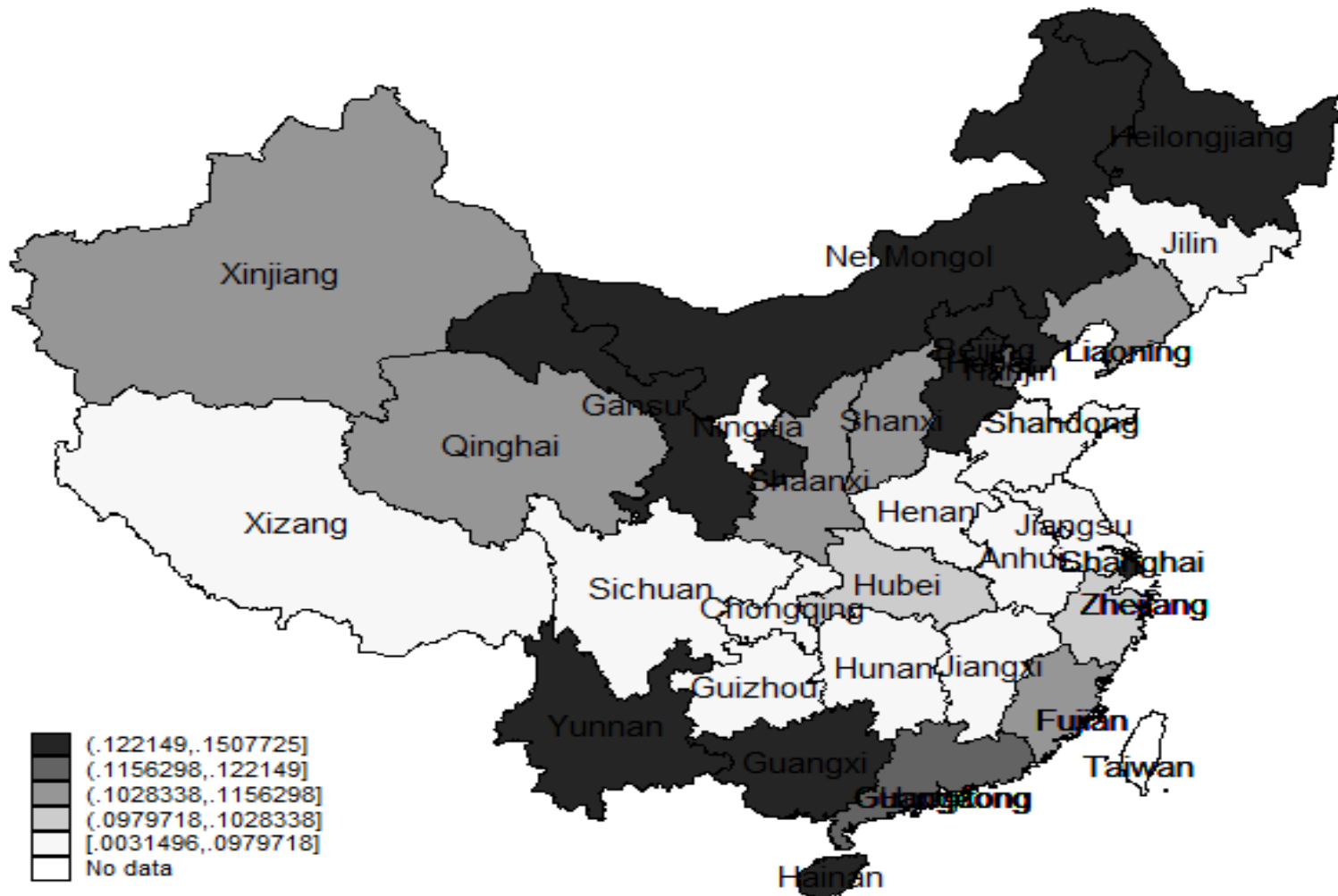
- Different branching strategies and intensities of Big 4 banks:

Province-level Market Share of BOC
As on 2012/12/31



Branching strategies of Big 4 banks

Province-level Market Share of ICBC
As on 2012/12/31



Results I: Deposit Competition

- Empirical Results: 1 stdev increase in BOC increases LDR by about 0.5 stdev after stimulus

Table IV Effect of Big 4 Competition on SMB's **LDR**

Year	07-14	07-08	09-10	11-12	13-14
Dep Var: LDR	(1)	(2)	(3)	(4)	(5)
BOC	2.379***	0.790	1.177	3.274**	5.300**
	(3.700)	(0.774)	(1.226)	(2.720)	(2.209)
ICBC	0.276	0.336	-0.566	0.970	3.505
	(0.404)	(0.707)	(-0.440)	(0.580)	(1.614)
CCB	-1.698*	-1.179**	-0.411	-3.475	-5.783**
	(-1.782)	(-2.466)	(-0.300)	(-1.629)	(-2.395)
ABC	-0.395	0.394	-0.697	-0.823	-2.120
	(-0.637)	(1.074)	(-0.802)	(-0.504)	(-1.222)
quarter fixed effect	√	√	√	√	√
bank type fixed effect	√	√	√	√	√
Constant	0.804***	0.643***	0.844***	0.838***	0.790***
	(11.58)	(6.372)	(9.711)	(4.311)	(3.609)
Observations	672	168	168	168	168
R-squared	0.467	0.633	0.554	0.499	0.451
cluster	bank	bank	bank	bank	bank

Results I (cont'd): Pre-trend of BOC?

■ Empirical Results

- Pre-trend? when estimating the model *without* bank type fixed effect as a regressor, coefficient of BOC is also significant for the year 2007-2008.
- Joint-equity vs. urban commercial banks
 - All the 12 banks with the highest LDR at 2008 Q4 are joint-equity banks.
 - For historical reasons, BOC concentrate much of its business in Guangdong, so did joint-equity banks which are pioneers in China's reform and opening-up.
 - This causes a correlation between BOC competition and LDR in 2007-2008.

bankname	LDR at 2008 Q4	Bank type	bankname	LDR at 2008 A4	Bank type
Agricultural Bank of China	51%	big	Bohai Bank	70%	joint-equity
Industrial and Commercial Bank of China	56%	big	China Zheshang Bank	71%	joint-equity
Shengjing Bank	58%	urban	Hua Xia Bank	71%	joint-equity
Bank of Beijing	59%	urban	China Citic Bank	72%	joint-equity
China Construction Bank	59%	big	Shanghai Pudong Development Bank	72%	joint-equity
Bank of Nanjing	62%	urban	China Everbright Bank	73%	joint-equity
Harbin Bank	63%	urban	Guangdong Development Bank	74%	joint-equity
Bank of Chongqing	63%	urban	Evergrowing Bank	75%	joint-equity
Bank of Shanghai	64%	urban	China Merchants Bank	76%	joint-equity
Bank of Communications	65%	Jointly-equity (big)	China Minsheng Bank	77%	joint-equity
Bank of China	65%	big	Ping An Bank	79%	joint-equity
Bank of Ningbo	65%	urban	Industrial Bank	80%	joint-equity
Huishang Bank	68%	urban			

Results I (cont'd): Big 4 Competition

- One stdev increase in BOC increases (issue/equity) by 0.27, 0.22 and 0.52 stdev for 2009-2010, 2011-2012, and 2013-2014, respectively.

Table V Effect of Big 4 Competition on **WMP Issuance**

Year	08	09-10	11-12	13-14
Dep Var: Issuance/Equity	(1)	(2)	(3)	(4)
BOC	6.061 (1.319)	7.246*** (3.167)	40.45* (2.056)	146.4*** (2.847)
ICBC	3.077 (0.948)	2.174 (1.167)	44.10** (2.242)	54.60 (0.855)
CCB	-6.079 (-1.370)	-1.414 (-0.480)	-52.97* (-1.792)	-93.99 (-1.248)
ABC	0.756 (0.522)	-3.797** (-2.314)	18.87 (1.295)	15.21 (0.347)
Spread	-1.807 (-1.254)	-0.880* (-1.896)	-1.277 (-0.467)	3.089** (2.275)
LDR	√	√	√	√
LDR*Spread	√	√	√	√
Bank type fixed effect	√	√	√	√
quarter fixed effect	√	√	√	√
Constant	3.594* (1.884)	0.275 (0.536)	-6.079 (-0.945)	-7.651 (-0.999)
Observations	84	168	168	168
R-squared	0.214	0.431	0.348	0.515
Cluster	bank	bank	bank	bank

Results I (cont'd): Big 4 Competition

- BOC also affects WMP issuance indirectly through LDR: when LDR is excluded from the model, estimated coefficient of BOC increases.

Table V Effect of Big 4 Competition on **WMP Issuance** (continued)

Year	08	09-10	11-12	13-14
Dep Var: Issuance/Equity	(1)	(2)	(3)	(4)
BOC	4.916 (0.985)	8.669*** (3.760)	60.79*** (3.814)	159.4*** (4.011)
ICBC	3.087 (0.948)	2.155 (0.866)	50.48* (1.876)	62.40 (1.012)
CCB	-4.072 (-0.946)	-3.020 (-0.965)	-77.16** (-2.214)	-107.4 (-1.530)
ABC	0.312 (0.195)	-3.665** (-2.154)	15.02 (0.785)	9.900 (0.237)
Spread	0.0374 (0.105)	0.136** (2.447)	-1.554*** (-4.934)	3.031*** (3.071)
Bank type fixed effect	√	√	√	√
quarter fixed effect	√	√	√	√
Constant	0.187 (0.606)	0.674*** (3.788)	0.244 (0.0999)	-5.579 (-0.874)
Observations	84	168	168	168
R-squared	0.179	0.394	0.318	0.511
Cluster	bank	bank	bank	bank

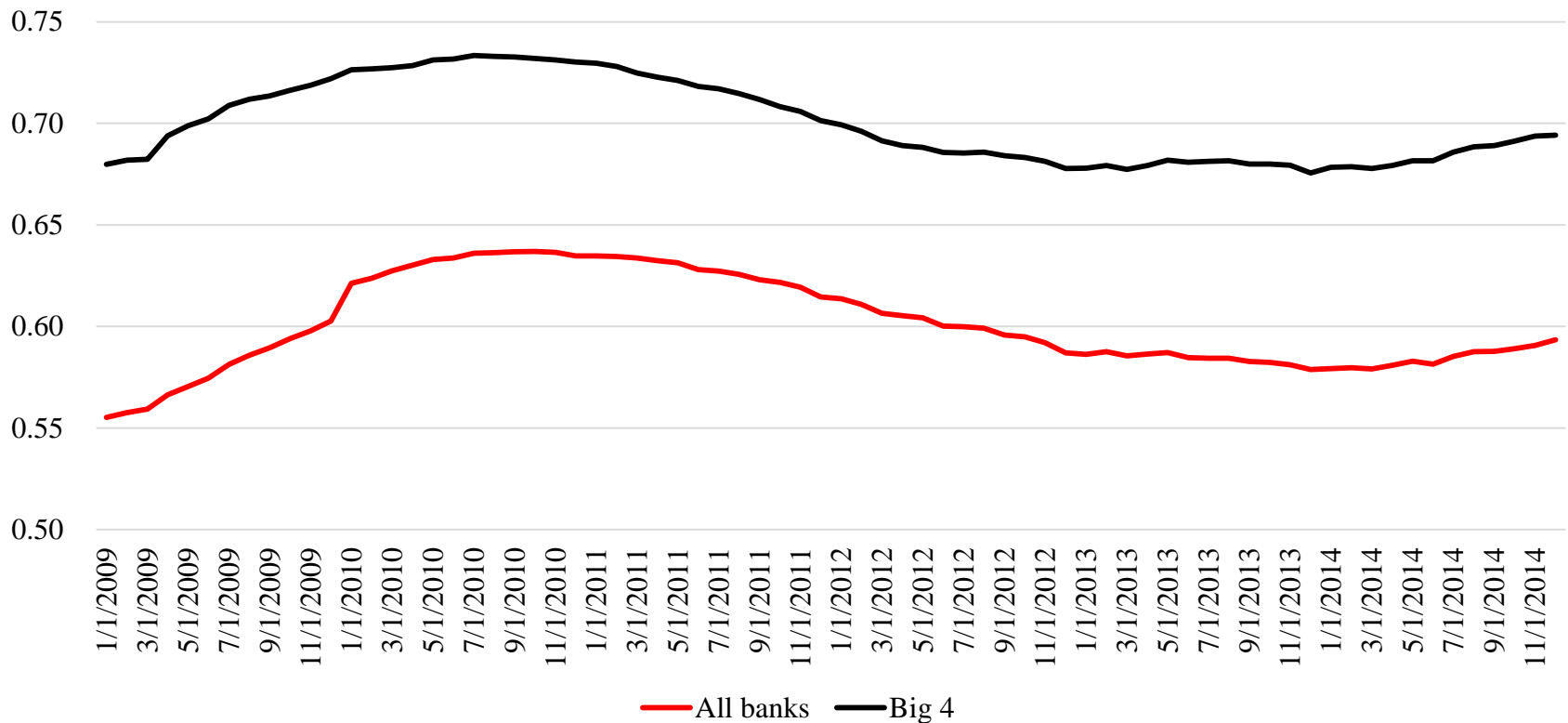
Big Four's issuance of WMPs

- Consequence of the stimulus plan:
 - The sharp increase in debt of CIICs (city infrastructure investment corp.;;) worried the central government.
 - Bank loan balance to CIICs in June 2009 was 7.66 trillion RMB while total income of local governments in 2010 was only 11.51 trillion RMB.
 - The rising housing price also became a concern.
 - Average housing price increased by 7.93% in 2011.
 - The State Council tightened credit supply to these sectors.

Big Four's issuance of WMPs

- To prevent default, banks move these loans off the balance sheet and refinance them by WMPs.
 - Percentage of medium and long-term loans increased during the plan, but reverted afterwards, indicating that banks did not refinance them with on-balance sheet loans.

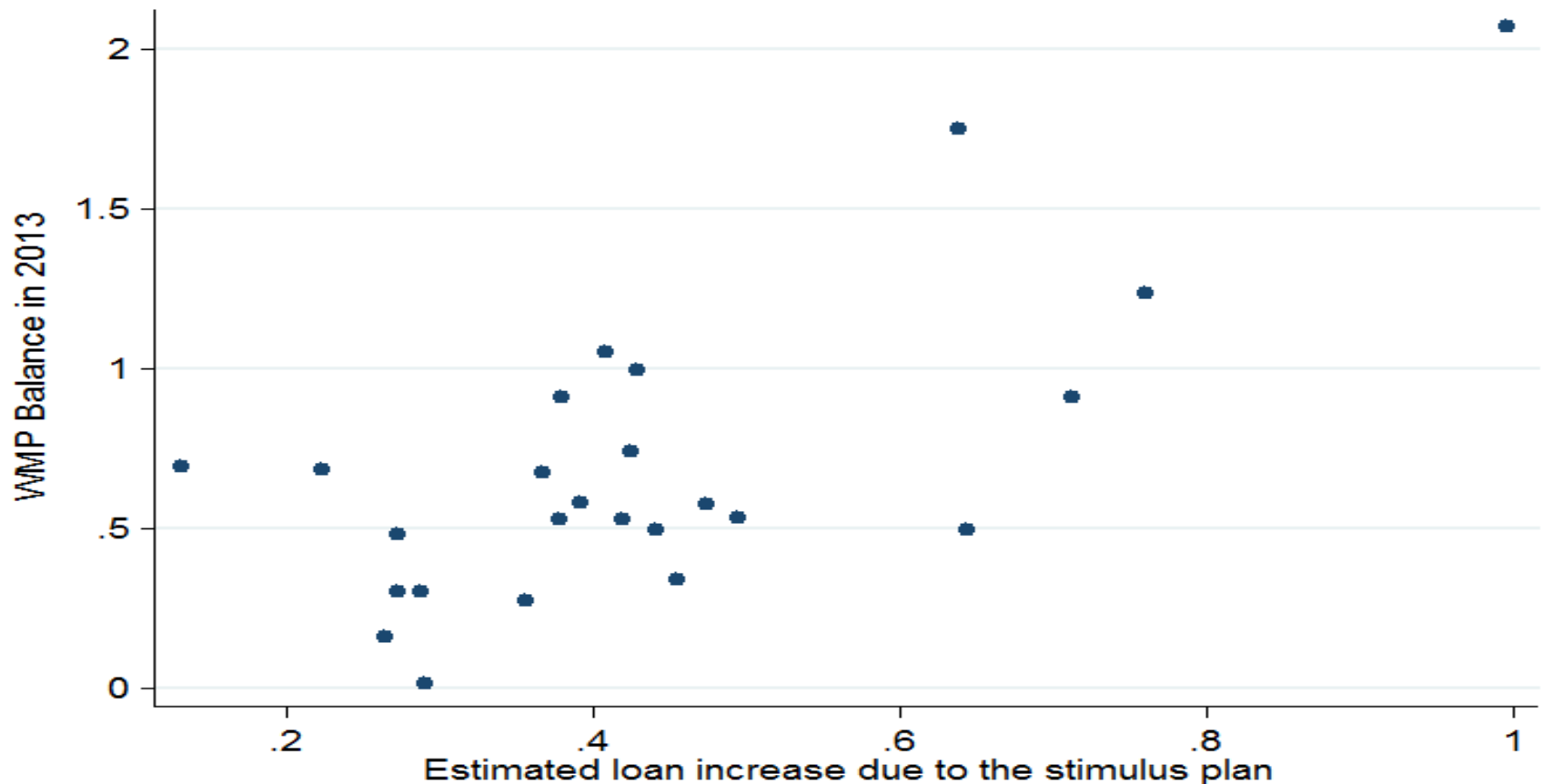
Figure 7.1: Change of percentage of medium- and long-term bank loans



Big Four's issuance of WMPs

- To prevent default, banks move these loans off the balance sheet and refinance them by WMPs.
 - We find a significant positive relationship between the increase in bank loans due to the stimulus plan and bank WMP balance only in later years when these loans matured.

Figure 7.2: Relation between WMP balance in 2013 and estimated loan increase



Results II: WMP rollover risk

■ WMP maturity mismatch

- WMP maturity is short while the assets financed by WMPs are typically long-term, similar to ABCP in the US money market.
- We construct a key variable *WMPdue*, which is the amount of WMPs due in each period over bank equity at the end of last period.

Table 1 Panel C: Maturity (in days) of WMPs

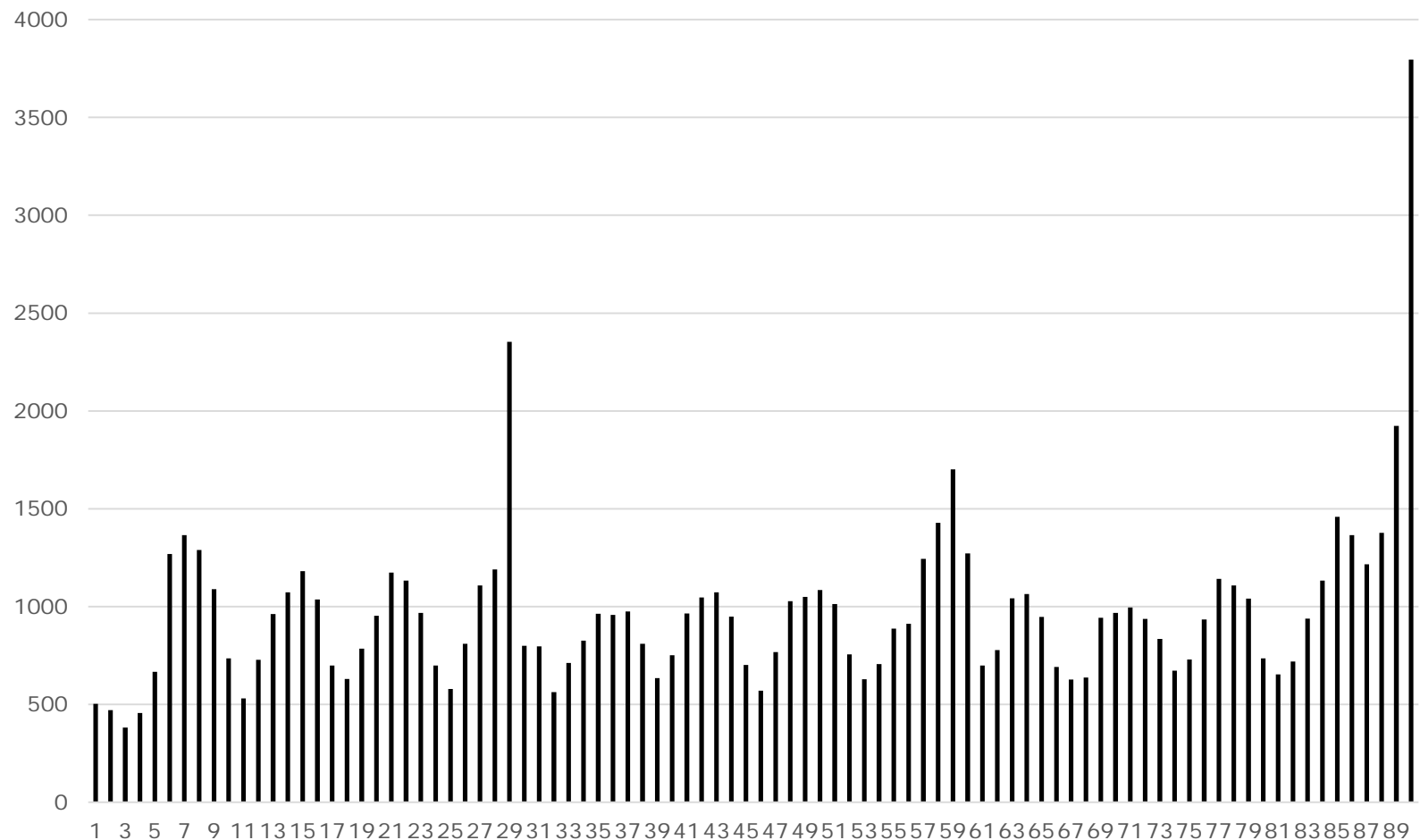
Banks		Big 4		SMBs	
Yield Type		Floating	Guarantee	Floating	Guarantee
Year	2007	326	282	377	278
	2008	203	207	165	90
	2009	219	38	162	91
	2010	117	38	129	87
	2011	107	72	90	70
	2012	123	78	116	94
	2013	127	83	125	97
	2014	139	76	118	100

Results II (cont'd): WMP rollover risk

■ WMP maturity mismatch

- CBRC monitors banks' LDR at the end of each quarter. Banks deliberately set WMPs to mature at the end of quarter and the money is transferred to the investors' deposit account.

Figure 8.2: Number of WMPs issued by SMBs due on each day within a quarter



Results II (cont'd): WMP rollover risk

■ Yields on newly issued WMPs

- One stdev increase in Shibor_d increase WMPReturn_d by about 0.76 stdev.
- For SMBs, one stdev increase in WMPdue increases WMPReturn_d by about 0.46 (0.25) stdev for principal-guaranteed (floating) WMPs.

Table VII Rollover risk and **WMP expected yield**

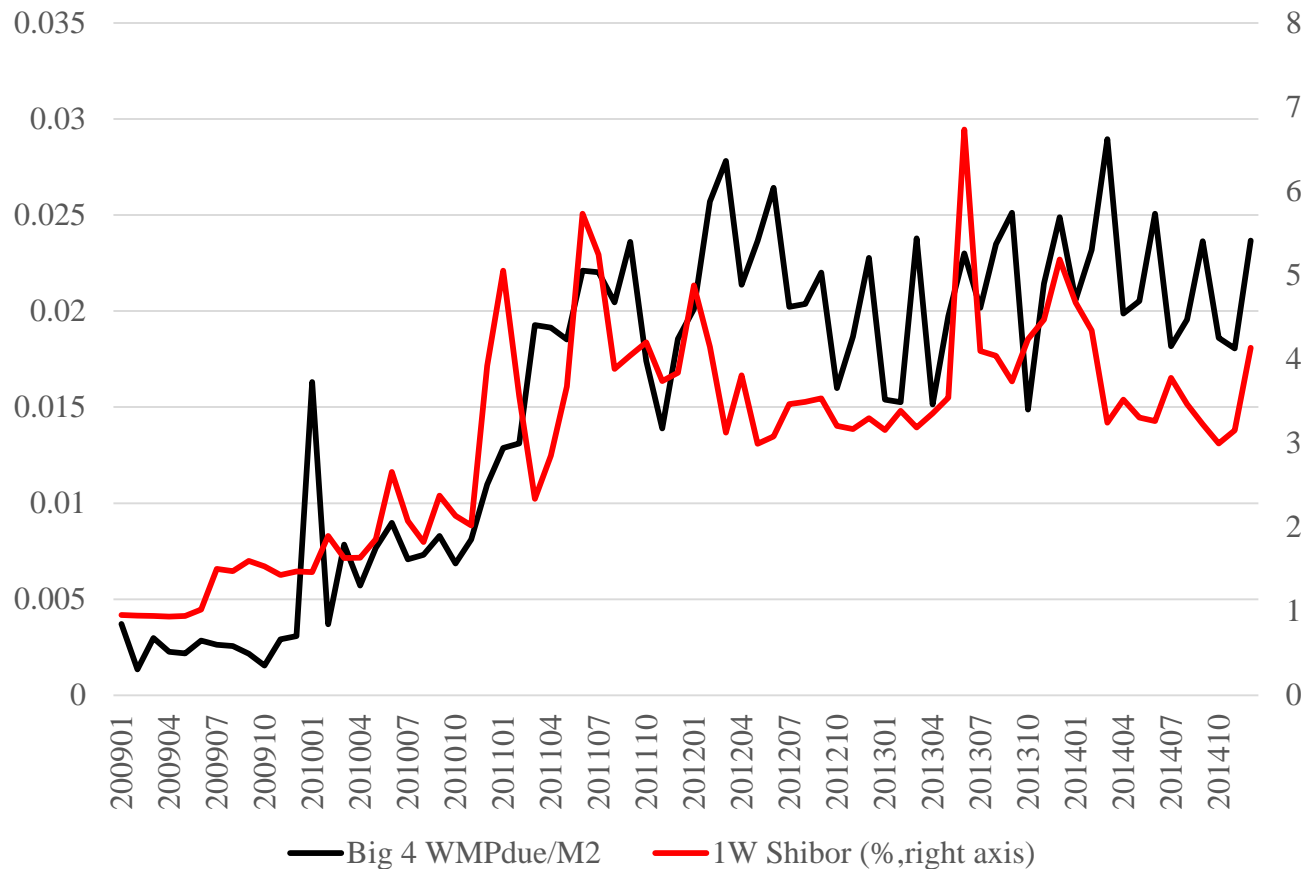
Bank type	Big 4		SMBs	
Yield type	Floating	Guarantee	Floating	Guarantee
Dep Var: WMPReturn_d	(1)	(2)	(3)	(4)
Shibor_d	0.629***	0.676***	0.621***	0.630***
	(13.64)	(12.42)	(13.8)	(14.66)
WMPdue	0.18	0.07	0.132***	0.225***
	(1.275)	(0.806)	(4.37)	(4.784)
Bank fixed effect	√	√	√	√
Quarter fixed effect	×	×	×	×
Constant	0.960***	0.618***	1.319***	0.04
	(5.964)	(3.879)	(15.7)	(0.358)
Observations	29,589	14,073	64,322	23,839
R-squared	0.660	0.717	0.671	0.659
Cluster	Quarter	Quarter	Quarter	Quarter

Results II (cont'd): WMP Rollover Risk

■ The interbank market

- 1-week Shibor closely tracks (Big 4 $WMP_{due}/M2$), but not correlated with (SMB $WMP_{due}/M2$).

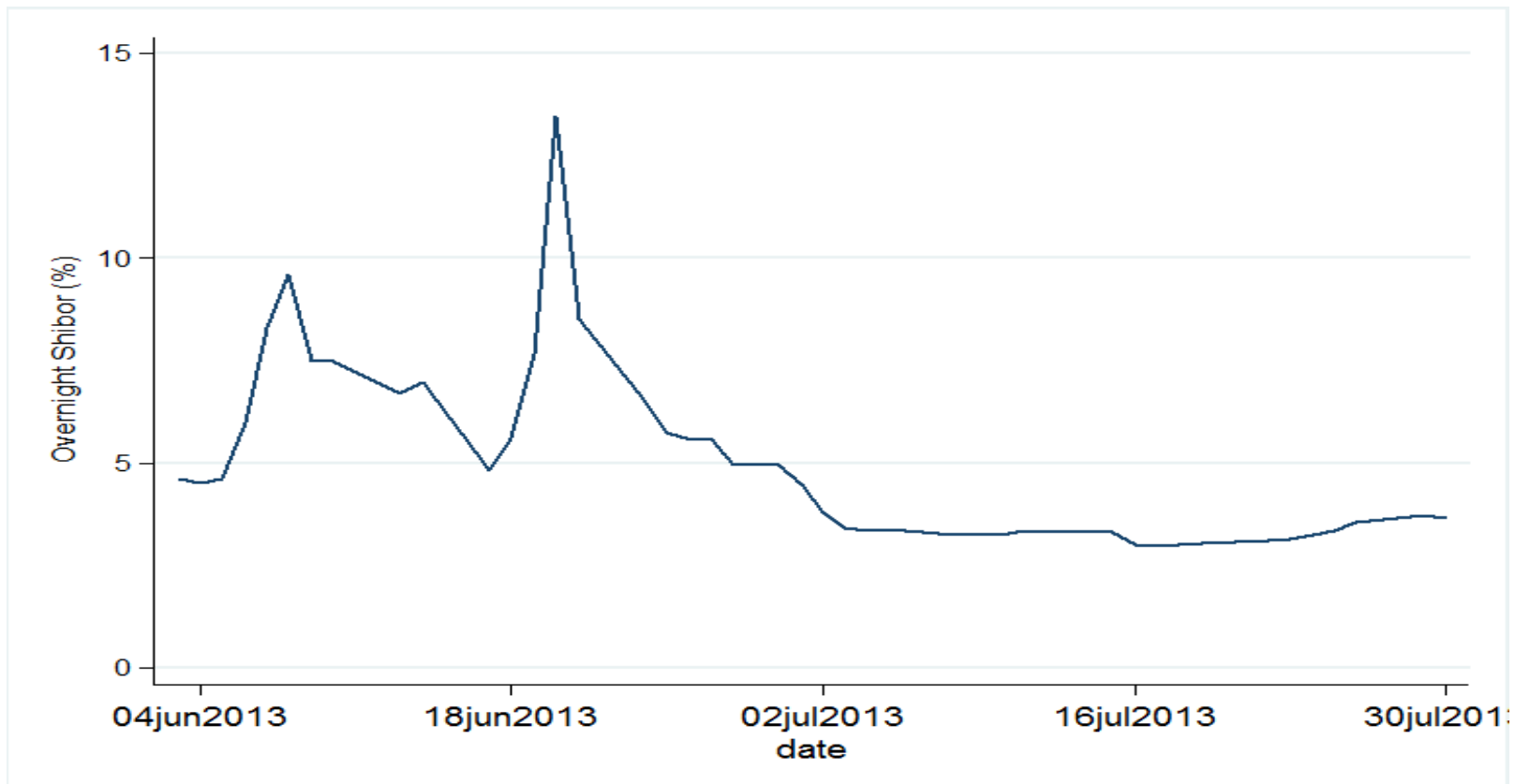
Figure 9.1 Average WMP_{due} of Big 4 and 1-week Shibor



Results III: Stock Market Reaction

■ SHIBOR event

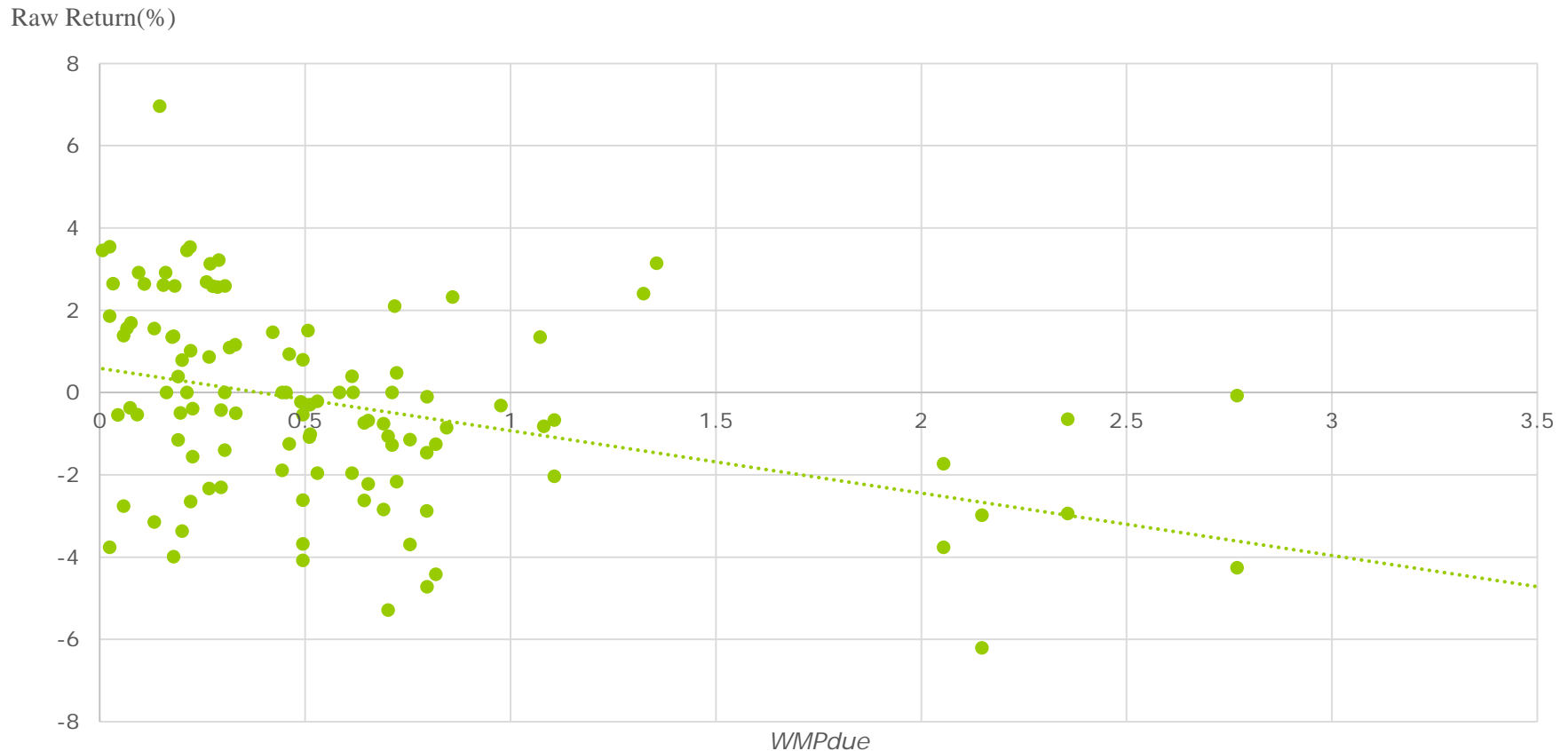
- On 17th June, 2013, PBOC issued an announcement requiring commercial banks to strengthen their liquidity management. PBOC tightened policy and didn't provide liquidity to the market.
- On 20th June 2013, the interbank rate spiked, with o/n rate over 13%.



Results III (cont'd): Stock Market Reaction

- Stock market response (of 17 listed banks):
 - consider the change in Shibor as unexpected if both the changes in overnight and 1-week Shibor are above a certain threshold c .

Figure 10: Relation between stock price and monthly WMPdue when $c=1\%$



Summary

- The rise of WMPs in China is triggered by the 4-trillion stimulus:
 - After the stimulus, Big 4 banks especially BOC had to attract more savings to satisfy the LDR requirement;
 - SMBs are forced to issue WMPs to attract deposits due to the increasing competition in the local deposit market.
 - Banks use WMPs to move loans off the balance sheet after the bureau tightened credit supply to CIICs and the real estate.
- The rollover risk of WMPs puts liquidity pressure on individual banks and the market as a whole;
- Growth similar to that of the money-market funds and especially ABCP growth and crash in the United States.
- A potential source of vulnerability; shadow banking growth often rooted in government distortions!