西南财经大学
SOUTHWESTERN UNIVERSITY OF FINANCE AND ECONOMICS

Monetary Policy, Cost Constraint and China's Shadow Banking

Qing Wang Chuan Li Xia Sheng

Institute of Chinese Financial Studies

Southwestern University of Finance and Economics

Berlin 2017.10

Measurement of China's shadow banking

- Unlike the US shadow banking, the shadow banking(SB) in China is primarily carried out by commercial banks to circumvent regulation requirements (loan quantity, deposit-to-loan ratio, safe-loan regulation, etc.).
- before 2013, Chinese commercial banks usually pursued risky non-standard assets through off-balance-sheet channel.

	Assets	Liabilities and Capital
Balance Sheet	Loans L_t^b	Deposits D_t
	Interbank loans IL_t	Interbank Borrowing IB_t
	Reserves RV_t	Bank capital N_t^b
Off Balance Sheet	Entrusted loans ET_t	Wealth management products WMP_t

- since 2013, regulation arbitrage opportunities through off-balance-sheet channel decreased. Shadow banking go through interbank channel.

  CBRC Article 8 (Mar 25, 2013): off-balance-sheet business must meet capital requirement.

- Since 2014, some interbank businesses, such as Interbank Payment and Buying Back the sale of financial assets, are prohibited to finance firms.[CBRC Article 127(Apr 24, 2014)].

- the shadow banking has now been filled in some low risk weighted balance-sheet items, mainly in "**Accounts Receivable Investment (ARI)**" .

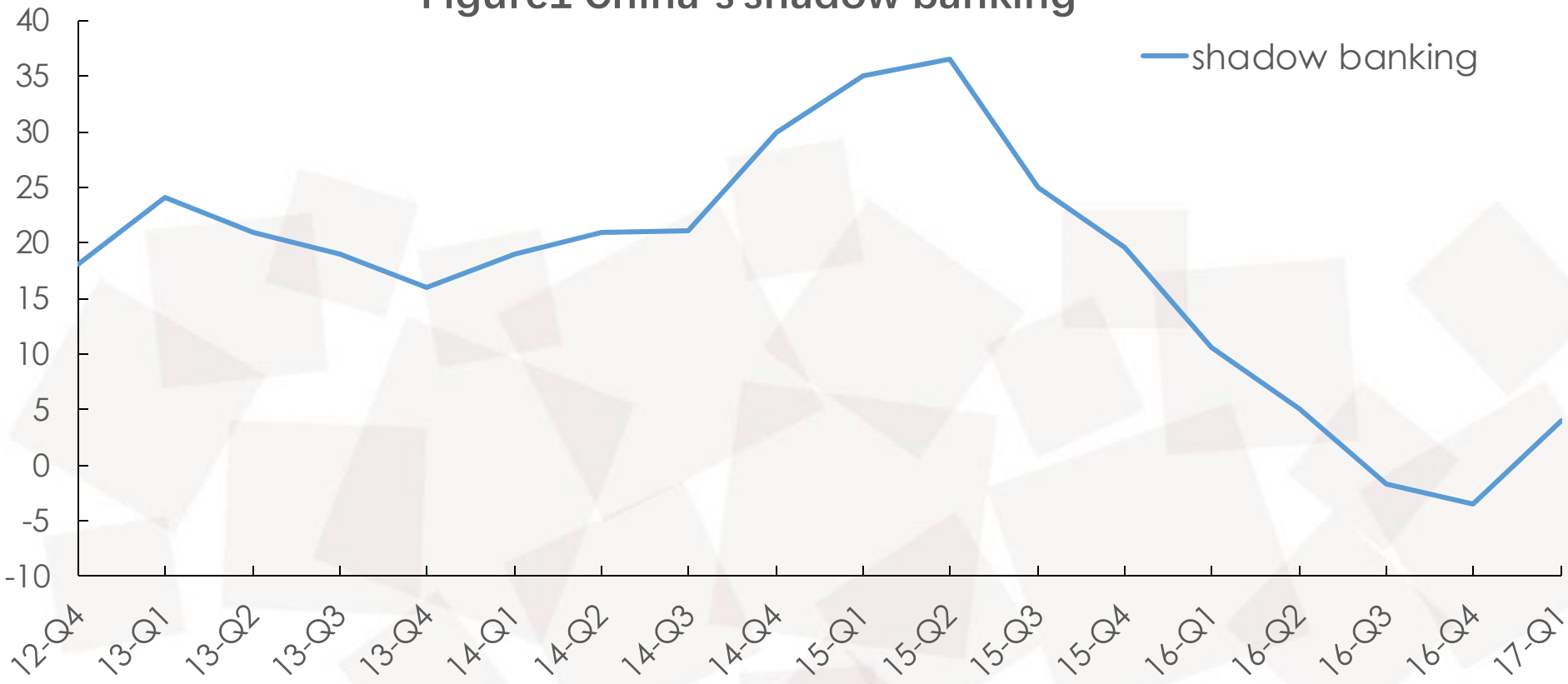
Measurement of China's shadow banking

- Our measurement:

shadow banking = ARI--- standard assets

standard assets: Government bonds and long-term targeted bonds issued by 4AMCs.

Figure1 China's shadow banking



- Figure 1 shows China's shadow banking has experienced a rapid growth since the fourth quarter of 2012. Till 2017q1, the scale of shadow banking (ARI) reaches 17 trillion RMB, amount to 7.9% of total bank assets, or 19.8% of non-big-4 bank assets.

Literatures

- Causes of SB:

1.Kaiji Chen, Jue Ren and Tao zha(2016, 2017) investigate the **nexus of monetary policy and shadow banking**. Tightening monetary policy drives shadow banking up, especially for small banks.

2. Kinda Hachem and Zheng Song(2016) analyze impacts of higher liquidity standards, find out that **high liquidity standards** make small and medium-sized banks develop shadow banking.

- Consequences of SB:

1.Franklin Allen et al(2015) explore firms' motivation in making entrusted loans, and find out the **entrusted loans are substitutions for the official credit**.

2.Hao Wang et al(2015) find out China's shadow banking accelerates interest rate liberalization and improves the social surplus.

- They all use entrusted loans representing SB.

Preliminary research:

By use of ARI, is monetary policy still the driving force for shadow banking?

- we test the impact of **exogenous monetary policy** on shadow banking.
- Data: the banks in our paper are 17 listed banks consist of the Big4 and 13 smaller banks. Quarterly data from 2012q4 to 2017q1(18 quarters).
- Our empirical analysis follows Kashyap and Stein(2000)、Jimenez et al(2014)
- The testing model:

$$\Delta logSB_{it} = \beta + \beta_1 \Delta m_t + \beta_2 D(big4) + \beta_3 D(small) + \beta_4 \Delta m_t * D(big4) + \beta_5 \Delta m_t * D(small) + Control_{ibt} + Control_{imt} + Control_{idt} + \alpha_t + \lambda_i + \varepsilon_{it}$$

Exogenous Monetary Policy

- The growth of M2 is an ideal indicator for monetary policy in China (Chen et al, 2017). Here we use residuals of "Taylor rule" including GDP gap、CPI gap 、bank lending and ARI as an indicator for exogenous monetary policy.
- The exogenous monetary policy M2* is residual of the following "Taylor rule" regression:

$$m_t = \varphi_{mt} m_{t-1} + \varphi_{yt} y_t^* + \varphi_{\pi t} \pi_t^* + \varphi_{lt} \Delta log L_t + \varphi_{sbt} \Delta log SB_t + \varepsilon_t$$

- The residual is denoted by Δm_t in our following empirical analysis

- When monetary policy tightens, small banks carry out more shadow banking.

Table 1. Impact of exogenous monetary policy on shadow banking

$\Delta logSB_{it}$	(1)	(2)	(3)	(4)
Δm_t	-0.30(0.29)	-0.27(0.39)	-0.32(0.35)	-0.23(0.37)
$D(big)$	-1.51(1.20)	-1.47(1.21)	-1.41(1.17)	-1.26(1.29)
$D(small)$	2.27(1.87)	2.21(1.90)	2.16(1.74)	2.02(1.71)
$\Delta m_t * D(Big4)$	0.35(0.29)	0.34(0.32)	0.59(0.48)	0.38(0.31)
$\Delta m_t * D(Small)$	-2.64**(1.19)	-2.36**(1.09)	-2.54**(1.20)	-2.33**(1.05)
Bank CAR		0.44*(0.26)		0.31*(0.17)
Bank NPL		0.81 (1.09)		0.80(1.47)
Bank ROA		1.39(1.57)		1.29(1.52)
$\Delta growth_t$		1.24(1.59)		1.19(1.72)
CPI_t		1.26(1.35)		1.17(1.28)
Real estate boom index		-0.21(0.20)		-0.18(0.26)
Stock returns		3.12(3.07)		3.09(3.11)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.11	0.16	0.13	0.20
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

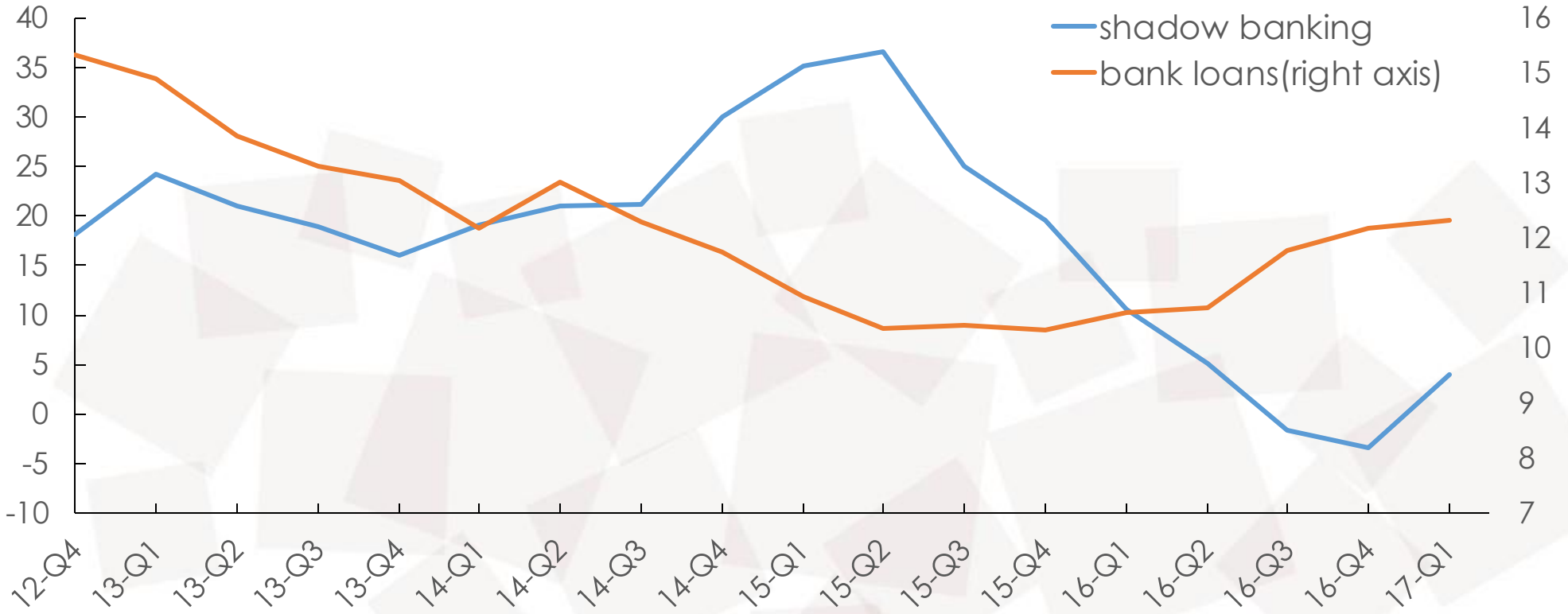
Table 2. Impact of exogenous monetary policy on bank loans

- When monetary policy tightens, banks reduce loans, especially for small banks.

$\Delta logL_{it}$	(1)	(2)	(3)	(4)
Δm_t	0.09(0.07)	0.08(0.10)	0.08(0.09)	0.07(0.10)
$D(big)$	0.17(0.33)	0.13(0.40)	0.16(0.39)	0.10(0.42)
$D(small)$	0.32(0.35)	0.28(0.37)	0.30(0.38)	0.17(0.3-0)
$\Delta m_t * D(Big4)$	0.21(0.14)	0.19(0.12)	0.19(0.18)	0.18*(0.11)
$\Delta m_t * D(Small)$	0.40(0.27)	0.36*(0.20)	0.37(0.27)	0.34*(0.20)
Bank CAR		-0.05(0.20)		-0.04(0.29)
Bank NPL		0.08(0.21)		0.08(0.28)
Bank ROA		-0.07(0.11)		-0.06(0.14)
$\Delta growth_t$		0.21(0.30)		0.17(0.29)
CPI_t		0.17(0.20)		0.10(0.09)
Real estate boom index		0.06(0.19)		0.07(0.25)
Stock returns		-0.30(0.24)		-0.28(0.27)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.09	0.12	0.09	0.12
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

Figure2 shadow banking and bank loans move in different way



The correlation coefficient between shadow banking and bank loan

All banks	-0.2741
Big 4 banks	0.1943
Small banks	-0.4743

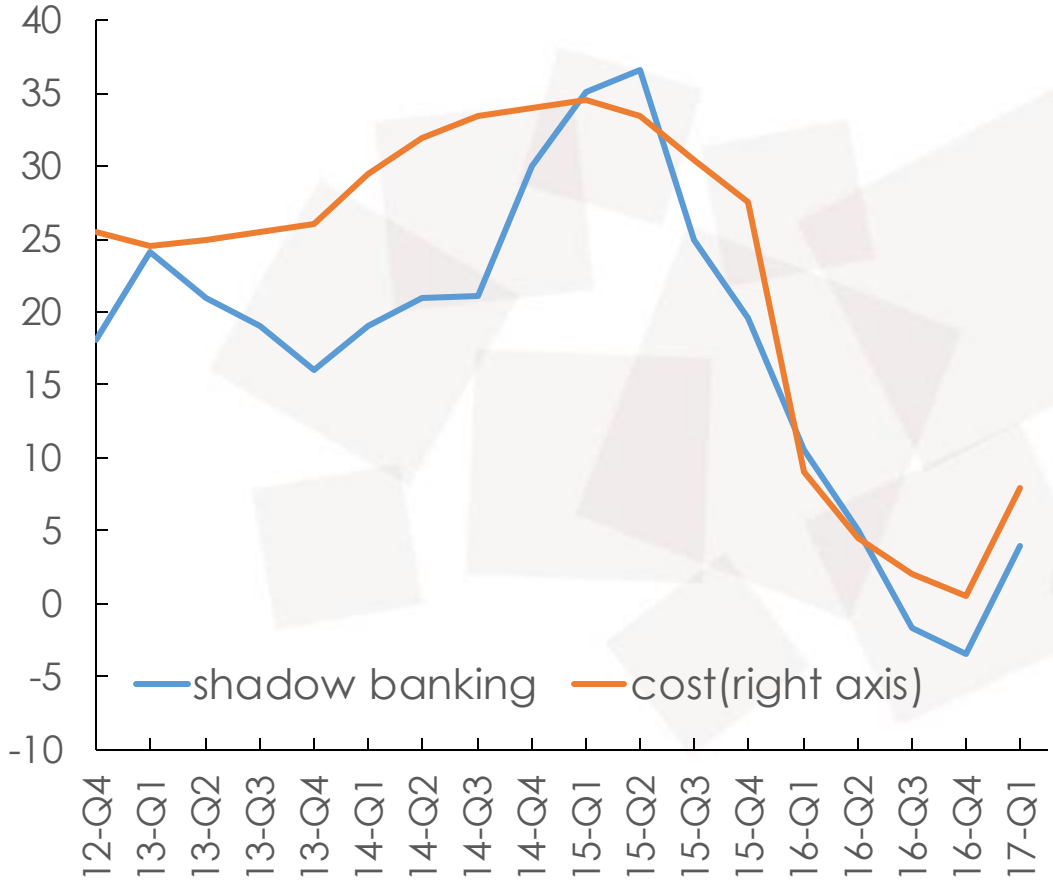
Why shadow banking and bank loan move oppositely?

Supply side reasons:

- 1.bank liquidity. Kinda Hachem and Zheng Song(2016).

- 2.money cost. When money cost increases, banks will choose to lend via SB, which could have lower regulation cost and higher gains. Banks invest in higher risk projects to compensate the higher money cost, so doing shadow banking is a natural choice.

shadow banking and deposit rate



shadow banking and LDR

Empirical Models

- First, we test the impact of bank's money cost on shadow banking:

$$\Delta logSB_{it} = \beta + \beta_1 \Delta Cost_t + \beta_2 D(big4) + \beta_3 D(small) + \beta_4 \Delta Cost_t * D(big4) + \beta_5 \Delta Cost_t * D(small) + Control_{ibt} + Control_{imt} + Control_{idt} + \alpha_t + \lambda_i + \varepsilon_{it}$$

Empirical Models

- Then, we test the interactions between the exogenous monetary policy and the money cost:

$$\Delta logSb_{it} = \beta + \beta_1 \Delta m_t + \beta_2 Cost_{it} + \beta_3 \Delta m_t Cost_{it} + Control_{ibt} + Control_{imt} + Control_{idt} + \alpha_t + \lambda_i + \varepsilon_{it}$$

(The correlation coefficients between Δm_t and cost range from -0.178 to 0.24)

EMPIRCIAL RESULTS

- Small banks carry out more shadow banking, while big banks don't care much about SB.
- Small banks with higher deposit rate carry out more shadow banking. (especially Minsheng, Pufa and Xingye bank)
- Demand side factors are insignificant.

Table 3. Impact of deposit rate on shadow banking

$\Delta logSB_{it}$	(1)	(2)	(3)	(4)
$\Delta Cost_{it}$	1.46(2.11)	1.32(2.09)	1.35(2.10)	1.27(2.17)
$D(big)$	-1.27(1.18)	-1.15(1.16)	-1.26(1.16)	-1.09(1.13)
$D(small)$	3.37*(2.25)	3.20*(1.67)	3.11*(1.67)	2.69*(1.57)
$\Delta Cost * D(Big4)$	9.51(6.35)	8.62(6.79)	8.83(6.43)	7.14(6.67)
$\Delta Cost * D(Small)$	18.41***(5.89)	16.33***(5.81)	17.62***(5.82)	16.01***(5.78)
Bank CAR		0.45*(0.24)		0.38*(0.22)
Bank NPL		0.83(1.56)		0.79(1.79)
Bank ROA		1.02(0.69)		0.94(0.70)
$\Delta growth_t$		-1.53(0.98)		-1.27(0.81)
CPI_t		1.26(0.91)		1.05(0.76)
Real estate boom index		-0.13(0.17)		-0.11(0.18)
Stock returns		3.11(2.73)		2.64(2.49)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.19	0.29	0.20	0.30
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

EMPIRCIAL RESULTS

- When monetary policy tightens, higher cost banks carry out more shadow banking .

Table 4. Interaction of deposit rate and monetary policy on SB

$\Delta logSB_{it}$	(1)	(2)	(3)	(4)
Δm_t	-0.32(0.21)	-0.31(0.18)	-0.30(0.25)	-0.29(0.19)
$Cost_{it}$	1.37(1.55)	1.22(1.51)	1.26(1.77)	1.01(1.42)
$\Delta m_t * Cost_{it}$	-3.11**(1.53)	-2.78**(1.49)	-3.01*(1.65)	-2.67**(1.39)
Bank CAR		0.50*(0.26)		0.44*(0.24)
Bank NPL		0.83(0.77)		0.79(0.80)
Bank ROA		1.02(1.23)		0.74(0.99)
$\Delta growth_t$		1.24(1.21)		1.20(1.32)
CPI_t		1.30(1.29)		1.17(1.31)
Real estate boom index		-0.20(0.32)		-0.18(0.35)
Stock returns		3.10(3.04)		2.70(2.79)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.12	0.14	0.12	0.14
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

EMPIRCIAL RESULTS

- When deposit rate rises, Big4 banks increase loans, while small banks decrease loans.

Table 5. Impact of deposit rate on bank loans

$\Delta logL_{it}$	(1)	(2)	(3)	(4)
$\Delta Cost$	0.29(0.38)	0.25(0.31)	0.27(0.33)	0.22(0.29)
$D(big)$	0.15(0.23)	0.11(0.18)	0.14(0.26)	0.10(0.11)
$D(small)$	0.29(0.25)	0.24(0.27)	0.27(0.28)	0.26(0.27)
$\Delta Cost_{it} * D(Big4)$	0.38(0.24)	0.36*(0.19)	0.34(0.28)	0.29*(0.17)
$\Delta Cost_{it} * D(Small)$	-1.31*(0.70)	-1.27*(0.70)	-1.30*(0.76)	-1.24*(0.69)
Bank CAR		-0.05(0.22)		-0.04(0.12)
Bank NPL		0.10 (0.24)		0.09(0.08)
Bank ROA		-0.06(0.09)		-0.05(0.09)
$\Delta growth_t$		0.14(0.13)		0.11(0.12)
CPI_t		0.14(0.16)		0.12(0.10)
Real estate boom index		0.05(0.12)		0.04(0.12)
Stock Returns		-0.20(0.17)		-0.14(0.06)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.12	0.15	0.12	0.17
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

EMPIRCIAL RESULTS

- When monetary policy tightens, higher cost banks carry out less lending business .

Table 6. Interaction of deposit rate and monetary policy on bank loans

$\Delta logL_{it}$	(1)	(2)	(3)	(4)
Δm_t	0.09(0.18)	0.08(0.31)	0.08(0.27)	0.05(0.18)
$Cost_{it}$	0.23(0.19)	0.15(0.21)	0.17(0.22)	0.12(0.19)
$\Delta m_t * Cost_{it}$	0.40***(0.15)	0.35**(0.15)	0.39**(0.14)	0.34**(0.16)
Bank CAR		-0.06(0.18)		-0.06(0.25)
Bank NPR		0.06(0.19)		0.04(0.19)
Bank ROA		-0.04(0.08)		-0.04(0.11)
$\Delta growth_t$		0.16(0.11)		0.17(0.14)
CPI_t		0.14(0.13)		0.10(0.09)
Real estate boom index		0.05(0.12)		0.04(0.10)
Stock Returns		-0.27(0.17)		-0.24(0.14)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.12	0.15	0.13	0.16
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

Different effect of money cost and monetary policy

The coefficients of money cost and monetary policy

		cost	Δmt
Small banks	SB	16.01***(5.78)	-2.33**(1.05)
	Loan	-1.24*(0.69)	0.34*(0.20)
Big banks	SB	7.14(6.67)	0.29*(0.17)
	Loan	0.38(0.31)	0.18*(0.11)

Robust test

- synthetic money cost of banks including deposit rate, interbank rate and central bank loan rate.

Table 7. Interaction of synthetic money cost and monetary policy (SB)

$\Delta logSB_{it}$	(1)	(2)	(3)	(4)
Δm_t	-0.29(0.38)	-0.26(0.55)	-0.28(0.49)	-0.24(0.51)
$Cost_{it}$	0..77(0.90)	0.71(1.02)	0.76(1.10)	0.61(0.89)
$\Delta m_t Cost_{it}$	-3.59*(1.97)	-3.43*(2.04)	-3.55*(2.00)	-3.36*(1.99)
Bank CAR		0.43*(0.22)		0.41*(0.24)
Bank NPL		0.79 (0.71)		0.61(0.50)
Bank ROA		0.94(1.09)		0.89(0.92)
$\Delta growth_t$		1.26(1.01)		1.15(0.95)
CPI_t		1.16(0.94)		1.10(1.09)
Real estate boom index		-0.37(0.65)		-0.32(0.57)
Stock returns		2.41(2.09)		2.30(1.61)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.09	0.10	0.09	0.11
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

Robust test

Table 8. Interaction of synthetic money cost and monetary policy (Loan)

$\Delta logL_{it}$	(1)	(2)	(3)	(4)
Δm_t	0.17(0.30)	0.14(0.29)	0.16(0.41)	0.12(0.32)
$Cost_{it}$	0.12(0.19)	0.09(0.11)	0.11(0.22)	0.08(0.15)
$\Delta m_t * Cost_{it}$	0.32**(0.14)	0.27*(0.14)	0.30*(0.16)	0.26*(0.15)
Bank CAR		-0.04(0.17)		-0.03(0.14)
Bank NPR		0.05(0.19)		0.04(0.15)
Bank ROA		-0.05(0.09)		-0.03(0.08)
$\Delta growth_t$		0.17(0.12)		0.16(0.12)
CPI_t		0.13(0.10)		0.09(0.08)
Real estate boom index		0.06(0.13)		0.05(0.12)
Stock Returns		-0.25(0.15)		-0.22(0.12)
Time fixed effects	no	no	yes	yes
Bank fixed effects	no	no	yes	yes
Adjust. R^2	0.09	0.11	0.10	0.12
Observations	306	306	306	306

Note: *, ** and *** represent the 10%, 5% and 1% significance level respectively.

Conclusions

- 1, for small banks, increase of money cost will increase shadow banking, and decrease bank loan. Cost constraint plays important role to explain the movement of shadow banking and opposite movement with bank loans.

- 2, monetary policy and money cost jointly affect shadow banking. Cost constraint has more significant effect on shadow banking.

- 3, generally, tightening monetary policy decreases bank loans, while increasing shadow banking, which means monetary policy lose efficiency in this situation.

Implications

- Because shadow banking weaken the effect of monetary policy, and make banks misallocate resources, shadow banking should be under control generally.

- In order to constrain shadow banking, monetary policy should cooperate and coordinate with regulation policy.

THANKS!