The Risk of Implicit Guarantees: Evidence from the Shadow Interbank Market in China

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Implicit Guarantees

Implicit guarantees are commonly used in the shadow banking system

In 2007-09 financial crisis,

- Bear Stearns, Goldman Sachs, etc. volunteered to bail out their internal funds.
- HSBC, Citigroup, etc. volunteered to bail out their SIVs.
- 44 MMFs received supports from their sponsors to avoid "breaking the buck".
- "Securitization without Risk Transfer" (Acharya, Schnabl, and Suarez, 2012)

In China, bank regulators are highly concerned with implicit guarantees (or return rigidity).

Data and Its Background

Wealth Management Products (WMPs) issued by banks in China.

WMPs nominally are not debt obligations;

- however, banks extend implicit guarantees, i.e.,
  they tend to pay returns that they advertise.

We focus on interbank WMP-CD pairs

- share the same group of investors
  backed by the "same" underlying assets
  their yield spread informs the risk of implicit guarantees

Main Results

Empirical findings:

- The risk of implicit guarantees is *lower* for WMPs issued by *riskier* banks.
- The interbank WMP-CD spread is *smaller* for *riskier* banks.

We propose a stylized model based on a signaling game to rationalize the empirical findings

- Intuition: banks with worse reputation have stronger incentives to send more positive signals, i.e., higher realized returns
- Regulatory implication: different banks should have different risk weights for their off-balance-sheet exposure

Literature

Implicit Guarantees
Gorton and Souleles (2007), Acharya, Schnabl, and Suarez (2012), Ordõnez (2016)

Signaling
Spence (1973), Ordõnez, Perez-Reyna, and Yogo (2017)

Shadow banking in China
Chen, Ren, and Zha (forthcoming), Archaya, Qian, and Yang (2017), Hachem and Song (2017), Allen, Gu, Qian, and Qian (2017), et.al.

Outline of the Talk

- Background
- Data and empirical results
- Baseline model and its extension

Banking System in China

Big 5 (or 4) banks with total assets 86.6 trillion rmb

Joint-equity banks with total assets 43.5 trillion rmb
- 8 out of 12 are publicly listed

Urban banks with total assets 28.2 trillion rmb
- 8 out of 130 (in the sample) are publicly listed

Rural banks with total assets 29.9 trillion rmb
- 6 out of 451 (in the sample) are publicly listed

Urban and rural banks
- less branches
- less resilient to regional shocks
- largely rely on interbank market for external credit

Wealth Management Products

Wealth management products: sold by banks

- signal "promised" returns when marketing
- no obligations of paying "promised" returns
- realized returns could be different from "promised" returns

Outstanding WMPs: 29.05 trillion rmb by the end of 2016.

- WMPs without guarantees (off-balance-sheet, 23.11 trillion rmb)
- WMPs with principal guaranteed (on-balance-sheet)

- retail WMPs (15.54 trillion rmb, 53.5%)
- institutional WMPs (13.51 trillion rmb)
  - non-financial institutional WMPs (7.52 trillion rmb)
  - interbank WMPs (5.99 trillion rmb)

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Data

data of WMPs from https://www.chinawealth.com.cn

- a website run by China Central Depository and Clearing Co.
- a subsidiary of China Bank Regulatory Committee
- key variables: “expected” return, realized return,
  issuing bank, type of guarantee, client type, maturity, starting date,
  expiration date, purchase threshold, ...

Interbank CD from http://www.chinamoney.com.cn

Summary Statistics I

$$degree\ of\ implicit\ guarantee_{i,j} = \frac{realized\ return_{i,j} - promised\ return_{i,j}}{promised\ return_{i,j}}.$$

Table: Implicit Guarantee

Panel A: *types of clients*					
client types	mean (std)	5th perc	10th perc	25th perc	N
retail	-0.037 (0.104)	-0.233	-0.160	-0.018	224,138
institutional	-0.016 (0.081)	-0.088	-0.023	0	143,499
interbank	-0.011 (0.076)	-0.029	0	0	33,887
all WMPs	-0.027 (0.095)	-0.207	-0.104	0	401,524
Panel B: *interbank WMPs across different types of banks*					
bank types	mean (std)	1st perc	5th perc	10th perc	N
joint-equity	-0.010 (0.080)	-0.350	0	0	14,081
urban	-0.009 (0.079)	-0.364	-0.026	0	8,655
rural	-0.014 (0.068)	-0.357	-0.029	0	11,151
all banks	-0.011 (0.076)	-0.354	-0.029	0	33,887

Summary Statistics II

Table: WMP CD spread

Panel A: *WMP return − CD yield*

	promised return					*realized return*				
bank types	mean (std)	Q1	median	Q3	N	mean (std)	Q1	median	Q3	N
joint-equity	0.778 (0.527)	0.550	0.700	0.900	4957	0.797 (0.578)	0.600	0.750	0.950	3716
urban	0.749 (0.529)	0.500	0.700	0.870	2211	0.793 (0.415)	0.600	0.750	0.920	1395
rural	0.567 (0.424)	0.300	0.530	0.750	1550	0.583 (0.391)	0.320	0.550	0.780	1162
all banks	0.733 (0.517)	0.500	0.680	0.890	8718	0.757 (0.521)	0.550	0.720	0.900	6273

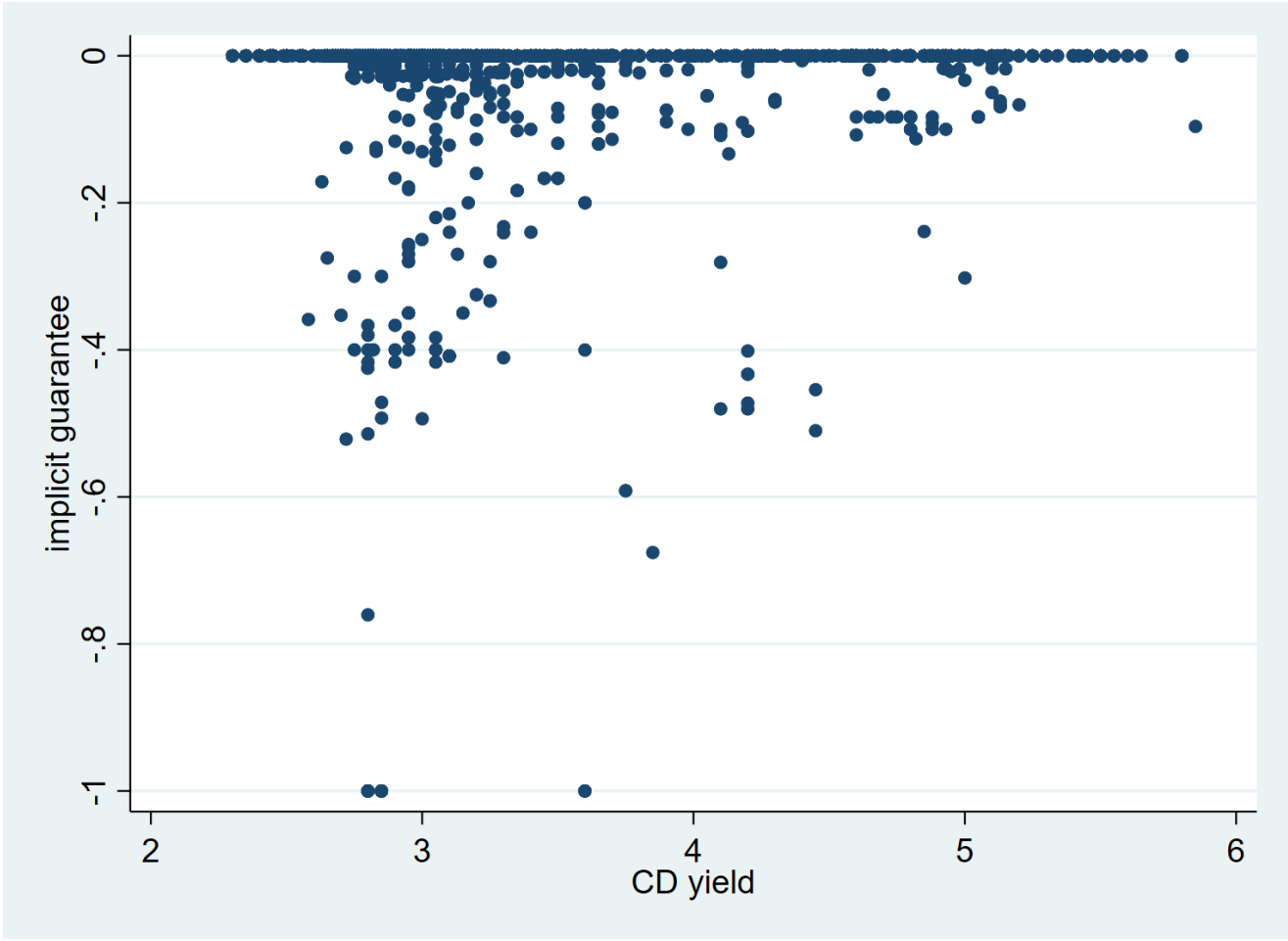
Panel B: $\ln(\textit{WMP return}) - \ln(\textit{CD yield})$

	promised return					*realized return*				
bank types	mean (std)	Q1	median	Q3	N	mean (std)	Q1	median	Q3	N
joint-equity	0.209 (0.137)	0.160	0.200	0.248	4955	0.218 (0.145)	0.167	0.209	0.261	3701
urban	0.200 (0.123)	0.137	0.197	0.246	2211	0.217 (0.096)	0.167	0.216	0.257	1395
rural	0.155 (0.107)	0.083	0.152	0.216	1550	0.162 (0.097)	0.093	0.160	0.217	1162
all banks	0.197 (0.130)	0.141	0.193	0.243	8716	0.207 (0.129)	0.156	0.204	0.253	6258

Panel C: $(\textit{WMP return} - \textit{CD yield}) / \textit{CD yield}$

	promised return					*realized return*				
bank types	mean (std)	Q1	median	Q3	N	mean (std)	Q1	median	Q3	N
joint-equity	0.218 (0.145)	0.167	0.209	0.261	3701	0.251 (0.193)	0.180	0.232	0.298	3716
urban	0.232 (0.169)	0.146	0.217	0.279	2211	0.249 (0.126)	0.182	0.241	0.293	1395
rural	0.174 (0.132)	0.086	0.164	0.241	1550	0.181 (0.116)	0.097	0.174	0.242	1162
all banks	0.228 (0.168)	0.151	0.213	0.275	8718	0.237 (0.170)	0.168	0.226	0.288	6273

Implicit Guarantees against CD Yield



Implicit Guarantee

Dependent Variable	$(realized\ R - promised\ R)/promised\ R$			
	linear regression		censored regression	
	(1)	(2)	(3)	(4)
promised R	-0.056***		-0.014***	
	(-4.588)		(-12.77)	
CD yield	0.045***	0.023***	0.012***	0.010***
	(4.089)	(3.022)	(13.62)	(13.26)
$\alpha_{urban} - \alpha_{joint}$	0.031	0.009	0.016***	0.010***
	(1.417)	(0.382)	(13.29)	(13.02)
$\alpha_{rural} - \alpha_{joint}$	0.025***	0.007*	0.008***	0.002***
	(4.652)	(1.878)	(12.21)	(6.27)
maturity	0.001	-0.001	0.003***	0.002***
	(0.352)	(-0.270)	(13.80)	(13.72)
principal guaranteed	-0.041*	-0.016	-0.010***	-0.005***
	(-1.706)	(-0.652)	(-8.58)	(-4.98)
principal & return guaranteed	-0.029*	-0.005	0.044***	0.063***
	(-1.975)	(-0.351)	(13.03)	(12.30)
expected liquidity at maturity	-0.005	-0.010	0.0004***	-0.005***
	(-0.224)	(-0.470)	(52.26)	(-10.94)
unexpected liquidity at maturity	0.018	0.011	0.007***	0.003***
	(1.025)	(-0.638)	(6.28)	(2.97)
R-squared	0.228	0.224	-	-

Interbank WMP-CD Spread

Dependent Variable	$WMP\ return - CD\ yield$		$\ln(WMP\ return) - \ln(CD\ yield)$		$\frac{WMP\ return - CD\ yield}{CD\ yield}$	
	expected	*realized*	*expected*	*realized*	*expected*	*realized*
	(1)	(2)	(3)	(4)	(5)	(6)
CD yield	-0.573***	-0.479***	-0.163***	-0.154***	-0.218***	-0.204***
	(-10.85)	(-8.236)	(-14.78)	(-12.08)	(-16.73)	(-14.43)
α_{joint}	2.812***	2.047***	0.702***	0.739***	1.154***	1.034***
	(11.18)	(5.244)	(17.64)	(13.66)	(18.22)	(8.255)
$\alpha_{urban} - \alpha_{joint}$	0.046	0.388***	0.018	0.085***	0.050	0.144***
	(0.435)	(3.546)	(0.790)	(5.445)	(1.625)	(4.716)
$\alpha_{rural} - \alpha_{joint}$	0.258***	0.344***	0.064***	0.083***	0.080***	0.105***
	(5.174)	(5.766)	(4.880)	(5.014)	(4.871)	(5.329)
maturity	0.011*	0.018	0.002	0.001	0.002	0.004
	(1.711)	(1.113)	(1.495)	(0.164)	(1.256)	(0.732)
principal	-0.477***	-0.538***	-0.125***	-0.145***	-0.144***	-0.157***
guaranteed	(-6.932)	(-5.743)	(-6.883)	(-6.904)	(-6.652)	(-7.989)
principal & return	-0.406***	-0.454***	-0.102***	-0.116***	-0.120***	-0.127***
guaranteed	(-4.869)	(-5.763)	(-4.844)	(-5.643)	(-4.366)	(-5.429)
expected liquidity	-0.071*	0.039	-0.018*	-0.002	-0.037**	-0.013
at maturity	(-1.766)	(0.335)	(-1.840)	(-0.121)	(-2.411)	(-0.324)
unexpected liquidity		0.131*		0.020***		0.043**
at maturity		(1.936)		(2.976)		(2.106)
observations	8718	6127	8716	6112	8718	6127
N of banks	176	149	176	149	176	149
R-squared	0.583	0.556	0.590	0.560	0.610	0.570

t statistics in parentheses; * $p < .1$, ** $p < .05$, *** $p < .01$

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Model Setup at $t = 0$ and $t = 2$

- $t = 0, 1, 2$. Risk-free rate is zero. Risk-averse creditors with $u(\cdot)$
- a bank has X_0 units of long-term assets at $t = 0$.
  - high type with prob α_0, whose unit asset value is $k > 1$ at $t = 2$;
  - low type with prob $1 - \alpha_0$, whose unit asset value is 1 at $t = 2$.
- the bank maximizes $(\mu k + 1 - \mu)X_2$ at $t = 2$, where
  - X_2: units of long-term assets, and
  - μ: market's belief of a bank being high type at $t = 2$.
- liquidity shortfall f at $t = 0$
  - only a half of f is financed by short-term CD (on-balance-sheet)
  - the other half is financed by short-term WMP (off-balance-sheet)

Model Setup at $t = 1$

three states at $t = 1$: *up*, *med*, and *down*.

- chances high-type faces *up* and *med* states are β and β_h ;
- chances low-type faces *up* and *med* states are β and $\beta_l (< \beta_h)$.

Liquidity shocks at three states (apply to both types):

- *up* state, sufficiently large positive shocks
- *down* state, the bank fails;
  recovery values for CD and WMPs are the same $\underline{r}$.
- *med* state, on-balance-sheet account has sufficient liquidity
  off-balance-sheet account has only $\underline{r}$.

Payoffs of CD and WMP at $t = 1$

Face value of CD is R, which is paid in both *up* and *med* states.

R is decreasing in α_0.

$u(0.5f) = \Pi u(R) + (1 - \Pi)u(\underline{r})$, where $\Pi = \alpha_0\beta_h + (1 - \alpha_0)\beta_l + \beta$

Payoffs of WMP

- *up* state, R^{up} paid by both types (pooling equilibrium).
- *med* state, high-type pays $R^h + \underline{r}$ and low-type pays $R^l + \underline{r}$.
  - one unit of long-term assets liquidated by high-type yields $\theta_h (< 1)$ units of payoff at $t = 1$: $X_2^h = X_0 - \frac{R^h}{\theta_h}$
  - one unit of long-term assets liquidated by low-type yields $\theta_l (< \theta_h)$ units of payoff at $t = 1$: $X_2^l = X_0 - \frac{R^l}{\theta_l}$

Pooling Equilibrium in *Med* state

market's belief of the bank being high-type

$$\alpha_1 = \frac{\alpha_0 \beta_h}{\alpha \beta_h + (1 - \alpha_0)\beta_l}$$

$R^h = R^l = 0$.

market value of the bank's long-term assets: $(\alpha_1 k + 1 - \alpha_1)X_0$.

creditors' indifference condition w.r.t. WMP:

$$u(0.5f) = \beta u(R^{\text{up}}_{\text{pool}}) + (1 - \beta)u(\underline{r}).$$

Separating Equilibrium in *Med* state

Incentive compatible constraint: $X_0 \geq k(X_0 - \frac{R^h}{\theta_l})$.

market value of the high-type: $k(X_0 - \frac{R^h}{\theta_h})$.

$R^l = 0$.

creditors' indifference condition w.r.t. WMP:

$$u(0.5f) = \beta u(R^{\text{up}}_{\text{separate}}) + \alpha_0 \beta_h u(R^h + \underline{r}) + (1 - \beta - \alpha_0 \beta_h) u(\underline{r}).$$

Comments

- As the prior of being high-type α_0 deteriorates,

  the separating equilibrium becomes more efficient and

  WMP's payoff in *med* state rises sharply.

- Bad reputation worsens the fundamental of good-type.

- Equilibrium selection is a concern.

Conclusion

- We document a fact that riskier banks are more exposed to risks of their shadow banking business.
- A simple signaling game model can rationalize the facts.
- The bad reputation has real nonlinear adverse consequences.
- Regulatory implication: different banks should have different risk weights for their off-balance-sheet exposure