

Regulatory Arbitrage and Competition: Evidence from Wealth Management Product Market in China

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Outline

- 1 Introduction
- 2 Institutional Background
- 3 Data and Variables
- 4 Empirical Models and Results
 - Baseline Regression
 - Sensitivity Test
 - Mechanism
- 5 Conclusion

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Motivation

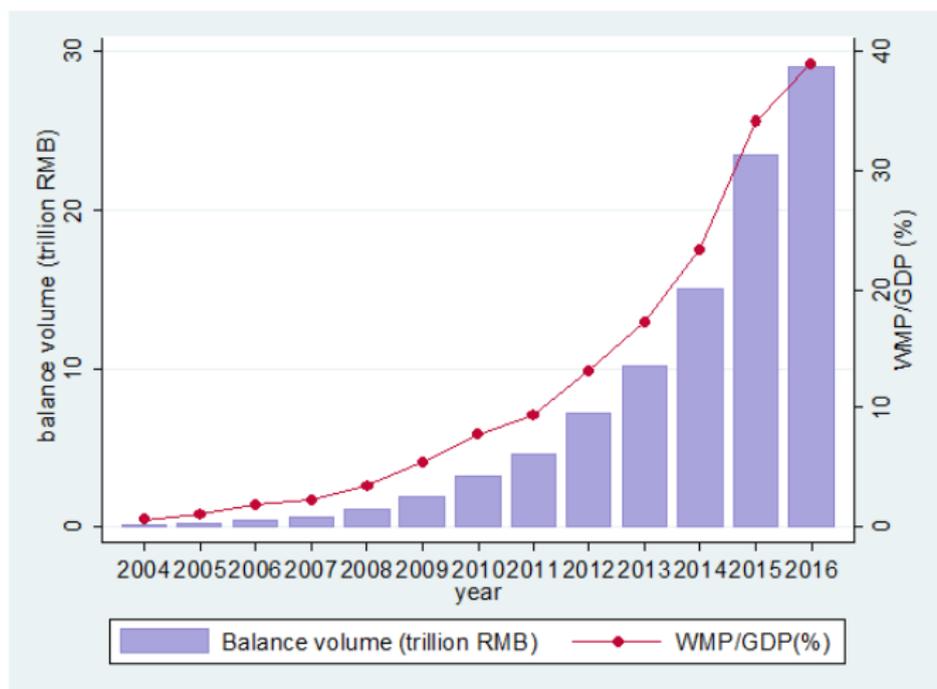


Figure 1: The growth of WMP market during 2004-2016

Motivation

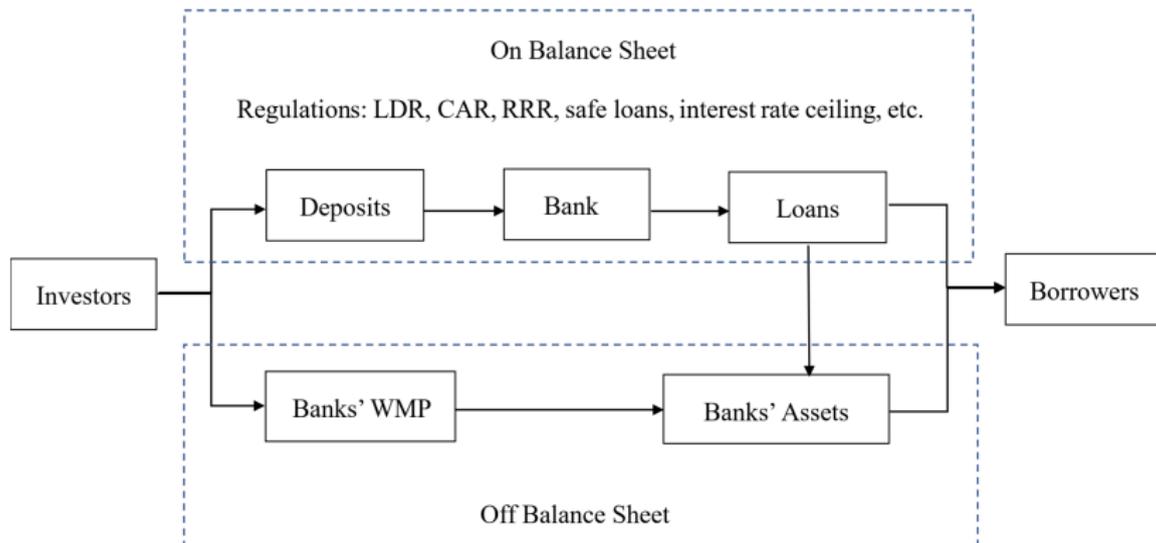


Figure 2: WMPs or Deposits

Motivation: National Market

Table 1: On-balance-sheet and off-balance-sheet market share comparison,2004-2016

year	asset share (on balance sheet)			WMP market share (off balance sheet)		
	<i>SOB</i> ¹ (%)	<i>JSB</i> ² (%)	<i>CCB</i> ³ (%)	<i>SOE</i> (%)	<i>JSB</i> (%)	<i>CCB</i> (%)
2004	83.32	14.38	2.28			

¹ *SOB*(state-owned banks); ² *JSB*(joint stock banks); ³ *CCB*(city commercial banks).

Motivation: National Market

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2004	83.32	14.38	2.28	10.71	85.71	3.57

¹ *SOB*(state-owned banks); ² *JSB*(joint stock banks); ³ *CCB*(city commercial banks).

Motivation: National Market

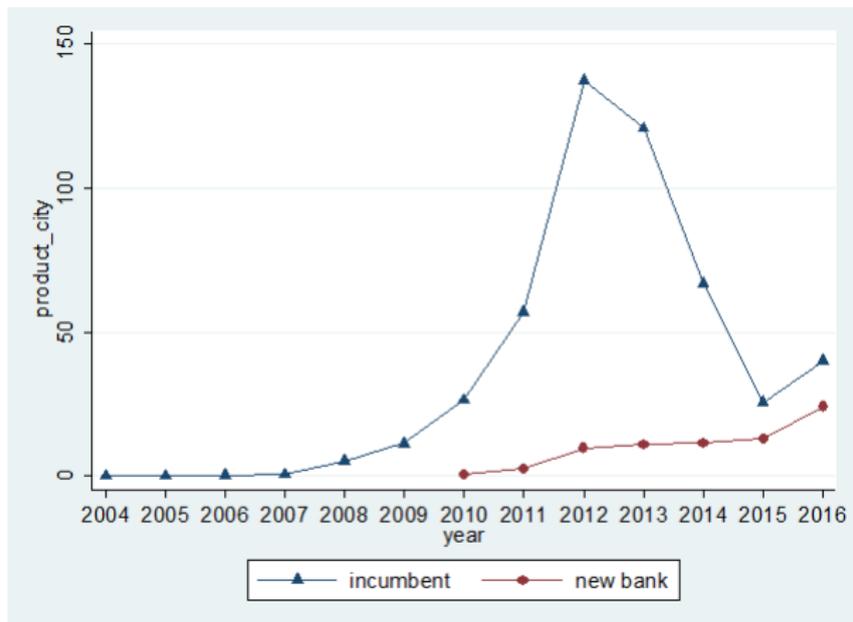
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	SOB ¹ (%)	JSB ² (%)	CCB ³ (%)	SOE(%)	JSB(%)	CCB(%)
2004	83.32	14.38	2.28	10.71	85.71	3.57
2005	79.59	16.06	4.33	34.21	57.14	8.65
2006	77.16	16.54	6.2	29.59	45.68	24.73
2007	73.56	18.79	7.57	35.67	40.41	23.92
2008	72.63	19.35	7.95	25.46	53.31	21.23
2009	71.13	20.18	8.68	34.03	48.12	17.85
2010	68.51	21.2	10.29	45.00	37.69	17.30
2011	66.11	22.58	11.31	42.65	35.47	21.87
2012	63.36	24.25	12.39	34.55	36.11	29.34
2013	61.65	24.7	13.65	34.34	34.07	31.59
2014	59.86	25.67	14.48	32.63	32.32	35.05
2015	57.58	26.48	15.95	27.62	26.08	46.30
2016	55.57	27.12	17.31	25.39	21.44	53.17

¹ SOB(state-owned banks); ² JSB(joint stock banks); ³ CCB(city commercial banks).

Motivation: Local Market

Figure 3: Average WMP issuance: Incumbents V.S. Entrants



Note: This graph shows the average number of WMPs issued in a city. We define incumbents to be the banks which already have local branches before 2009, and new banks to be the banks which establish branches in a city after 2009.

This paper

- Wealth management products(WMPs) are deposits in disguise, a short-term financial product offered as off-balance-sheet deposit without explicit government support.
- WMPs help banks to circumvent a set of regulations (interest rate ceiling, loan-to-deposit ratio, capital adequacy, safe loans, etc.), and it is a starting point for the non-state banks to challenge the state banks.
- We examine how banks' market share influences their incentives to issue WMPs, and find that competition is the driving force of WMPs issuance, in a regulated market like China.

This paper

- Empirically, using WMP data during 2004-2016, we document a robust inverted-U shape between WMP issuance and banks' market share at both the national market and local markets.
- Taking advantage of the differentiated market structures of issuing regions, we exploit incentive of banks to issue WMPs under various environments.
- The banking structure changes in 2009 which involves the geographic deregulation of bank entry imposes an exogenous shock on banking market. We then construct instrument variables using the deregulation policy to tackle with the reverse causality problem.
- We also explore the potential mechanisms through which banks' market share influence their WMP issuance incentives.
 - whether regulatory constraint is binding
 - banking structure
 - first mover advantage

Contribution

1. We apply a novel data of WMP and investigate banks' WMP issuing behavior from the perspective of **competitive dynamics**.
 - shadow banking:
 - regulatory arbitrage (e.g., Boyson, Fahlenbrach, and Stulz, 2016; Houston, Lin, and Ma, 2012),
 - capital regulation (e.g., Plantin, 2015)
 - risk-taking and portfolio construction (e.g., Gennaioli, Shleifer, and Vishny, 2012),
 - liquidity risk (e.g., Moreira and Savov, 2017)
 - WMP:
 - the effect of monetary policy on shadow banking (Chen, Ren, and Zha, 2018)
 - bank risk (Acharya, Qian, Su, and Yang, 2019)
 - maturity mismatch (Luo, Fang, Liu, and Zhao, 2019)
 - liquidity regulation (Hachem and Song, 2016)
 - interest rate liberalization (Wang, Wang, Wang, and Zhou, 2019).

Contribution

2. Two datasets are constructed at national and local market level, respectively. We evaluate the disparate responses of WMP issuance by bank headquarters and local branches to changes in market shares.
 - competition:
 - market structure (e.g., Blundell, Griffith, and Van Reenen, 1999)
 - industry level measures (e.g., Aghion, Bloom, Blundell, Griffith, and Howitt, 2002; Hashmi, 2013)
 - scale:
 - large companies have advantages on the development of radically new products (Arrow, 1962; Cohen and Klepper, 1996; Cockburn and Henderson, 2001);
 - larger firms are more difficult to do innovation (Chandy and Tellis, 2000; Koberg, Detienne, and Heppard, 2003; Qian and Li, 2003; Cohen, 2010).

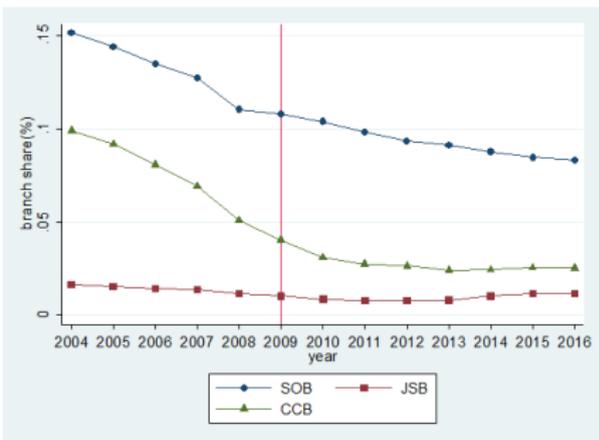
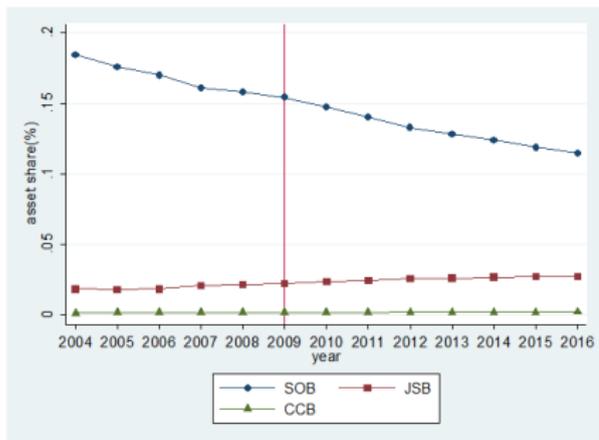


Figure 4: Market share in national market V.S. local market

Contribution

3. We confirm the relationship between market share and WMP issuance under potential endogeneity.
 - competition and innovation: manufacturing industries (e.g., Nickell, 1996; Xu, 2008; Siebert and Zulehner, 2010), financial services (e.g., Bos, Kolari, and Van Lamoen, 2013)
 - However, a firm who innovates will grow and thus has higher market share. This reverse causality could bias the estimation and even make the relationship artificial (Blundell, Griffith, and Van Reenen, 1999).
 - After the geographic deregulation in 2009, JSBs and CCBs are free to establish branches across provinces and they issue more WMPs in local markets.

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What is WMP?

WMPs are different from traditional deposits:

- WMPs are much less liquid than checking account.
- WMPs almost always offer higher expected interest rate than time deposits of the same maturity.
- WMPs are off-balance sheet and thus immune to a set of regulations.

Table 2: Average return 2004-2016

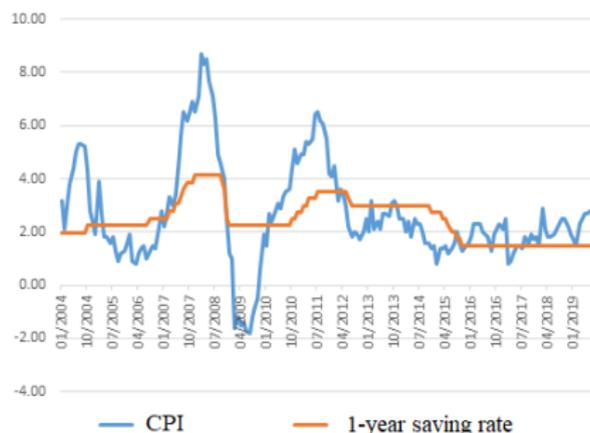
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
3m time deposit rate	1.71	1.71	1.74	2.31	3.15	1.71	1.76	2.87	2.84	2.6	2.57	1.72	1.1
WMP expected return by bank type (maturity 87-93 days)													
SOB	2.23	3.26	4.04	4.29	4.48	1.85	2.42	3.73	3.63	4.33	5.02	4.63	3.67
JSB	4.08	2.98	4.15	4.21	4.39	2.18	2.50	4.20	4.30	4.63	5.36	4.84	3.94
CCB	-	3.34	4.58	4.14	4.17	1.80	2.35	4.38	4.71	4.89	5.38	5.09	4.05
average	3.34	3.09	4.23	4.22	4.36	1.98	2.43	4.06	4.22	4.64	5.28	4.92	3.94

The birth of WMP

Demand side:

- High inflation, while slump in stock market
- WMP: low risk, flexible maturities, reasonably high rate of return
- With limited investment choices, WMPs become a favorable alternative for investors.

Figure 5: CPI V.S. 1-year saving rate



The birth of WMP

Supply side:

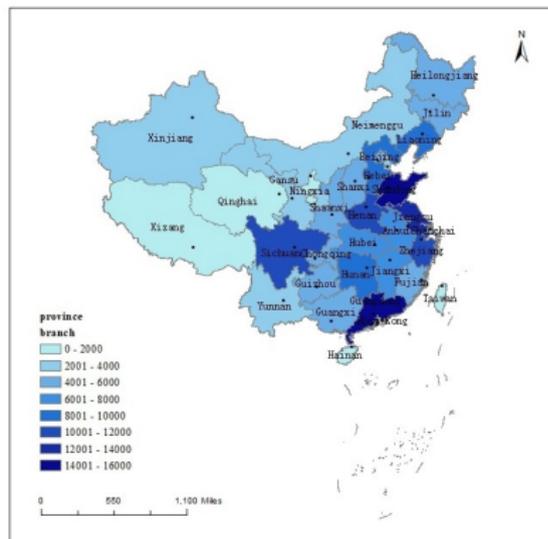
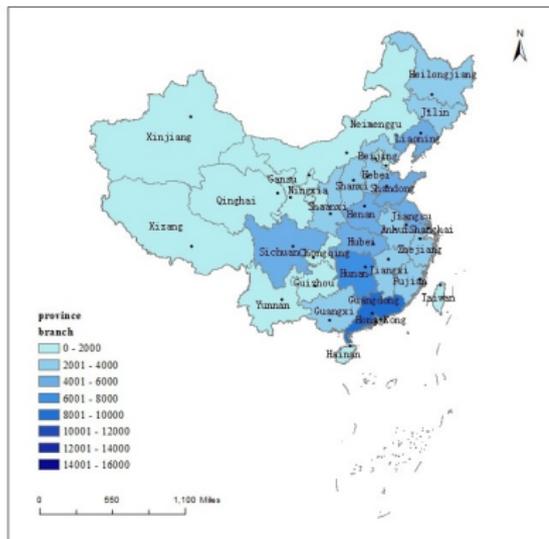
Banks are the major credit supplier in China, but they are subject to a number of regulation requirements.

- interest rate ceiling
- loan-to-deposit ratio
- capital adequacy
- require reserve ratio
- safe loans

Geographically, non-state banks are restricted in establishing branches outside their headquarters.

- At the end of 2005, the branches of the largest four banks covered more than 95% of the cities while JSBs only covered 7.16% of the cities.
- 2009 geographic deregulation: “Adjustment Comment on the Market Access Policy of Setting up Branches for Small- and Medium-sized Commercial Banks”

Figure 6: Heat Map of Bank Branches in 2004 and 2016



The birth of WMP

Supply side:

- **Banks can attract more investors using WMPs.**
 - The interest rate ceiling in deposits;
 - WMPs can indirectly stimulate growth of on-balance-sheet deposits;
 - WMPs can either be issued nationwide (as long as the issuing bank has a local branch in the city) or be issued exclusively in several cities or a single city.
- There is a large gap between supply and demand.
—According to People's Bank of China (PBC) in 2005, the size of indirect financing is about 82.9% of the total financing volume.
- Since off-balance sheet, WMPs help banks to practice regulatory arbitrage.
- Issuing WMP brings new source of non-interest income when it is a pass-through business.

As a result, WMP breaks the inherent market structure.

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Data

[1] Time span

- 2004-2016

[2] Banks

- 5 state-owned banks(SOB)
- 12 joint stock banks(JSB)
- 132 city commercial banks(CCB) excluding Jiangxi Bank and Xinjiang Bank.

[3] Data source

- WMP issuance data: WIND, which includes the name of a WMP, its issuing bank, purchasing date, issuing district, and other detailed information.
- Banks' branch data: CBRC, which includes the name of a branch, date of establishment, address, and other detailed information.
- City characteristics data: City statistical almanac.
- Bank characteristics data: Banks' annual reports.

Variables

Bank panel data:

We assume that banks' headquarter makes the WMP issuance decision and consider the national market as a whole.

Table 3: The key variables of the bank panel data

Key Variable	Definition
$product_{it}$	the number of WMP that bank i issues in year t
$issue_{it}$	$issue_{it} = 1$ if $product_{it} > 0$; otherwise $issue_{it} = 0$.
MS_{it}	bank asset share

Summary Statistics

Table 4: Summary Statistics: Bank Panel Data

Variable	Obs	Mean	S.D.	Min	Max
dependent variable					
issue	1,776	0.5214	0.4997	0	1
product	1,776	171.0045	571.9487	0	9989
key independent variable					
MS	1,473	0.8824	3.0156	0.0019	23.384
market share by bank type					
SOE	65	13.6926	5.0131	5.0045	23.384
JSB	153	1.8124	1.1161	0.0467	3.8292
CCB	1,255	0.1055	0.16	0.0019	1.2904

Bank-city unbalanced panel data:

Table 5: The WMP issuance information

Product code	Issuing bank	Date	Issuing region
LC134690.LC	INDUSTRIAL AND COMMERCIAL BANK OF CHINA	20-Aug-13	Jiangsu
LC134691.LC	CHINA CONSTRUCTION BANK	21-Aug-13	Zhejiang
LC13468F.LC	AGRICULTURAL BANK OF CHINA	23-Aug-13	Nation
LC134692.LC	BANK OF CHINA	15-Oct-13	Nation

Table 6: Number of WMP by issuing region

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
nation ¹	104	403	836	2041	3987	3993	7104	17151	20720	29985	42888	50712	61062
city ²	8	146	407	484	1760	2701	2821	4643	7892	9773	12181	11069	12187

¹ nation refers to the number of WMP that are issued nationwide;

² city refers to the number of WMP that are issued in specific cities or provinces.

Variables

Bank-city unbalanced panel data:

We assume that bank branches make the WMP issuance decision and define their decision scope to be the city in which they operate.

Table 7: The key variables of the bank-city unbalanced panel data

Key Variable	Definition
$productcity_{ijt}$	the number of WMP that bank i issues in city j of year t
$issuacity_{ijt}$	$issuacity_{ijt} = 1$ if $productcity_{ijt} > 0$; otherwise $issuacity_{ijt} = 0$.
$MScity_{ijt}$	bank branch share

Variables

Control variables:

- Bank characteristics:
 - *CAR* : capital adequacy ratio, which is defined as the ratio between banks equity and risk weighted assets.
 - *ROA* : return to asset, which is defined to be the after-tax profit as of total asset.
 - *LDR*: loan to deposit ratio, which is defined to be the total loans as of total assets.
 - *NPL*: non-performing loan ratio, which is the non-performing loans as of total loans.
 - *NII*: non-interest income ratio, which is defined to be the non-interest operating income as of total operating income.
- City characteristics:
 - $gdppc_{city}$: log of GDP per capita.
 - pop_{city} : log of population.
 - *FIR*: financial interrelation ratio, which is defined to be the ratio between the sum of all financial institutions year-end deposits and loans and the total GDP in a city.

Table 8: Summary Statistics: Bank-city Unbalanced Panel Data

	Obs	Mean	S.D.	Min	Max
dependent variable					
issuecity	34,126	0.4032	0.4905	0	1
productcity	34,126	35.1468	111.43	0	868
key independent variable					
MScity	34,126	6.9888	8.5367	0.0183	100
market share by bank type					
SOB	19,270	10.8418	9.3366	0.0877	100
JSB	8,504	1.0155	1.0754	0.0183	14.8402
CCB	6,352	3.2969	4.3698	0.0201	31.6327
channel variable					
CR4	31,329	0.4472	0.145	0.1356	1
newbank	32,316	1.2217	1.7004	0	23
age	34,126	19.6137	16.083	0	68
bank characteristics					
LDR	32,815	65.9204	8.0466	28.5	82.95
CAR	32,725	12.2202	2.1366	2.78	33.97
NPLR	31,572	1.7214	1.1893	0	11.92
ROA	33,224	1.0449	0.327	0.01	2.46
LAR	32,911	0.5015	0.0744	0.1856	0.6923
NII	32,974	20.6533	9.9438	-1.5	76.82
city characteristics					
FIR_city	31,279	2.3733	1.2124	0.5081	13.5303
gdppc_city	31,247	10.472	0.7757	4.5951	13.0557
pop_city	31,315	6.0053	0.7022	2.819	8.1292

Outline

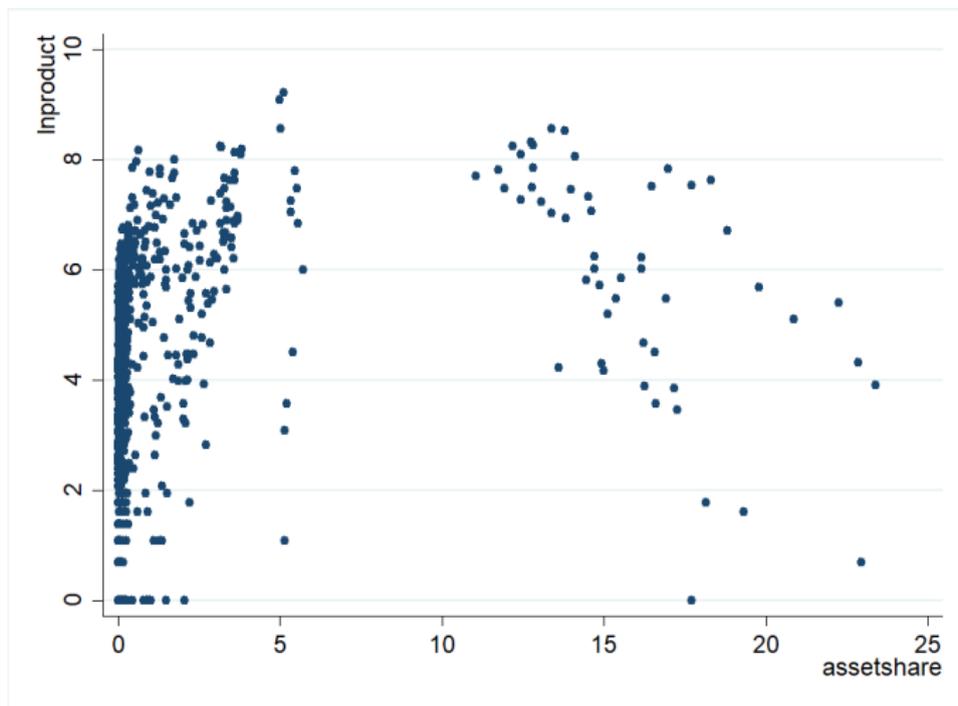
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Bank panel data

Figure 7: Scattered graph between WMP issuance and asset market share



Baseline Regression: Bank Panel Data

Bank Panel Data

$$P(\text{issue}_{it} = 1) = G(\alpha_1^1 MS_{it-1} + \alpha_2^1 MS_{it-1}^2 + X_{it-1} \beta^1 + \mu_i + \mu_t + \epsilon_{it})$$

$$l\text{product}_{it} = \max(0, \alpha_1^2 MS_{it-1} + \alpha_2^2 MS_{it-1}^2 + X_{it-1} \beta^2 + \mu_i + \mu_t + \epsilon_{it})$$

- A bank's WMP issuance decision is determined by the asset share and its squared term with a set of control variables.
- X_{it-1} refers to the bank characteristics in the previous year.

Table 9: Inverted U shape: Bank panel data

Dependent variable:	issue	lproduct		balance volume	sales volume
	(1)	(2)	(3)	(4)	(5)
	Probit	OLS	Tobit	Tobit	Tobit
MS	4.3642*** (1.2081)	0.9234*** (0.1638)	0.9339*** (0.1349)	0.4527*** (0.1075)	0.9317*** (0.1486)
MS2	-0.1757*** (0.0570)	-0.0378** (0.0110)	-0.0358*** (0.0069)	-0.0237*** (0.0063)	-0.0315*** (0.0077)
LDR	0.1153*** (0.0164)	0.1386*** (0.0139)	0.1598*** (0.0121)	0.0253* (0.0141)	0.0819*** (0.0227)
CAR	-0.0489* (0.0263)	-0.0703** (0.0237)	-0.0798*** (0.0268)	-0.0591 (0.0525)	-0.1026*** (0.0399)
NPLR	-0.1368** (0.0676)	-0.1732** (0.0741)	-0.2373** (0.0750)	0.1495 (0.1601)	-0.3613** (0.1199)
ROA	0.4203** (0.2062)	0.0207 (0.2119)	-0.1471 (0.2177)	0.3661 (0.4074)	-0.5105 (0.4467)
LAR	-15.9520*** (1.9277)	-18.9270*** (1.2466)	-22.6333*** (1.3455)	-3.4484** (1.4506)	-19.6826*** (2.0439)
NII	0.0106* (0.0064)	0.0044 (0.0068)	0.0104* (0.0053)	0.0908*** (0.0110)	0.0059 (0.0142)
Bank FE	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Constant	1.2976 (0.8159)	4.2756*** (0.7547)	4.2058*** (0.7587)	5.7079*** (1.0472)	11.9991*** (1.5752)
N	1,016	1,016	1,016	96	141

Inverted U shape: Bank panel data (cont.)

Figure 8: The inverted-U shape

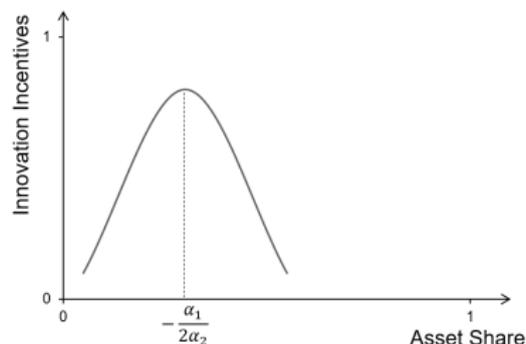
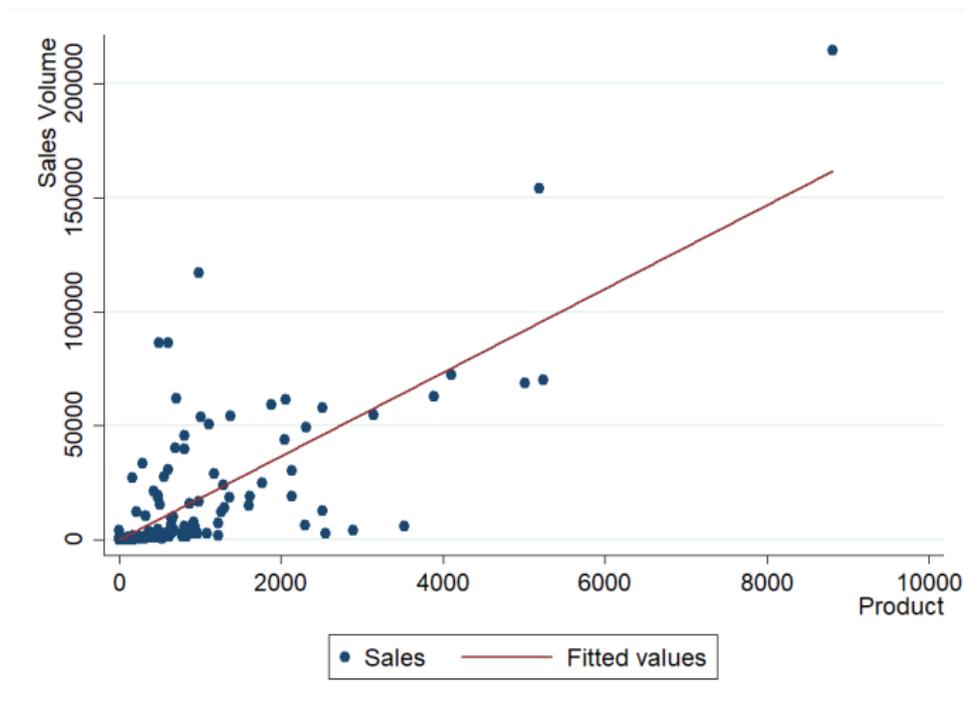


Table 10: Asset share by bank type

Variable	Obs	Mean	S.D.	Min	Max
SOB	65	13.6926	5.0131	5.0045	23.384
JSB	153	1.8124	1.1161	0.0467	3.8292
CCB	1,255	0.1055	0.1600	0.0019	1.2904
threshold(Probit)		12.5474			
threshold(Tobit)		12.2715			

Sales volume and the number of WMP issuance

Figure 9: Scattered graph between sales volume and the number of WMP issuance



Baseline Regression

Bank-city Unbalanced Panel Data

$$P(\text{issuecity}_{ijt} = 1) = G(\theta_1^1 \text{MScity}_{ijt-1} + \theta_2^1 \text{MScity}_{ijt-1}^2 + X_{it-1} \gamma^1 + Z_{jt-1} \eta^1 + \mu_t + \mu_i + \mu_j + \vartheta_{ijt})$$

$$l\text{productcity}_{ijt} = \max(0, \theta_1^2 \text{MScity}_{ijt-1} + \theta_2^2 \text{MScity}_{ijt-1}^2 + X_{it-1} \gamma^2 + Z_{jt-1} \eta^2 + \mu_t + \mu_i + \mu_j + \tau_{ijt})$$

- A local branch's WMP issuance decision is affected by bank's branch share in a city in the previous year and its squared term, together with a set of control variables.
- Z_{jt-1} refers to city characteristics control variables in the previous year.

Table 11: Inverted U shape: Bank-city unbalanced panel data

Dependent variable	issuacity		lproductcity
	(1) Probit	(2) OLS	(3) Tobit
MScity	0.0502*** (0.0087)	0.0290*** (0.0060)	0.0927*** (0.0121)
MScity2	-0.0016*** (0.0003)	-0.0011*** (0.0002)	-0.0031*** (0.0004)
LDR	0.0263*** (0.0044)	0.0147*** (0.0034)	0.0881*** (0.0071)
CAR	-0.0886*** (0.0111)	-0.0814*** (0.0072)	-0.2119*** (0.0164)
NPLR	-0.5363*** (0.0400)	-0.5602*** (0.0292)	-1.2136*** (0.0449)
ROA	0.0287 (0.0919)	-1.0524*** (0.0649)	-0.6170*** (0.1420)
LAR	0.5228 (0.4404)	3.6076*** (0.3618)	0.7080 (0.6686)
NII	-0.0053*** (0.0020)	0.0158*** (0.0016)	0.0042 (0.0033)
FIR_city	-0.0300 (0.0345)	0.0115 (0.0247)	-0.0273 (0.0522)
lgdppc_city	0.1821** (0.0716)	0.0679 (0.0587)	0.3648*** (0.1182)
lpop_city	-0.4310* (0.2358)	0.0788 (0.1688)	-0.4197 (0.3962)
Bank FE	yes	yes	yes
City FE	yes	yes	yes
Year FE	yes	yes	yes
Constant	-0.4509 (1.9064)	-0.6668 (1.4208)	-4.5673 (3.1552)
R^2		0.54	
N	26,159	26,479	26,479

Inverted U shape: Bank-city unbalanced panel data

Figure 10: The inverted-U shape

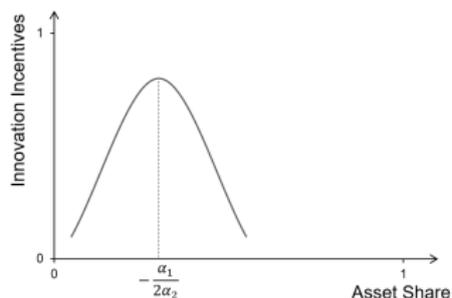


Table 12: branch share by bank type

Variable	Obs	Mean	S.D.	Min	Max
SOB	19,270	10.8418	9.3366	0.0877	100
JSB	8,504	1.0155	1.0754	0.0183	14.8402
CCB	6,352	3.2969	4.3698	0.0201	31.6327
threshold(Tobit)		14.95			

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2009 Bank Deregulation

- In April 2009, “Adjustment Comment on the Market Access policy of Setting up Branches for Small- and Medium-sized Commercial Banks” was introduced by the CBRC. This adjustment aimed to free JSBs and CCBs to set up new branches in new cities. This deregulation removes any entry restrictions for new branches in a city if the JSB or CCB had already set up branches in this city or in their capital city.

Figure 11: Before and after deregulation policy of 2009

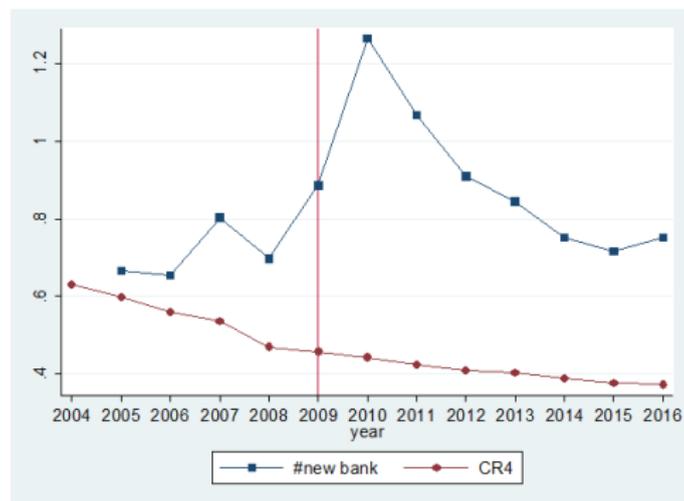


Table 13: Sensitivity test: Before and after deregulation

	Bank panel data: lproduct				Bank-city unbalanced panel data: lproduct_city			
	OLS		Tobit		OLS		Tobit	
	< 2010 (1)	≥ 2010 (2)	< 2010 (3)	≥ 2010 (4)	< 2010 (5)	≥ 2010 (6)	< 2010 (7)	≥ 2010 (8)
MS	1.0194*** (0.1837)	1.0541*** (0.1863)	1.1307*** (0.2049)	1.1062*** (0.1761)				
MS2	-0.0411*** (0.0105)	-0.0482*** (0.0132)	-0.0428*** (0.0101)	-0.0496*** (0.0111)				
MScity					0.0283*** (0.0073)	0.0380*** (0.0072)	0.1911*** (0.0279)	0.0959*** (0.0129)
MScity2					-0.0005** (0.0002)	-0.0016*** (0.0002)	-0.0062*** (0.0011)	-0.0034*** (0.0004)
Bank characteristics	yes	yes	yes	yes	yes	yes	yes	yes
City characteristics	no	no	no	no	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes
City FE	no	no	no	no	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-0.1047 (1.2357)	4.7516*** (0.8418)	-3.1524 (2.2000)	3.9463*** (0.6853)	10.9845*** (2.2262)	0.6404 (2.3099)	-25.3685*** (9.2131)	2.7217 (4.1630)
N	203	813	203	813	6,612	19,867	6,612	19,867

Instrument Variable

- a dummy variable *policy*, equals to one if it is before 2010, and zero otherwise.
- three dummy variables *SOE*, *JSB*, *CCB* indicate a bank's type.
- a dummy *urban* is defined on cities to denote whether it is an urban area. 22% of the cities in bank-city unbalanced panel belong to urban areas.
 - 4 municipalities under the jurisdiction of the central government (Beijing, Tianjin, Shanghai, Chongqing),
 - 27 provincial capital cities,
 - 5 cities with independent planning (Shenzhen, Xiamen, Qingdao, Dalian, Ningbo).
- Instrument variables: $policy*SOE*urban$, $policy*JSB*urban$, $policy*CCB*urban$, $policy*SOE$, $policy*JSB$, $policy*CCB$.

Table 14: IV regression

	Bank panel data		Bank-city unbalanced panel data	
	Dependent Variable: lproduct		Dependent Variable: lproductcity	
	First stage (1)	Second stage (2)	First stage (3)	Second stage (4)
MS		1.2281*** (1.5757)		
MS2		-0.0601*** (0.0501)		
MScity				2.4111*** (0.6084)
MScity2				-0.2243*** (0.0343)
Policy*SOE			-2.8029*** (0.2665)	
Policy*JSB	-12.7747*** (0.3896)		-1.1147*** (0.2787)	
Policy*CCB	-10.7180*** (0.4573)		-2.5555*** (0.3104)	
Policy*SOE*urban			0.1975 (0.1265)	
Policy*JSB*urban			-0.2422** (0.1192)	
Policy*CCB*urban			-1.5066*** (0.1372)	
Bank characteristics	yes	yes	yes	yes
City characteristics	no	no	yes	yes
Bank FE & year FE	yes	yes	yes	yes
City FE	no	no	yes	yes
N	1,016	1,016	26,479	26,479

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Potential Channels—national market

Whether regulatory constraint is binding:

- Banks have different optimal levels of risk.
 - Banks are less constrained by regulations if gap between credit supply and demand is small, and it is optimal to have low level of risks and high level of capital.
 - Banks are more constrained if their optimal level of risk is high and capital level is low.
- We use whether a bank's CAR is above the regulation requirement of 8% ($CAR > 8$) to measure whether a bank is constrained by regulation.

Potential Channels—local market

- Banking structure:

Given one bank in different cities may face different competitive environment, local branches may make heterogeneous decisions.

- We use *CR4* to measure banks' concentration, where $CR4_{jt}$ is the branch share of the top 4 banks with most branches in a city.

- Challenges from entrants:

- *newbank* represents the number of new banks that are established in a city, and it represents the potential challenges that banks in a local market may face during a specific year.

- existing customer base:

Longer years of establishment means a more stable customer base, and it might influence banks' incentive to issue WMPs.

- We use years of establishment of a bank's first branch in a city (*age*) to measure a bank's experience in a city.

Specifications

Bank-city Unbalanced Panel Data

$$\begin{aligned} lproductcity_{ijt} &= \max(0, \rho_2 MScity_{ijt-1} + \phi_2 Channel + X_{it-1} \lambda_2 + Z_{jt-1} \omega_2 \\ &+ \varphi MScity_{ijt-1} * Channel + \mu_t + \mu_j + \xi_{ijt}) \end{aligned}$$

- *Channel* refer to channel variables *CR4*, *newbank*, *age*.

Table 15: Number of WMP issued— Channel analysis

	Dependent variable: lproduct	
	(1) tobit	(2) FE
lagassetshare	2.2402*** (0.7536)	1.1386* (0.6083)
CAR > 8	2.5528*** (0.6949)	1.5245*** (0.4706)
CAR > 8 *lagassetshare	-2.0799*** (0.7452)	-1.0336* (0.5994)
lagLDR	0.0093 (0.0105)	0.0123 (0.0092)
lagNPLR	0.0593 (0.0531)	0.1100** (0.0453)
lagROA	0.0165 (0.1798)	-0.0968 (0.1486)
lagLAR	-2.3590* (1.2399)	-2.6129** (1.0628)
lagNII	0.0025 (0.0042)	-0.0034 (0.0036)
constant	-2.1275 (2.2766)	
sigma	1.1994*** (0.0312)	-1.4355* (0.8130)
bank fixed effect	Yes	Yes
year fixed effect	Yes	Yes
N	1,037	1,037

Table 16: Number of WMP issued in a city— Channel analysis

Variables	Dependent variable: lproductcity		
	(1)	(2)	(3)
MScity	0.1422*** (0.0168)	0.0833*** (0.0124)	0.1159*** (0.0125)
MScity2	-0.0022*** (0.0004)	-0.0029*** (0.0004)	-0.0016*** (0.0004)
CR4	0.7782* (0.4150)		
newbank		-0.0215 (0.0137)	
age			0.0262*** (0.0031)
MScity*CR4	-0.1222*** (0.0289)		
MScity*newbank		0.0053*** (0.0017)	
MScity*age			-0.0026*** (0.0003)
Bank characteristics	yes	yes	yes
City characteristics	yes	yes	yes
Bank FE	yes	yes	yes
City FE	yes	yes	yes
Year FE	yes	yes	yes
Constant	-4.5932 (3.1560)	-0.5838 (3.1596)	-5.0339 (3.1411)
N	21,560	26,479	26,479

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Conclusion

We study banks' WMPs issuance motives in a heavily regulated market.

- 1 Using both bank panel data (asset share) and bank-city unbalanced data (branch share), we confirm the inverted U shape between market share and WMP issuing decision.
- 2 We identify that banks with more constraints will issue WMPs to obtain competitive advantages.
- 3 WMPs, as a trial of interest liberalization, are intensively used by banks to circumvent regulations. Competition is the driving force in the WMP issuance, in both national and local market.
- 4 Given our evidence, the best defense against regulatory arbitrage would be a more liberalized environment accompanied with macro-prudential policies.

Thank you!