

Regulatory Arbitrage, Credit Expansion and the Development of Shadow Banking in China- from the Perspective of Bank-issued Wealth Management Products

Kuan Kang, Zariyawati Mohd Ashhari, Mohamed Hisham Dato
Hj Yahya, Soh Wei Ni

School of Business and Economics, Universiti Putra Malaysia, 43400, Malaysia
Email: freezingpurple929@126.com, mohdhisham@upm.edu.my, sohweini@upm.edu.my
Corresponding Author Email: zariyawati@upm.edu.my

To Link this Article: <http://dx.doi.org/10.6007/IJARAFMS/v14-i1/20757> DOI:10.6007/IJARAFMS/v14-i1/20757

Published Online: 23 February 2024

Abstract

Bank-issued Wealth Management Products (WMPs) are perceived as the largest part of China's shadow banking system and has undergone dramatical growth during the past decade. This study uses a sample of 46 commercial banks and adopts two-step system GMM to investigate the determinants for the rise of WMPs from 2015 to 2021 in China. The results show that WMPs, as the essential deposit substitution and off-balance-sheet activities of commercial banks, are mainly driven by the motivation to satisfy credit expansion and circumvent regulatory requirements on liquidity and capital adequacy. The results demonstrate that regulatory arbitrage is the primary driving of shadow banking activities. Besides, this study further explores the heterogeneity between nationwide commercial banks (NCBs) and local commercial banks (LCBs) on the motivation to issue WMPs. Comparing with NCBs, LCBs tend to issue more WMPs to raise funds and relieve their supervisory pressure.

Keywords: Regulatory Arbitrage, Credit Expansion, Wealth Management Products (WMPs), Shadow Banking.

Introduction

Chinese government has initiated 4 trillion RMB Great Stimulus Plan (GSP) to respond Global Financial Crisis (GFC) in late 2008, which although has preserved a growth in economy, but also dramatically boosted the expansion of shadow banking in China (Acharya et al., 2020). In the post-crisis era, shadow banking system plays the role of credit intermediation in China (Huang et al., 2022). According to Financial Stability Board (FSB), China with about 80 trillion RMB comprised the third largest share of global shadow banking assets in 2021¹. It is roughly

¹ According to "Global Monitoring Report on Non-Bank Financial Intermediation 2022" by Financial Stability Board (FSB), The United States and eight participating euro area

equivalent to 10 times that assets in 2010. Noteworthy, shadow banking in China is different from that in the United States and Europe, which are mainly dominated by non-bank financial institutions (Ouyang & Wang, 2022; Shah et al., 2021; Ehlers et al., 2018). By comparison, with immature capital market, China's shadow banking activities are characteristic of bank-centric and have close connection with fully regulated commercial banks (Du et al., 2023, Allen & Gu, 2021).

Moreover, there is lack of substantial asset securitization in China's shadow banking system, which is concentrated on simple structure of financial products (Shah et al., 2023; Ouyang & Wang, 2022), mainly the bank-issued wealth management products (WMPs). According to Hachem (2018), WMPs is regarded as a kind of asset-backed short-term deposit substitution product that are designed and sold by China's commercial banks to investors to raise funds, which is an off-balance-sheet (OBS) activity. Commercial banks, through issuing WMPs, cooperate with non-bank financial institutions (NBFIs) and involve in interbank, channeling and outsourcing businesses to circumvent regulation and support shadow loans (Tan et al., 2017)². In the past decades, the year-end outstanding amount of WMPs has undergone significant rise from 2.8 trillion RMB in 2010 to 29 trillion RMB in 2021³ and it becomes the largest component of shadow banking in China.

Under above background, this study investigates the bank-related factors that accelerates the upsurge of shadow banking in China from the perspective of WMPs. Due to WMPs in China is not subject to the restrictions of reserve requirement and interest rate ceiling like traditional deposits, it has higher yield and becomes an important instrument of commercial banks to attract funds. Besides, WMPs are designed by commercial banks to mature toward the end of a month or a quarter. Then, commercial banks have the authorities to manage those expired WMPs funds as deposits, which are recorded on the balance sheet for a short period so as to meet the liquidity supervisory requirements (Cai et al., 2019). In addition, in the light of OBS characteristic of WMPs, it helps commercial banks to remove credit assets out of balance sheet, especially the non-performing loans (NPLs). Therefore, to a certain degree, the development of shadow banking in China comes from the profit-seeking incentive of regulatory arbitrage.

The drivers of shadow banking in China are also related to the credit boom post the GFC and the sharp credit crunch in the following years. The 4 trillion RMB GSP with correspondingly loose credit policies has not only led to credit expansion in the real estate industry and local government financing platforms, but also the distortions of credit asset quality and allocation in Chinese banking system (Allen & Gu, 2021). Subsequently, the high demands to refinance those loans in such industries with overcapacity industries boost the development of shadow banking. Additionally, shadow loans complement the credit for small- and medium-enterprises (SMEs) that have lack access to bank loans. Although the marketization is continually accelerated in China's financial system in recent years, there still are government interventions and financial repression under the particular politico-economic structure.

jurisdictions account for the first and second largest shares of narrow measure of shadow banking assets in 2021.

² The operation mechanism of interbank, channeling and outsourcing businesses through WMPs please refers to Appendix 1.

³ Source: "Annual Report of China Bank-issued Wealth Management Products" by China Bank-issued Wealth Management Products Registration and Custody Centre (WMPRCC).

Financial supervision plays a vital role in the development of WMPs and shadow banking in China.

The dataset in this study covers 46 China's commercial banks in the period of 2015-2021. According to China Banking Insurance Regulatory Commission (CBIRC), the selected sample held almost 80% of total assets of commercial banking sector and about 88% of total outstanding balance of WMPs by the end of 2021. Moreover, considering the distinctions in asset sizes, ownership structures, market segmentation and governance among different types of commercial banks in China, this study also explores the heterogeneity by types on the determinants for the development of WMPs. Importantly, empirical literature on shadow banking and its determinants are still scarce (Zhou & Tewari, 2019). This study empirically contributes to a burgeoning literature on China's shadow banking and WMPs business in the transforming period of marketization and liberalization in China. The results shows that commercial banks not only evade supervisory restrictions but also satisfy the increasing financing demands through issuing WMPs.

The arrangement of this study is structured as follows. Section 2 reviews the related literature followed by Section 3, which is the data and methodology. Section 4 provides the results and analysis for the determinants of WMPs issuance and includes the heterogenous analyses across different types of commercial banks and robustness check. Section 5 concludes this study and provides policy recommendation in the end.

Literature Review

Recent studies have referred to the unique characteristic of shadow banking in China's financial system. In 2011, "shadow banking" is defined by Financial Stability Board (FSB) as 'credit intermediation involving entities and activities (fully or partially) outside the regular banking system'. Similar to developed countries, China's shadow banking system likewise plays the role of credit intermediation (Huang et al., 2022). However, it provides credit-like businesses in China, which is closely associated with the conventional banking system rather than NBFIs (Yang et al., 2019). With aggressive expansion in recent years, shadow banking has become a significant part of China's financial system (Sun, 2019). In particular, "bank-centricity" is the significant feature of shadow banking in China (Du et al., 2023, Allen & Gu, 2021; Dang et al., 2019). Commercial banks are the dominant financial institutions with more than 75% of overall assets of financial system in China and deeply participate in shadow banking activities via issuing WMPs (Feng et al., 2022; Hachem, 2018).

Moreover, researches in exploring the role of WMPs in China's shadow banking system have grown rapidly. Most studies consider WMPs as the largest component of shadow banking (Shah et al., 2023; Ouyang & Wang, 2022; Wang et al., 2022; Acharya et al., 2020; Sherpa, 2013) while some studies do not deny the importance of WMPs in China's shadow banking system but identified it as "banks' shadow" or "shadow deposits" that hides in regular commercial banks (Cai et al., 2019; Ehler et al., 2018; Borst, 2013). Shen (2016) states that WMPs pool funds together and take some restricted or heavily regulated credit assets as underlying assets, which is perceived as a bank-like intermediation in China. To put it different, WMPs was an alternative funding source to supplement shadow loans and settle the shortage of formal credit (Huang et al., 2022; Chan & Ji, 2020). Besides, from the perspective of the underlying assets which are repackaged credit assets including bank loans, WMPs can be recognized as securitized products (Luo et al., 2019; Liang, 2016; Sheng & Soon, 2015). In some studies, WMPs business is called as informal securitization (Wang, Zhao & Li, 2022; Shen, 2016). However, Sun (2019) states that WMPs with higher yields is just a

substitution of deposits in essence, which does not play the roles of money and credit creation.

This study also reviews the literature related to determinants for the development of shadow banking and WMPs issuance in China. Some studies attribute the rapid rise of shadow banking activities in China to the 4 trillion RMB GSP (Acharya et al., 2020; Yang et al., 2019; Ehlers et al., 2018; Bai et al., 2016) and meanwhile, many researches believed that regulatory arbitrage was an important driver of WMPs explosion in China (Liu & Shim, 2024; Shah et al., 2023; Huang et al., 2022; Arora & Zhang, 2019). According to Acharya et al. (2020), around 2 trillion RMB funds of GSP are financed by relatively short-term bank loans of China's state-owned commercial banks (SOCBs) to support the long-term projects of local governments, such as the infrastructure projects. Therefore, SOCBs become increasingly aggressive to attract funds for lending, which boosts the growth of WMPs. Chen et al (2020) empirically demonstrate that shadow loans have supplemented the financing demands of China's local governments to rollover and repay the stimulus-related bank loans from 2012. Due to the capital market is still under-developed in China, the banks' loan as main financing channel is insufficient to satisfy the funding demands from real economy (Chen et al., 2020; Hachem, 2018; Lasak, 2015). Commercial banks design WMPs to raise funds for those unregulated shadow loans to a great extent.

Furthermore, the development of shadow banking is related to regulatory arbitrage (Adrian & Ashcraft, 2016; Schwarcz, 2011). Commercial banks in China are always under financial repression and tight supervision. There are studies providing information that China's long-term control on deposit rate has facilitated the growth of WMPs with market-oriented interest rate (Chan & Ji, 2019; Collier, 2017). More importantly, commercial banks also cooperate with NBFIs and securitize those bank loans as underlying assets of WMPs to remove them off balance sheets (Qi, 2016; Shen, 2015; Borst, 2013). Similarly, Tan et al (2017) and Luo et al (2019) point out that commercial banks in China package and sell their non-performing loans (NPLs) as asset management plans to NBFIs (typically the trust companies). Subsequently, they buyback those assets repackaged by NBFIs as underlying assets of WMPs under the repurchase agreement. The NPLs are transferred from credit asset to investment through WMPs, which is conducive to reduce the non-performing loans ratio and prompts regulatory arbitrage (Shah et al., 2023; Luo et al., 2019; Wang et al., 2019). However, both NPLs and non-performing loans ratio (NPLR) have undergone slight increase in recent years, which implies potential negative effect of NPLR on the development of WMPs.

Additionally, due to WMPs as OBS business is not subjected to the requirement of high reserves like deposits, commercial banks can raise funds through issuing WMPs rather than deposits to increase capital and liquidity (Shah et al., 2023; Acharya et al., 2020). Cai et al. (2019) have indicated the mechanism of commercial banks to adjust the loan-to-deposit ratio (LDR) through WMPs, which is a legal liquidity regulatory indicator with the ceiling of 75% before October 2015. On one hand, they temporarily record the maturity WMPs funds as deposit on balance sheet through manipulating the expiring date of WMPs just at the time when authorities monitor LDR (also see Acharya et al., 2020; Hachem, 2018). On the other hand, the operation mechanism of WMPs that remove loans off balance sheet has also led to the reduction of LDR. Moreover, Basel III has underlined the importance of capital and liquidity adequacy for banks after GFC. There is a positive association between increasing requirements on capital and shadow banking activities (Irani et al., 2020). Owing to the lack of sources access to capital, commercial banks tend to engage in off-balance-sheet and shadow banking businesses to raise funds, which is not subject to capital requirement but has

higher costs. Zhang (2020) proposes that high fund costs will pass to the borrowers with a rising lending rate. The traditional bank loans will decrease whereas the shadow loans increase. Liao (2020) states that issuing WMPs can reduce the risk-weighted assets on the balance sheet and then indirectly increase the capital adequacy ratio (CAR).

In summary, WMPs become a vehicle of commercial banks to issue new loans without recording on the balance sheet and thus window-dress their balance sheet to bypass the regulations on liquidity, capital and asset quality for regulatory arbitrage. Nevertheless, there are lack of empirical researches to discuss the comprehensive impacts of those regulations on WMPs issuance because of the restriction of data available. Besides, due to commercial banks adjust their supervisory indicators mainly to satisfy financing demands of real economy, this study takes the on-balance-sheet credit increase into consideration to investigate bank-related determinants of the growth of WMPs. Significantly, the ceiling on both deposit rate and LDR has been cancelled in October of 2015; leverage ratio management as a regulatory complement of CAR has been updated in 2015; and new rules on asset management products has implemented in 2018 to normalize the development of WMPs and curb the risky shadow banking activities in China. Therefore, the relationship between those bank-related variables and WMPs issuance may change under different supervisory environment.

Based on the literature discussed above, this study comes with the objectives

1. to examine the incentive of regulatory arbitrage on the development of WMPs in China;
2. to examine the incentive of on-balance-sheet credit expansion on the development of WMPs in China.

Methodology

Due to most of commercial banks do not disclose their issuing amount of WMPs, there is limitation on data available in database (Shah et al., 2023). The sample includes 46 commercial banks holding about 80% of total assets of commercial banks and more than 80% of total outstanding balance of WMPs during the sample period of 2015-2021. The sample commercial banks are listed in **Appendix 2**. Besides, this study employs the quarterly data for two reasons. Firstly, reporting requirement of supervisory indicators for commercial banks is quarterly basis although not disclosure. Secondly, more than half of WMPs have less than three months duration before the new rules on asset management products. Therefore, the final dataset for this study is quarterly unbalance panel data, which mainly obtains from Pystandard's quarterly ranking reports of WMPs, Wind database and National Bureau of Statistics (NBS).

Considering the dynamic characteristic of data in the field of banking, this study adopts two-step system Generalized Method of Moments (GMM) which is a widely accepted dynamic estimator and also can solve the issue of endogeneity. The specific models are as follow:

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 LDR_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (1)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 T1CAR_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (2)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 LDR_{i,t} + \beta_3 T1CAR_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (3)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 NPLR_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (4)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 LDR_{i,t} + \beta_3 T1CAR_{i,t} + \beta_4 NPLR_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (5)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 GTL_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (6)$$

$$WMP_{i,t} = \beta_0 + \beta_1 WMP_{i,t-1} + \beta_2 LDR_{i,t} + \beta_3 T1CAR_{i,t} + \beta_3 NPLR_{i,t} + \beta_4 GTL_{i,t} + \beta_i Control_{i,t} + \varepsilon_{i,t}; (7)$$

Where, $WMP_{i,t}$ is the proxy variables of the outstanding amount of WMPs; $WMP_{i,t-1}$ is the lagged terms of WMPs; $LDR_{i,t}$ is the Loan-to-Deposit Rate (LDR); $T1CAR_{i,t}$ is the Tier 1 Capital Adequacy Ratio (CAR); $NPLR_{i,t}$ is the Non-Performance Loan Ratio (NPLR); $GTL_{i,t}$ is the Growth Rate of Total Loans (GTL); $Control_{i,t}$ is a set of control variables; β_0 is the intercept; $\beta_1, \beta_2, \beta_3, \dots, \beta_n$ are the estimated coefficients; $\varepsilon_{i,t}$ is the error term for bank i in period t ; i represents the commercial banks ($i = 1, 2, \dots, 46$); t represents the time period ($t = 1, 2, \dots, 28$).

Dependent Variable. Considering the transformation of WMPs from close-ended to open-ended after the new rules on asset management products, issuing number of WMPs may decline whereas funds raised by WMPs may remain unchanged. Therefore, the issuing number of WMPs used in some researches will underrate the size of WMPs. This study chooses the quarterly issuing balance scores of WMPs for each commercial bank from Pystandard's quarterly ranking report of WMPs as the dependent variable to represent the issuing size of WMPs, which is more reliable.

Independent Variable. This study employs quarterly growth rate of loans for individual commercial bank (GTL) as proxy variable of on-balance-sheet credit expansion, as well as Loan-to-deposit Ratio (LDR), Tier 1 Capital Adequacy Ratio (T1CAR) and Non-Performance Loan Ratio (NPLR) as the proxy variables for the incentive of regulation arbitrage. Although the legal upper limitation 75% has been cancelled in October 2015, LDR remains an important liquidity regulatory indicator for China's commercial banks. According to CBIRC, overall LDR in the third quarter of 2020 was over 75% for the first time, which implies relatively great liquidity pressure in banking system. T1CAR is the ratio of Tier 1 capitals to risk-weighted assets, which is closely related to bank stability. A higher T1CAR indicates that commercial banks hold stronger capital buffer to withstand risks while a lower T1CAR reveals great regulatory pressure on capital requirements. NPLR is a core supervisory indicator on asset quality with the suggested ceiling of 5%. Commercial banks with higher NPLR face more pressure to maintain provision and improve their asset quality.

Control Variable. This study employs the logarithm of each commercial bank quarter-end asset (Size) from micro levels to control the impacts of asset size. Besides, the quarter-to-quarter growth rate of GDP (GGDP) and average quarterly value of one-year Shanghai Interbank Offered Rate (SHIBOR) are two macro-economic control variables used in this study to reflect growing trend of macro-economy and the impacts of monetary policy, respectively. The description of all variables is illustrated in Table 1.

Table 1

Variables Description

Variables	Symbol	Description
Dependent Variable		
Issuing size of WMPs	WMP	Issuing balance score of WMPs for individual commercial bank
Independent Variables		
Regulatory Arbitrage		
Liquidity Requirement: Loan-to-deposit Ratio	LDR	$LDR = \frac{Total\ Loans}{Total\ Deposit}$
Capital Requirement: Tier 1 Capital Adequacy Ratio	T1CAR	$Tier\ 1\ CAR = \frac{Tier\ 1\ Capitals}{Risk\ Weighted\ Assets}$
Asset Quality: Non-Performance Ratio	LoanNPLR	$NPLR = \frac{NPLs}{Total\ Loans}$
On-balance-sheet Credit Expansion		
Increased residence income	GTL	Quarterly growth rate of loans for individual commercial bank
Control Variables		
Bank's size	Size	Logarithm of quarter-end asset (billion) of individual commercial bank
Economic growth	GGDP	Quarter-to-quarter growth rate of GDP
Monetary policy	SHIBOR	Average quarterly value of one-year SHIBOR

Note(s): SHIBOR represents Shanghai Interbank Offered Rate.

Results and Discussion*Descriptive statistics*

Descriptive statistics are summarized in **Table 2**. The mean and standard deviation of issuing balance score of WMPs of overall sample commercial banks in China are 6.26 and 1.65 respectively, while the minimum and maximum values are 1.92 and 10.00 respectively. The wide range indicates significant individual difference in WMPs issuance across banks. In light of regulatory arbitrage, the average LDR of overall sample commercial banks is 73.5%, which is below the original ceiling of 75%. However, the maximum value exceeds 110% while the minimum value is less than 40%. It implies that distinct business structures and deposit competitiveness among commercial banks. Besides, commercial banks in China have the average T1CAR of 10.52% that are well-capitalized. There is a relatively strict capital regulation and commercial banks face strong pressure to maintain capital adequacy in China. With regard to NPLR, the average is 1.46% but the values range from 0.42% to 3.44%. Due to commercial banks in China are always under rigorous supervisory standards, overall NPLR is relatively low. Nevertheless, it reveals an increasing trend in the sample period. It is noteworthy that the average growth rate of total loans is 17.41% and the maximum reaches 70%, which indicates the credit expansion in banking system.

Table 2

Descriptive Statistics

Variable	N	Mean	p50	SD	Min	Max
WMP	1281	6.26	6.03	1.65	1.92	10.00
LDR	1186	73.50	72.55	14.03	32.32	118.90
T1CAR	1190	10.52	10.25	1.38	7.68	14.68
NPLR	1101	1.46	1.46	0.41	0.42	3.44
GTL	1214	17.41	15.86	8.96	-22.17	70.69
Size	1257	6.92	6.64	1.70	4.18	10.47
GGDP	1288	6.31	6.80	3.52	-6.90	18.30
SHIBOR	1288	3.43	3.17	0.70	1.89	4.77

Note(s): The description of variables is illustrated in Table 1.

Besides, this study performs the correlation matrix and variance inflation factor (VIF) analyses to avoid bias caused by collinearity. The results are illustrated in Table 3. All correlation coefficients are less than 0.8 and VIFs of variables are less than 5 with the mean VIF of 1.31, which demonstrates that the dataset is without multicollinearity and the causality can be reliably explained.

Table 3

Correlation Matrix and VIF

	WMP	LDR	T1CAR	NPLR	GTL	Size	GGDP	SHIBOR
WMP	1							
LDR	0.294***	1						
T1CAR	0.133***	0.195***	1					
NPLR	-0.067**	0.268***	0.133***	1				
GTL	-	-	-	-	1			
Size	0.762***	0.400***	0.320***	-0.057*	0.308***	1		
GGDP	0.019	-0.057**	-0.042	-0.002	0.001	-0.014	1	
SHIBOR	0.119***	-	-	0.025	0.010	-	0.238***	1
VIF	/	1.47	1.26	1.26	1.42	1.47	1.06	1.24
Mean VIF	1.31							

Note(s): *** p<0.01, ** p<0.05, * p<0.1 represent statistical significance at 1%, 5% and 10% levels, respectively. Definitions of other variables can be found in Table 1.

Empirical Results

The results based on the two-step GMM estimator for Model (1) to (7) are provided in **Table 4**. The regression coefficients of LDR for liquidity regulatory requirement in columns (1), (3), (5) and (7) are significantly and positively associated with WMP issuance no matter whether adding other independent variables. This indicates that commercial banks with higher LDR are more likely to issue WMPs to lower their LDR and tackle liquidity supervision, which is in line with the hypothesis of the study. When LDR increases, commercial banks face greater pressure to attract funds and provide traditional loans. Issuing WMPs help commercial banks expand their deposits by provisionally recording expired WMPs funds on balance sheet on

one hand, and reduce their on-balance-sheet loans by informally securitizing their credit assets on the other hand. Moreover, even though authorities have relaxed the regulatory requirements for LDR from October 2015, commercial banks still have strong incentive to issue WMPs to increase their competitiveness in deposit market under the accelerating deregulation especially the interest rate liberalization in recent years.

Regarding to the regulatory requirements of bank's capital (T1CAR), the results in columns (2), (3), (5) and (7) show that T1CAR is significantly and negatively associated with the issuing size of WMPs (WMP), which confirms that the lower T1CAR is, the greater regulatory pressure of commercial banks on capital requirements and larger issuing size of WMPs. Although the overall commercial banks capital is relatively sufficient in China, it is declining in recent years. Capital Adequacy Ratio (CAR) as an important supervisory indicator of Basel III for risk management and financial stability, authorities in China increasingly strengthens the supervision on banks' capital, especially for those banks perceived as "too-big-to-fail" and Domestic Systemically Important Banks (D-SIB). Therefore, China's commercial banks still face regulatory pressure on capital adequacy and they are more likely to raise funds through off-balance-sheet WMPs. Firstly, commercial banks benefit from the spread incomes between the yields for investors and underlying assets of WMPs. WMPs can be regarded as an instrument for profitability diversity. Secondly, it is mentioned before that the operation mechanisms of WMPs provide commercial banks channels to move their credit assets out of balance sheet, which decrease the total amount of risk-weighted assets to maintain and even increase T1CAR.

The results for both LDR and T1CAR verify that the expansion of WMPs is driven by the incentives of commercial banks to regulatory arbitrage in China. However, the influences of the asset quality regulation (NPLR) on WMPs issuance are different from expectation. According to the results showed in columns (4) of Table 4, the coefficient of NPLR is significantly negative at 1%, which indicates that commercial banks with lower NPLR tend to issue more WMPs. Nevertheless, the coefficients of NPLR are not significant in column (5) and (7) when adding other independent variables. There are some possible explanations. Firstly, due to commercial banks in China are always anxious about their NPLR, which is a core supervisory indicator of credit risk and also connected to their profitability and costs, most of them have lower NPLRs that between 1% and 2%. The overall regulatory pressure on NPLR is relatively stable during the sample period. In addition, some researchers have demonstrated that issuing WMPs give rise to the growth of NPLR indirectly (Zeng, Wei & Chen, 2019). Those credit assets that transferred out of balance sheet through WMPs not only include the NPLs but also regular loans, which decreases more than NPLs and thus results in the increase of NPLR.

Meanwhile, the above relationship between NPLR and WMPs proposes that liquidity pressure and loan quota in China are the primary triggers of commercial banks to issue WMPs, which is also reflected by the results for causality between credit expansion and WMPs issuance. As shown in column (6) and (7), the increase of on-balance-sheet loans (GTL) is significantly and positively associated with the rapid rise of WMPs. In addition, commercial banks prefer to issue loans to large enterprises and state-owned companies to control their NPLR. They also engage in channeling businesses with those large enterprises through WMPs (Appendix 1) in depth to indirectly provide funds for borrowers which are difficult to get bank loans. Therefore, as the main sources of financing, commercial banks have to provide more traditional loans to superior enterprises and shadow loans to other borrowers by the complex operation mechanism of WMPs business.

Table 4
Empirical Results

Dependent Variable: WMP							
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.WMP	0.660*** (7.00)	0.594*** (7.85)	0.671*** (8.53)	0.682*** (8.56)	0.710*** (7.90)	0.563*** (4.14)	0.656*** (8.78)
LDR	0.021*** (3.32)		0.013** (2.47)		0.013* (1.78)		0.013** (2.32)
T1CAR		- 0.079*** (-2.88)	- 0.085*** (-3.09)		-0.083** (-2.57)		-0.065* (-1.84)
NPLR				- 0.487*** (-3.24)	-0.034 (-0.21)		-0.018 (-0.10)
GTL						0.008* (1.79)	0.007* (1.89)
Size	0.095 (0.98)	0.370*** (5.43)	0.266*** (3.44)	0.376*** (3.42)	0.230** (2.54)	0.312* (1.82)	0.279*** (3.79)
GGDP	- 0.030*** (-7.57)	- 0.030*** (-8.44)	- 0.032*** (-8.97)	- 0.031*** (-9.10)	- 0.032*** (-8.98)	- 0.028*** (-5.47)	- 0.028*** (-8.38)
SHIBOR	0.05 (0.31)	0.398*** (4.23)	0.176 (1.27)	0.136 (0.82)	0.177 (0.83)	0.233 (0.35)	0.052 (0.22)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1125	1128	1104	1040	1025	1185	999
F-statistics	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (1)	0.000	0.000	0.000	0.000	0.002	0.000	0.001
AR (2)	0.271	0.492	0.408	0.448	0.544	0.212	0.442
Hansen Test	0.138	0.115	0.121	0.181	0.139	0.152	0.178
Instrument	42	38	41	36	43	34	44

Note(s): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ represent statistical significance at 1%, 5% and 10% levels, respectively; t-statistic are in parenthesis; L.WMP is the lagged terms of WMP; Time dummies are included in this regression to control time fixed effect (Time FE); Bank fixed effect (FE) is controlled by GMM; F-statistics represents the p-value of F test; AR (1) and AR (2) represent the p-values of Arellano-Bond test for the first and second order correlation, respectively; Hansen Test represents the p-value of Hansen Test for the over-identifying restrictions of instrument variables; Instruments represents the number of instrument variables; Two-step System GMM adopts the Windmeijer's (2005) finite-sample correction for the standard error. Definitions of variables can be found in Table 1.

Heterogeneity Analysis

In order to examines the heterogeneity by types of banks on the bank-related determinants of WMPs, this study divides the sample commercial banks into two types and estimates

Models (1), (2), (4) and (6) adding the interaction terms of independent variables and a dummy variable (type). According to their distinction in geographic reach of branch network and businesses, there are 16 Nationwide Commercial Banks (NCBs) and 30 Local Commercial Banks (LCBs). Type equals to 1 for NCBs and equals to 0 for LCBs. To be specific, mostly all cities in China have covered by the branches of NCBs whereas the branches of LCBs are mostly concentrated in the provinces and cities where they are established and cannot conduct cross-regional businesses. Besides, there are other significant differences between NCBs and LCBs, including asset size, ownership, business structure and regulatory requirements. The results are summarized in Table 5.

Table 5
Heterogeneity Analysis

Dependent Variable: WMP				
Models	(1)	(2)	(4)	(6)
L.OATs	0.592*** (6.51)	0.657*** (10.54)	0.709*** (10.01)	0.624*** (12.39)
LDR	0.020* (1.79)			
LDR*type	-0.014** (-2.09)			
T1CAR		-0.071** (-2.23)		
T1CAR*type		0.065** (2.08)		
NPLR			-0.272* (-1.83)	
NPLR*type			-0.051 (-0.24)	
GTL				0.012*** (3.31)
GTL*type				-0.020*** (-3.48)
type	3.974** (2.30)	-0.536* (-1.69)	0.529 (1.55)	0.08 (0.16)
Size	-0.672 (-1.39)	0.256*** (3.65)	0.131 (1.31)	0.418** (2.19)
GGDP	-0.039*** (-4.64)	-0.033*** (-10.41)	-0.037*** (-11.85)	-0.027*** (-5.20)
SHIBOR	1.829** (2.03)	0.501*** (4.40)	0.555* (1.93)	-0.153 (-0.38)
Bank FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
N	1077	1079	920	1185
F-statistics	0.000	0.000	0.000	0.000
AR (1)	0.000	0.000	0.000	0.000
AR (2)	0.200	0.460	0.373	0.261
Hansen Test	0.265	0.163	0.152	0.136

Instrument	40	40	41	36
<p>Note(s): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ represent statistical significance at 1%, 5% and 10% levels, respectively; t-statistic are in parenthesis; L.WMP is the lagged terms of WMP; type is dummy variable, for NCBs, type equals to 1 while for LCBs, type equals to 0; Time dummies are included in this regression to control time fixed effect (Time FE); Bank fixed effect (FE) is controlled by GMM; F-statistics represents the p-value of F test; AR (1) and AR (2) represent the p-values of Arellano-Bond test for the first and second order correlation, respectively; Hansen Test represents the p-value of Hansen Test for the over-identifying restrictions of instrument variables; Instruments represents the number of instrument variables; Two-step System GMM adopts the Windmeijer's (2005) finite-sample correction for the standard error. Definitions of variables can be found in Table 1.</p>				

According to the results, the coefficients of interaction terms LDR*type, T1CAR*type and GTL*type are significant and have opposite directions with LDR, T1CAR AND GTL respectively, which indicates that significant heterogeneity between different types of banks and the motivation to bypass the liquidity and capital regulations through issuing WMPs is stronger for LCBs than NCBs. As a matter of fact, NCBs with more than 70% of total assets dominate the China's banking system. The mean asset of NCBs is 1.28 trillion RMB while that of selected top LCBs is only 0.08 trillion RMB. Besides, there are more plentiful business and profitability structure, more mature risk management for NCBs than LCBs. They are more monopolistic and competitive in the financial market. LCBs with fewer fund sources and branches are not comparable to NCBs to gain deposits and capitals. Moreover, LCBs are more likely to focus on traditional settlement, deposits and lending businesses. They face more pressure to attract funds from the public and then provide loans to the real economy. Therefore, WMPs funds may become important supplement for LCBs to regulatory arbitrage and satisfy the financing demands. More importantly, this study focuses on the period of accelerating transformation of commercial banks and increasing strict supervision. NCBs with relatively abundant assets and strong innovation capacity can better diversify their businesses and normalize their WMPs business to respond to updating financial policies more efficiently.

Robustness Check

This study applied the instrumental variables and two-stage least squares estimation (IV2SLS) for panel data for robustness check, which can also mitigate some potential endogeneity. The result of IV2SLS estimation is proper owing to it passes under-identification, weak identification and overidentification tests. Besides, it is consistent with the previous results in general which is illustrated in Table 6. Issuing WMPs is an important off-balance-sheet instrument of commercial banks to raise funds to support credit expansion and evade regulations on liquidity and capital.

Table 6
Robustness Check

Dependent Variable: WMP	
Models	(7)
LDR	0.018** (2.02)
T1CAR	-0.127* (-1.78)
NPLR	0.011 (0.05)
GTL	0.009* (1.68)
Size	0.902** (2.12)
GGDP	-0.05 (-1.19)
SHIBOR	0.346 (0.58)
Bank FE	Yes
Time FE	Yes
N	836
F-statistics	0.000
R-squared	0.5699
Endogeneity Test	0.0069
Under-identification Test	0.0000
Hansen Test	0.2837

Note(s): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ represent statistical significance at 1%, 5% and 10% levels, respectively; t-statistic are in parenthesis; F-statistics represents the p-value of F test; Endogeneity Test represents the p-value of Durbin-Wu-Hausman; Under-identification Test represents the p-value of Kleibergen-Paap rk LM statistic; Weak identification Test includes Cragg-Donald Wald F statistic and Kleibergen-Paap rk Wald F statistic; Hansen Test represents the p-value of Hansen Test for the over-identifying restrictions of instrument variables. Definitions of variables can be found in Table 1.

Conclusion

In recent years, there are increasing attentions paid to the development of shadow banking in China, which is with the especial characteristic of “bank-centricity”. Bank-issued wealth management products (WMPs) raise and channel the public funds to shadow loans, which plays a vital role that closely connect traditional banking and shadow banking systems. Due to commercial banks are always under strict supervision in China, this study investigates the triggers on the development of WMPs considering the incentive of regulatory arbitrage and on-balance-sheet credit expansion based on the quarterly unbalance panel dataset of 46 Chinese commercial banks from 2015 to 2021. The empirical results under two-step System GMM estimator show that commercial banks in China involve in more WMPs business to raise funds for credit expansion (GTL) and move their credit assets out of balance sheet to meet the regulatory requirements on liquidity (LDR) and capital (T1CAR). However, asset quality regulation (NPLR) is not direct factor in the issuance of WMPs. Moreover, this study further

explores the heterogeneity between nationwide commercial banks (NCBs) and local commercial banks (LCBs) on the motivation to issue WMPs. Comparing with NCBs, LCBs tend to issue more WMPs to raise funds and relieve their supervisory pressure on liquidity and capital.

The results depict that commercial banks with stronger motivations to reduce LDR and increase T1CAR have larger scale of WMPs issuance. Therefore, this study recommends that the policy maker in China should concern the activities of “window-dressing” balance sheet of commercial banks through WMPs and strengthen the information disclosure standards of WMPs to prevent fraudulent reporting of supervisory indicators by commercial banks. Furthermore, due to the lack of sources for commercial banks to gain funds in China’s financial system, authorities should accelerate the development modernized capital market to provide channels for financing and transfer credit assets. Last but not least, due to WMPs business is closely connected with shadow banking system, policy maker should also carefully identify the deepest underlying assets of WMPs and potential risks to avoid crises caused by excessive maturity mismatch and liquidity volatility.

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Appendices

Appendix 1, Operation Mechanisms of WMPs

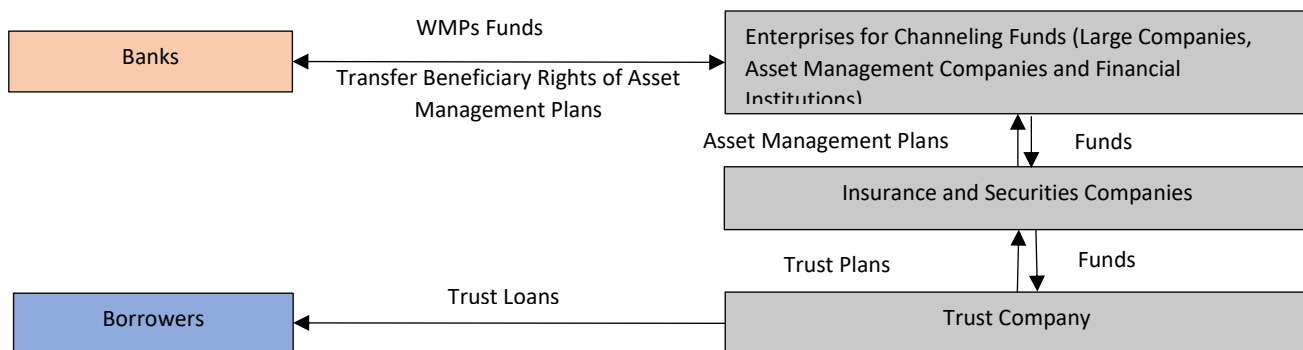


Figure A1: Channeling Business with Beneficiary Rights.

Note(s): Large Companies, Asset Management Companies and other Financial Institutions directly offer loans to borrowers and transfer those credit assets as asset management plans (AMPs) to trust companies, which repackage those credit assets as trust plans. Meanwhile, Banks issue WMPs and invest those WMPs funds in AMPs, while enterprises transfer beneficiary rights of

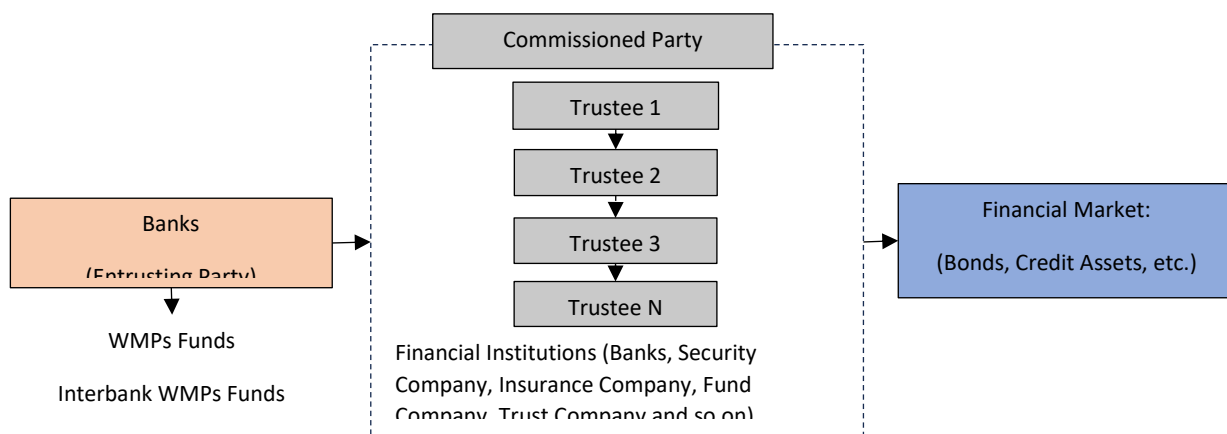


Figure A2: Interbank WMPs and Outsourcing Business.

Note(s): Commercial banks raise funds through interbank deposits and WMPs. Then, they outsource those funds to other banks and Non-Bank Financial Institutions (NBFIs). Financial institutions as trustees increase the leverage, maturity, risks and ultimately

Appendix 2: Sample Commercial Banks of Study

Table A1: Sample Commercial Banks of Study.

No.	Bank	Symbol	type
1	Industrial and Commercial Bank of China	ICBC	NCB
2	China Construction Bank	CCB	NCB
3	Agricultural Bank of China	ABC	NCB
4	Bank of China	BOC	NCB
5	Bank of Communications	BoCom	NCB
6	Postal Savings Bank of China	PSBC	NCB
7	China Merchants Bank	CMB	NCB
8	Shanghai Pudong Development Bank	SPDB	NCB
9	Industrial Ban	CIB	NCB
10	China Sitic Bank	CITIB	NCB

11	China Minsheng Bank	CMBC	NCB
12	China Everbright Bank	CEB	NCB
13	Ping An Bank	PAB	NCB
14	Hua Xia Bank	HXB	NCB
15	China Zheshang Bank	CZB	NCB
16	China Bohai Bank	CBB	NCB
17	Bank of Beijing	BJCB	LCB
18	Bank of Shanghai	SHCB	LCB
19	Bank of Jiangsu	JSCB	LCB
20	Bank of Ningbo	NBCB	LCB
21	Bank of Nanjing	NJCB	LCB
22	Bank of Hangzhou	HZCB	LCB
23	Bank of Changsha	CSCB	LCB
24	Bank of Guiyang	GYCB	LCB
25	Bank of Chongqing	CQCB	LCB
26	Bank of Zhengzhou	ZZCB	LCB
27	Bank of Lanzhou	LZCB	LCB
28	Qilu Bank	QLCB	LCB
29	Xiamen International Bank	XMIB	LCB
30	Bank of Hebei	HBCB	LCB
31	Bank of Dongguan	DGCB	LCB
32	Guangdong Nanyue Bank	NYCB	LCB
33	China Resources Bank of Zhuhai	HRCB	LCB
34	Guangdong Huaxing Bank	HXCB	LCB
35	Bank of Zhangjiakou	ZJKCB	LCB
36	Bank of Rizhao	RZCB	LCB
37	Chongqing Rural Commercial Bank	CRCB	LCB
38	Qingdao Rural Commercial Ban	QRCB	LCB
39	Guangdong Zijin Rural Commercial Bank	JZRCB	LCB
40	Jiangsu Changshu Rural Commercial Bank	JCRCB	LCB
41	Jilin Jiutai Rural Commercial Bank	JTRCB	LCB
42	Wuxi Rural Commercial Bank	WRCB	LCB
43	Jiangsu Jiangyin Rural Commercial Bank	JJRCB	LCB
44	Jiangsu Suzhou Rural Commercial Bank	JSRCB	LCB
45	Jiangsu Jiangnan Rural Commercial Bank	TJRCB	LCB
46	Tianjin Rural Commercial Bank	JNRCB	LCB

Note(s): Source, People's Bank of China (PBOC); NCB and LCB represent National Commercial Bank and Local Commercial Bank, respectively.