

Shadow Banking Modes: The Chinese versus US System*

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Abstract

Using newly collected data this paper shows that Chinese shadow banking is different from the US counterpart in two important dimensions. The Chinese system creates information insensitive investment products by implicit guarantee rather than financial engineering and operates on a banking platform instead of capital markets. The theoretical model analyses why Chinese shadow banking is bank-centric and discusses the role of the Chinese government and welfare implications. This paper also formalizes the conceptual differences between implicit guarantee and securitization as well as asymmetric perception of implicit guarantee and neglected risks.

JEL Classification Codes: E51, G21, G23, P51

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1. Introduction

Shadow banking is an integral part of the US financial system. This was evident during the financial crisis in 2007/08 where the runs on debt funding markets such prime money market funds, repos, asset-backed commercial papers and other securitized products triggered massive policy interventions. Similarly, shadow banking is a central element of the financial transformation in China. An important question is whether the structure and growth of Chinese shadow banking since 2008 mimic the US counterpart and are thus subject to the same risks and vulnerability. This paper provides a unified theoretical framework based on the concept of information sensitivity by Dang et al. (2015, 2015a) to model Chinese shadow banking with focus on the creation of deposit-like investment and compares it to the US systems. In addition, this paper presents a comprehensive set of newly collected Chinese shadow banking statistics.

A broad definition of shadow banking is deposit and credit creation outside the regulated banking system (FSB, 2013). Such activities in China experience rapid growth since the global financial crisis in 2008. On the deposit side, the most important category is wealth management products (WMPs). Most WMPs are structured and sold by banks in corporation with trust companies, brokers and security firms. Since these products are de jure offered by these non-bank financial institutions, WMPs are not considered as traditional bank deposits but treated as asset management products and thus recorded off banks' balance sheets and not subject to the deposit (interest rate) regulation. The majority of WMPs has a maturity of less than three months. WMP investors (depositors) expect to be repaid at par value plus interest. On the lending side, the funds raised through WMPs are mainly invested in interbank markets and bond markets but part of it is also lent to riskier borrowers (e.g. property developers, mining companies and local government financing vehicles) through trust companies as trust loans. Some proceeds from WMPs are even invested in stocks.

Figure 1a shows the number of bank-sponsored WMPs issued per month from January 2007 to February 2019. More than 702,000 products had been issued during this period. When this innovation started, only 235 WMPs were issued in January 2007. The number of WMPs issued went up to 5,048 in January 2014. In November 2017, more than 14,382 products were issued. Since then the number of issuance has declined steadily because of stricter regulation and 10,075

products were issued in February 2019. Figure 1b shows that the outstanding amount of WMPs in RMB experiences a parallel growth. In December 2007 the total amount invested in WMPs was 530 billion RMB. The outstanding amount increased to 10.21 trillion RMB in December 2013. The highest amount was reached at 30.32 trillion RMB in November 2017. There is a large drop in January 2018 and since then the outstanding amount is around 22 trillion RMB.

[Insert Figure 1]

When we compare Chinese and US shadow banking there are similarities. WMPs are comparable to money market funds (MMF) and securitized products. A driver of the growth of the US MMF industry in the 1970s was interest rate regulation. During that period of high inflation and low bank deposit rates because of Regulation Q, US investors were looking for higher yields and yet safe investment products (Borst, 2013). This was also a driver of securitization. The reasons behind the rise of WMPs are similar. Because of interest rate regulation, WMPs offer higher rates than bank deposits. On the lending side, a part of the proceeds from WMPs is lent to risky borrowers as trust loans and enable borrowers with limited access to traditional bank credits to obtain funding. MMFs and securitization vehicles invest the money raised in debt instruments and provide funding to a broad range of borrowers. Both MMFs and securitization reduce funding costs of borrowers. For example, due to securitization of the underlying loans, subprime borrowers obtain mortgages at affordable rates (Brandlee, 2011) and firms with lower ratings can borrow on the asset-backed commercial paper markets in the US. In China property developers, infrastructure projects or firms from riskier industries obtain trust loans through funding from WMPs. Furthermore, these activities are implicitly endorsed by financial deregulation in 1980s in the US which enabled banks to sell loans through these innovations to expand lending. This is similar in China. Shadow banking provides funding to borrowers who are restricted from banks loans and capital markets.¹

Figures 2a shows the outstanding amount of trust loans from January 2008 to February 2019. The growth of trust loans parallels the growth of WMPs as the latter provides funding for trust companies to lend. For example, from January 2015 to December 2018, the average monthly

¹ For institutional details and historical background see Li and Hsu (2013), Schwarcz (2013) and Dang et al. (2014).

outstanding amount of trust loans is 7.23 trillion RMB. Figures 2b shows another shadow loan market. Entrusted loans are loans between two corporations where a bank acts as an intermediary and trustee. The main lenders are state-owned enterprises. Since the beginning of 2018 the aggregate amount of both types of shadow lending activities decline.

[Insert Figure 2]

Despite these similarities, this paper argues that there are two fundamental differences between Chinese and US shadow banking. In China, shadow banking relies on traditional banks to perform many basic functions of credit intermediation. This makes it very bank-centric, and a true “shadow” of the banking system. In contrast, already in the 1970s capital markets have long been an integral part of the US financial system and provide an efficient platform for financial innovations. The growth of shadow banking in the US has relied on this platform for credit intermediation, risk redistribution and pricing. For example, asset managers of collateralized loan obligations (CLOs) are typically private equity firms which buy syndicated corporate loans from banks and sell them to institutional investors in forms of securitized debt tranches on the capital markets (Fitch, 2018). Independent asset managers as MMF providers are directly competing with banks for depositors. A natural consequence is that the US shadow banking system is market-based, operating in parallel to banks. In contrast, WMPs are created and offered by banks in corporation with non-bank financial institutions. Based on a conduit structure, banks channel funds from WMPs to trust companies which then provide trust loans to firms. Even in the entrusted loan markets banks play an important role as they act as an intermediary between borrowing and lending firms.

The other key difference concerns how the two shadow banking systems seek to create information insensitive and safe investment products that offer higher yields than demand deposits and government bonds. Dang et al. (2015) argue that MMF and securitization are the endogenous response of the US financial system to meet the increasing demand for safe assets by institutional investors. MMF and senior tranches of securitized products have no explicit capital guarantee by the issuer but are considered as safe because of financial design such as tranching and over-collateralization (Gorton and Metrick, 2012). In contrast, Chinese shadow banking

products are relatively simple in structure. Chinese investors perceive WMPs as safe because banks are involved in structuring and distributing these products. Although banks are typically not contractually liable when the underlying borrowers do not repay, investors expect guarantees by banks and enforcement by the government in the case of default. On average, 70% of WMPs issued since 2007 carry no explicit credit guarantees. Yet investors expect their investments to be safe. Chinese shadow banking creates information insensitive investment products based on implicit guarantee rather than financial structuring.

In this paper we employ a unified theoretical framework based on the concept of information sensitivity by Dang et al (2015, 2015a) to model Chinese shadow banking with the focus on the creation of deposit-like products and analyze the structural differences between the Chinese and US system. The theoretical analysis focuses on three interrelated questions. Why is Chinese shadow banking a bank-centric system? How does it create information insensitive products? What is the role of the government in Chinese shadow banking? Answers to these questions will provide a better understanding and evaluation of the opportunities and risks of shadow banking for China. It also has important implications for the reform and regulation of this industry.

A complement paper is Acharya et al (2016) who provide an empirical analysis of WMPs issued by the largest 25 banks over the period 2008-2014. This paper analyses the implications of rollover risks for the issuing banks and shows that when there are more WMPs due to mature this has consequences for yields, interbank market behavior and stock prices. Chen et al (2018) study entrusted loans and show that contractionary monetary policy during 2009-2015 caused these loans to rise rapidly, offsetting the expected decline of traditional bank loans and hampering the effectiveness of monetary policy on total bank credit. Allen et al (2015) and Hachem and Song (2016) also analyze the rise of entrusted loans. These papers focus on the lending (and asset) side of shadow banking. In contrast, our paper mainly analyzes the creation of information insensitive and safe deposit-like products on the liability side of shadow banking. Brunnermeier et al (2017, 2018) discuss Chinese shadow banking as a gradualistic approach that allows the government to learn how the economy reacts to small policy changes. The next section provides a more detailed review of these papers.

The remainder of the paper is organized as follows. The next section provides some institutional background and a comprehensive set of Chinese shadow banking statistics and discusses related papers. Section 3 conducts a theoretical analysis with particular focus on implicit guarantee and the role of the government. Section 4 discusses further extensions of the model and the contribution to the banking literature. Section 5 concludes with a discussion of potential directions for reform and regulation of the system.

2. Chinese Shadow Banking

This section provides a brief overview of the Chinese shadow banking industry and discusses the supply and demand side drivers of shadow banking as well as (implicit) regulatory endorsement of these activities. In addition, a comprehensive set of newly collected data and market statistics is presented. The underlying assumptions of the theoretical analysis in the next section are motivated by and based on these institutional stylized facts.

2.1. An Overview of Shadow Banking Activities

According to the deposit and lending perspective of financial intermediation, Chinese shadow banking activities can be classified into three broad classes. On the deposit side, bank sponsored wealth management products (WMPs) is the main category. These are investment products structured and sold by banks in cooperation with non-bank financial institutions using a conduit structure. The main partners are trust companies. From a legal and de jure perspective, the trust company has fiduciary obligations and is responsible for due diligence and supposed to act on the interest of investors. But in most cases banks reach out to investors, structure the products and even determine the use of proceeds. By cooperating with trust companies WMPs are not considered as bank deposits and recorded off banks' balance sheet. Therefore, WMPs can offer higher interest rates because they are not subject to deposit regulation. After tightening in banking regulation since 2012 banks create more complicated conduit structures where not only trust companies but also brokers, security firms or insurance companies are involved. In principal, trust companies can offer (pure) trust products. In order attract retail investors they typically need to cooperate with banks.

From the lending perspective, since WMPs are not considered as deposit the use of WMP funds are not subject to standard bank lending regulations such as capital requirement. The proceeds from the issuance of WMPs are invested in interbank lending and bond markets. A significant part is lent to firms and other types of borrowers as trust loans. Therefore, trust loans constitute an important class of shadow banking activities. These loans are typically given to riskier borrowers, such as property developers, mining companies and local government financing vehicles. These borrowers have limited access to bank loans and capital markets. In addition to trust loans, entrusted loan is another shadow lending activity. An entrusted loan is loan when one corporate (or individual) lends to another with a bank serving as a trustee. Some SOEs, who can borrow cheaply from banks, have incentives to lend excess funds to others borrowers to arbitrage the interest rate difference (Allen et al, 2015; Chen et al, 2018). Banks are also an important player in the entrusted loans markets.

The third class of activities comprises of deposit and lending activities by firms without banks as middlemen, such as lending by micro lenders and pawn shops or through online peer-to-peer (P2P) lending platforms and the underground black market. Dang et al (2018) analyze an illegal fundraising scandal in Anyang and the spillover effects from informal lending to bank lending. This is the most opaque segment but a small part of the shadow banking system compared to the more than 45 trillion RMB markets for WMPs, trust loans and entrusted loans in 2017.

2.2. Demand and Supply Side Drivers

China's banking system has been and is still subject to significant regulations. The deposit rate ceiling, in particular, has depressed interest rates in the economy and created financial repression especially in the period around 2010. Therefore, real interest rates have been either negatives or close to zero in recent years except 2009 (Figure 3). China has one of the world's highest saving rates, but there are few investment opportunities given the still underdeveloped capital markets and near-closed capital account. Investors' desire for alternative investments created high demand for alternative banking products.

By structuring them off banks' balance sheet, WMPs are not subject to the deposit rate ceiling regulation, allowing yields on these products to move in line with market interest rates. Some of

the WMPs carry explicit credit guarantee by banks, and most of them are structured as short-term investment, making them a close substitute to deposits from a credit and liquidity risk perspective. So WMPs offer banks a tool to circumvent interest rate control while maintaining or even expanding their deposit base.

[Insert Figure 3]

In addition, through shadow banking transactions banks can overcome lending restrictions such as the reserve requirement, loan-deposit ratio and credit quota (Acharya et al., 2013; Plantin, 2014). Compared to other countries, China has relatively high reserve requirements. The reserve requirement ratio (RRR) for large banks was 9.5 % in January 2007 which increased to 15% in January 2008 and gradually went up to 21.5% in June 2011. The RRR is 14.5% in October 2018. Off-balance sheet lending transactions are exempt from many credit and macro-prudential requirements and subject to less official interference especially before 2017. By cooperating with non-bank financial institutions (e.g. trust companies, securities firms) banks can extend credit creation beyond what is allowed by existing regulations.

2.3. Monetary Policy and Regulatory Endorsement

Another driver for the rise of shadow banking came from a policy change after the financial crisis in 2008. There was a substantial policy stimulus of 4 trillion RMB and significant liquidity injection by the People's Bank of China (PBOC). However, by late 2010, the economy showed signs of overheating, with inflation rose above 5%. The PBOC cut back stimulus and ordered banks to reduce their lending. The abrupt policy change created a problem for banks, as they had lent significantly to local government financing vehicles and other large and credit-intensive infrastructure projects. The long-term nature of these investments required continued credit infusion, without which there would likely be project failures and rise in non-performing loans. As a response, banks expanded their off-balance sheet operations and became increasingly reliant on shadow banking to intermediate credit. Chen et al (2018) provide empirical evidence for this view. Hachem and Song (2016) analyze how a regulatory tightening can lead to a credit expansion through shadow lending. See also Acharya et al (2016) and Allen et al (2016).

Chen et al (2018) show that contractionary monetary policy during 2009-2015 caused entrusted loans to rise rapidly, offsetting the potential decline of traditional bank loans and hampering the effectiveness of monetary policy on total bank credit. This paper constructs a micro dataset of new entrusted loans between nonfinancial firms for the period 2009-2015 and identifies the name of a financial trustee that facilitated each entrusted loan. It analyzes the responses of shadow lending activities facilitated by state versus non-state owned banks to changes in monetary policy. This paper shows that contractionary monetary policy increases the risk of deposit withdrawals in individual banks. This risk in turn increases the expected cost for individual banks to recoup deposit shortfalls and leads banks to adjust their portfolio toward risky non-loan assets and facilitate lending between firms to finance investments and help increase the amount of entrusted loans.

Our data depicted in Figure 2b shows that the growth of outstanding entrusted loans extends beyond 2015. The average annual growth rate from 2008 to 2015 is 115.6% but it slowed down thereafter. From 2015 to 2017, the annual growth rate of entrusted loans is 13.2% and still relatively high. Since 2018 net issuance is negative and outstanding amount is declining.

Furthermore, the rise of shadow banking has been seen as a positive development to broaden the diversity of China's financial system (Zhang, 2013). On the one hand, shadow banking provides funding to borrowers who are unable to get financing from banks and capital markets. Since small and medium enterprises (SMEs) account for a large share of these borrowers, shadow financing has supported the development of private businesses. On the other hand, shadow banking provides a testing ground for interest rate liberalization, as credit allocation in the sector is driven by market forces (He and Wang, 2012). Shadow banking is consistent with China's dual track reform approach. While maintaining stability and control over the regular banking system, shadow banking is a parallel system that is more driven by market forces.²

² The most prominent example of the dual track reform approach is the one country two systems formula for Hong Kong. Other examples are the special economic zone of Shenzhen and the free trade zone in Shanghai.

2.4. Characteristics of WMPs and Trends

Bank-sponsored WMPs have three main characteristics. (1) A typical WMP has short maturity (less than three months). (2) It offers an annualized interest rate of 3-5%. (3) It carries no explicit capital guarantee. This section provides a comprehensive set of industry statistics. The data used to compile the figures are obtained from the following sources: The financial information company Wind, People's Bank of China (PBOC), China Banking Association (CBA), China Banking and Insurance Regulatory Commission (CBIRC), and China Banking Wealth Management Registration System (chinawealth.com.cn).³

Figure 4a shows that 49.5% of total number of WMPs issued between January 2007 and February 2019 have a maturity of one to three months. More than 75% of products have a maturity of less than six months. Especially around 2011 WMPs with maturity less than three months account for more than 70% of all issuance (Figure 4b). Figure 5a shows that on average 64.4% of WMPs issued between January 2007 and February 2019 offer an annualized interest rate of 3-5% and 25.3% of products have a yield of 5-8%. During 2009 around 70% of WMPs had a yield of less than 3% (Figure 5b). This is the period when inflation is low. Since 2010 the average yields have increased. There is considerably fluctuation in the average yields, and especially around the 5% interest rate.

[Insert Figure 4]

[Insert Figure 5]

The most unique feature of WMPs is its capital guarantee structure. Figure 6a shows that in the period from January 2007 to February 2019, only 9.2% of WMPs issued have explicit guarantee of both principal and interest payment, and 21.2 of products only offer the guarantee of principal payments. The large majority (69.6%) of WMPs have no capital guarantee at all. From a contractual perspective WMPs are not safe investments. Yet investors consider them as safe.

³ China Banking Wealth Management Registration System is an agency under CBIRC and provides information about the WMP industry. The yearbook (中国银行业理财市场报告) contains detailed information.

Anecdotal evidence suggests that sales persons in bank branches often told investors that even there is no explicit capital guarantee they have no need to worry about their investments. Appendix provides two illustrative examples.

Figure 6b shows a clear trend. WMPs with explicit principal and interest guarantee declined from 50% in the beginning of 2007 to less than 10% in 2019. In contrast, WMPs with no credit guarantee increased from less than 20% in 2007 to more than 75% in 2019. This is mainly due to policy requirement.

[Insert Figure 6]

According to China Banking Wealth Management Registration System, 562 financial institutions had WMPs outstanding in 2017. There were 426 and 497 issuers in 2015 and 2016, respectively. Figure 7a shows the issuers of WMPs by the type of financial institutions.⁴ State-owned banks and joint-stock commercial banks together issued 76.9% of WMPs (by number of products) followed by urban commercial banks with an average of 14.6% market share. All other types of financial institutions together have less than 10% market share. Figure 7b shows that this composition is quite stable.

[Insert Figure 7]

2.5. Asset Composition and Rollover Risks

Given the fixed repayment and the short maturity of WMPs a concern is rollover risks. Some of the amounts raised are invested in risky assets and which have a maturity of longer than six months. This means if investors do not reinvest, issuers of WMPs investing in risky assets with longer maturity face a refinancing problem.

⁴ State-owned banks are Agricultural Bank of China, Bank of China, China Construction Bank, Industrial and Commercial Bank of China (the so-called Big 4), and Bank of Communications. Large national joint-stock commercial banks are Bohai Bank, China CITIC Bank, China Everbright Bank, China Merchants Bank, Evergrowing Bank, Guangfa Bank, Hua Xia Bank, Industrial Bank, Minsheng Bank, Ping An Bank, Shanghai Pudong Development Bank, and Zheshang Bank.

Figure 8a shows that in the period 2015 to 2018, on average 33.2% of the funds are invested in interbank markets, i.e. lent to other financial institutions. 29.8% are invested in bonds and bills which are more risky although the default of bonds is still not common in China so far. 33.4% are invested in other credits (e.g. trust loans, loans to local government financing vehicles (LGFV), loans to hedge funds and other risky borrowers), while 3.7% are even invested in stocks. Figure 8b shows that this asset composition is stable.

[Insert Figure 8]

Acharya et al (2016) provide an empirical analysis of rollover risk of WMPs for the issuing banks. This paper focuses on 25 banks (i.e. Big 4 banks, 13 joint-equity commercial banks and 8 urban commercial banks) over the period 2008-2014 and shows that when there are more WMPs due to mature there are consequences for yields, interbank market behavior and stock prices of issuing banks. Especially small banks offer significantly higher yields on the new WMPs to attract funds to repay maturing products. It affects interbank market behavior. Banks can tap into the interbank market as a source for funding. As the main lending banks in the interbank market, the Big 4 banks can ask or offer a higher interest rate from other banks, as shown by the quotes submitted to the interbank market, when they themselves have a greater amount of WMPs due to mature. Small banks are passive price takers in the interbank market. On the aggregate level, the one-week Shanghai Interbank Offered Rate (SHIBOR) closely tracks the aggregate amount of maturing WMPs issued by the Big 4 banks. Furthermore, this paper analyses the stock market response in times of an interbank market credit crunch in June 2013. When the cost of interbank funds unexpectedly rises, the stock prices drop more for banks with more WMPs maturing in the short-run. This indicates that investors seem to be aware of the rollover risk of issuing banks due to implicit guarantee.

This concern is one reason for the regulators to impose more oversights and stringent regulation of the WMP industry. An objective is to scale back the implicit guarantee structure of the industry. Among other things, the policy proposal in April 2018 requires banks to replace implicit guarantee by floating net asset value (NAV)-WMPs and report NAV to investors. Anecdotal and informal reports document that it is difficult to educate retail investors, especially

older investors and people without much financial knowledge about the workings of floating NAV-WMPs. These investors either keep expecting implicit guarantee or withdraw from such products as they perceive them as risky investments. A potential rapid outflow is one concern that led the government to issue a modified proposal in June 2018 which allows the implicit guarantee structure to exist until 2020.

Another part of the regulatory proposal in April 2018 is that it restricts banks to invest the funds from WMP into specific asset classes. This means that issuers have to discontinue some types of WMPs. A potential negative implication is that borrowers in the real economy who used to obtain credit from the WMP funds do not get funding anymore. Figure 8a shows that 33.4% of WMP funds are invested in other credits assets such as loans to real states and infrastructure projects, LGFV and other borrowers with little or no access to regular bank loans.

2.6. Shadow Financing to the Real Economy

Despite the steady rise of the WMP industry there are periods where net flows are negative. Figure 9 shows that a large outflow occurred in June 2014, where outstanding amount of WMPs decreased by 1.31 trillion RMB. In mid 2017 there were series of net outflows as well. The largest outflow occurs in January 2018, where the total outstanding amount of WMP drops 7.36 trillion RMB. Thereafter, the overall amount fluctuates around +/- 2 trillion RMB every month.

[Insert Figure 9]

Figure 10a shows the net flow of trust loans from January 2007 to February 2019. The monthly average amount of net issuance of trust loans in the period 2007 to 2017 was 62.96 billion RMB. There are several periods with negative net issuance of trust loans. Since March 2018 net lending is negative in every month except January 2019. Figure 10b shows the monthly net aggregate financing to the real economy through entrusted loans from January 2007 to February 2019. The main lenders in this market are state-owned enterprises (SOEs) and banks act as the trustee. These firms can borrow at relatively low interest rates from state-owned banks and relend the funds to other firms. In the peak month of December 2014, the net lending by firms was 455 billion RMB. The average monthly net lending amount of entrusted loans in the period 2007 to

2017 was 109.88 billion RMB. Since January 2018, net lending was negative in every subsequent month. Figure 10c shows that equity finance is small. The average monthly amount of equity issued by non-financial firms on Chinese stock exchanges between January 2007 and February 2019 was 44 billion RMB.

[Insert Figure 10]

Figure 10d shows that the Chinese financial system is dominated by banks and bank loans constitute the main financing sources for the real economy. The net issuance of bank loans was particularly large in every January when banks lent 2.53 trillion RMB (2016), 2.31 trillion (2017), 2.68 trillion (2018) and 3.56 trillion (2019). In the period January 2007 to February 2019, the monthly average net lending amount by banks was 812.10 billion RMB. Figure 11 shows that total amount of bank loans and deposit outstanding. In December 2018, the total amount of outstanding banks loans are 136.30 trillion RMB while total deposits in the regulated banking system amount to 177.52 trillion RMB. The growth of total bank deposits from 1990 to 2018 reflects the wealth accumulation in the private sector.

[Insert Figure 11]

3. A Theoretical Analysis of Chinese Shadow Banking

In this section we provide a theoretical analysis of Chinese shadow banking with particular focus on modeling implicit guarantees, asymmetric perception of credit guarantees, the role of the government and welfare implications. The underlying assumptions of the theoretical model is motivated and driven by the stylized facts presented in the previous sections.

3.1. Model

We consider a production economy with one storable consumption good, three dates ($t=0,1,2$) and five agents: (1) firm, (2) intermediary, (3) early investor, (4) late investor and (5) government. Consumption goods are storable. The agents have the following endowments and utility functions.

The firm (or entrepreneur) with utility function $U_F=c_0+c_1+c_2$, has no endowments but can implement an indivisible project X at investment cost w (in units of consumption goods) at date 0. If implemented, with probability $(1-\lambda)$ the project pays off x units of consumption goods (high state) at date 2 and with probability λ the project yield a payoff normalized to zero (low state). The intermediary with utility function $U_I= c_0+c_1+c_2$ provides financial intermediation services and has an endowment of κ units of consumption goods (capital buffer) at date 2. The early investor with utility function $U_E=c_0+c_1$ has an endowment of w_E units of consumption goods at date 0. The late investor with utility function $U_L=c_1+c_2$ has an endowment of w_L units of consumption goods at date 1. The government has utility U_G (which we specify in Section 4.5) and K units of consumption goods at date 1. To save on notations we assume that $w_E = w_L = w$.

In autarky, the utility of the four (private) agents are as follows. $U_F=0$, $U_I=\kappa$, $U_E=U_L=w$. By reallocating funds, the agents can achieve a welfare improvement if $(1-\lambda)x > w$. The only agent who has resources to fund the project is the early investor. We analyze a game with the following sequence of moves.

At date 0, the financial intermediary decides whether to provide a credit guarantee κ and the early investor decides whether to buy an investment product at price w from the intermediary. If he invests, the intermediary lends w to the firm which promises to pay back $s(X)$ at date 2, where the promise is backed by the project. This means $s(L)=0$ and $s(H)$ is the payoff of the claim (e.g. trust loans) in the high state. In addition, the intermediary charges the firm a fee τ in terms of consumption goods (to be paid at date 2).

At date 1, since the early investor does not value consumption at date 2, he redeems and wants to get back w from the intermediary plus interest rate r which we normalize to $r=0$. The late investor can learn about the true value of the asset of the intermediary at costs γ and then decides whether to invest w . If the first investor is not paid back w at date 1 the intermediary goes bankrupt. If there is no bankruptcy at date 1, at date 2 the financial intermediary gets liquidated and the owners of claims obtain consumption goods according to the contracts.⁵

⁵ This model is an extension of Dang et al (2017). We use their basic model structure to analyze implicit guarantees, asymmetric perception of guarantees and the role of Chinese government in shadow banking.

An interpretation of what is going on in the model is the following. At date 0, a property developer needs cash to invest in a long term real estate project. A financial intermediary sells WMP to investors and lends the proceeds to the real estate developer. So the WMP is backed by a real estate loan which is backed by the real estate project. Figure 8a shows that 33.4% of the proceeds from WMPs are lent to risky borrowers as trust loans or non-standard credit assets. At date 1, the early investors need cash and redeem from the intermediary. WMPs typically have a maturity between three and six months. Since the fund is lent out, the intermediary needs to attract new investors. If the intermediary is not able to repay at date 1, the WMP defaults and the intermediary goes bankrupt and the initial investors cannot consume.

3.2. Bank-Centric Shadow Banking

In this section we analyze the game when there is no government. Our model captures four stylized facts of the WMP and trust loans industry.

Lemma 1

Suppose $w \leq (1 - \lambda)x$. The early investor buys a WMP if $\lambda(w - \kappa) \leq \gamma$.

Proof

We solve the game by backward induction. Suppose the firm obtains funding and issues a claim that pays $s(L)$ or $s(H)$ at date 2. Note, in state L the project is worthless and thus $s(L)=0$.

At date 1, the late investor decides whether to invest. If he invests w then he makes a loss of w in the low state. His expected loss is λw . Suppose the investor learns that the project is worthless, he does not invest w . So ex ante information helps him to avoid an expected loss of $\pi_L = \lambda \cdot \max[w - s(L), 0] + (1 - \lambda) \cdot \max[w - s(H), 0] = \lambda w$. See also Dang et al. (2015, 2015a) for a general characterization of π_L (information sensitivity). If the intermediary provides a credit guarantee of κ , the late investor gets back κ in the low state at date 2. The value of information (or the benefit of learning about the solvency of the intermediary) is $\lambda(w - \kappa)$ or $\pi_L - \lambda\kappa$. There are two cases.

Case 1: $\gamma \geq \pi_L - \lambda\kappa = \lambda(w - \kappa)$. The late investor does not acquire information since information cost is larger than the value of information. At date 1, the breakeven condition for the uninformed late investor is $\lambda\kappa + (1 - \lambda)s(H) = w$. So the firm has to offer $s(H) = (w - \lambda\kappa)/(1 - \lambda)$. The breakeven condition for the intermediary is $(1 - \lambda)\tau - \lambda\kappa = 0$. (Note, the intermediary pays κ to the investor in the low state and obtains a fee τ from the firm in the high state.) So the firm has to pay the intermediary a fee of at least $\tau = \lambda\kappa/(1 - \lambda)$. The total repayment by the firm in the high state is $s(H) + \tau = w/(1 - \lambda)$. The firm is able to deliver the two promises if $x \geq w/(1 - \lambda)$ (i.e. the project has positive NPV, $E[X] - w = (1 - \lambda)x - w \geq 0$). In such a case, the late investor invests w at date 1. At date 0, the early investor anticipates that the late investor is going to refinance so that he can withdraw w at date 1. Therefore, the early investor buys the investment product for price w and the firm gets funding to implement the project at date 0.

Case 2: $\gamma < \pi_L - \lambda\kappa$. The best response of the late investor is to acquire information since the value of information is larger than information cost. If he learns that the project is worthless, he invests at most κ at date 1.⁶ Therefore, the early investor (who only values consumption at date 1) can withdraw at most κ . So he does not buy the trust product and there is no funding for the firm. *QED*

Lemma 1 shows that investors buy a WMP if the information sensitivity of the backing loans net credit guarantee of the intermediary is smaller than a critical value γ . Conversely, risky projects with $\pi_L > \gamma + \lambda\kappa$ will not be financed, all else equal. Loosely speaking, we interpret π_L as a measure of “suspicion”. If π_L is larger than a threshold value γ then investors have more reason to become concerned about how safe their investments would be.⁷ The model also encompasses the special case ($\gamma = 0$) where investors only invests if the product is riskless. In such a case this

⁶ Note, the incentive of the late investor to learn is not weakened by a high payment $s(H)$ since information acquisition is driven by the incentive to avoid a loss in the low state. If he learns that the state is high, he will buy it and make a (higher) profit but this does not deter him from learning about the low payoff state. Dang et al (2015a) formalize this intuition.

⁷ Generally speaking, we use information acquisition as a metaphor for becoming suspicious about a financial product that is supposed to be “safe”. If a product is information insensitive, then the value of information is zero.

requires the intermediary to provide full guarantee ($\kappa = w$) for funding to occur. Our model is more general in that it allows for rollover risks.

The model captures two stylized facts in the Chinese WMP and trust industry: (1) Buyers of WMPs expect their investment to be redeemable at par value (i.e. information insensitive). Appendix provides two illustrative cases. (2) Some WMP are information sensitive because the underlying loans are risky. If $\pi_L > \gamma$ investors will not buy them without sufficient credit guarantees.

Now we compare the ability of banks and trust companies to raise funds. A unique feature of the (regular) banking system in China is that it had no formal deposit insurance before 2015. Despite the lack of a deposit insurance system, banks are widely perceived as risk-free institutions because they have the central bank as (implicit) liquidity backstop. In contrast, other financial institutions, such as trust companies, are much smaller, less well-known, and carry less credibility with the public. Formally, we consider a possible cooperation between a trust company and a bank and call it the (joint) financial intermediary. Investors believe that the bank provides a guarantee of κ^{Bank} and the trust company provides κ^{Trust} .⁸

Proposition 1

Suppose $w < (1 - \lambda)x$, $\kappa^{Trust} < w - \frac{\gamma}{\lambda}$, and $\kappa^{Bank} \geq w - \frac{\gamma}{\lambda} - \kappa^{Trust}$. A cooperation between a trust company and a bank is welfare improving.

Proof

By Lemma 1, the early investor does not buy the WMP from the trust company as the sole intermediary if $\gamma < \lambda(w - \kappa^{Trust})$ or $\kappa^{Trust} < w - \frac{\gamma}{\lambda}$. The firm cannot conduct the project. If the trust company cooperates with the bank then the value of information is $\lambda(w - \kappa^{Trust} - \kappa^{Bank})$. Since $\lambda(w - \kappa^{Trust} - \kappa^{Bank}) \leq \gamma$, the late investors deposits, the early investor buys the WMP

⁸ Although investors' beliefs are not directly observable, anecdotal evidence about investors' beliefs suggests that κ^{Trust} is considered as small while κ^{Bank} is large.

and the firm obtains funding to conduct the project by Lemma 1. The welfare gain is the positive NPV of the project, i.e. $(1 - \lambda)x - w$. ***QED***

Proposition 2

The maximum fee the bank and trust company (as the joint intermediary) can charge the firm is

$$\tau_{Max} = x - \frac{w}{1-\lambda} + \frac{\lambda}{1-\lambda} (\kappa^{Bank} + \kappa^{Trust}) \text{ with } \kappa^{Bank} + \kappa^{Trust} \leq w.$$

Proof

The maximum fee the intermediary (bank and trust together) can charge the firm is $\tau = x - s(H)$. Lemma 1 shows for the late investor to break even, $s(H) = \frac{w - \lambda\kappa}{1-\lambda}$ where $\kappa = \kappa^{Bank} + \kappa^{Trust}$. So $\tau = x - \frac{1}{1-\lambda} (w - \lambda(\kappa^{Bank} + \kappa^{Trust}))$ is the maximum fee that the bank and trust can charge and share. ***QED***

Proposition 2 has an intuitive interpretation. Consider the special case in which the intermediary provides full credit guarantee ($\kappa^{Bank} + \kappa^{Trust} = w$) then the maximum fee the intermediary can charge (net paying back the investor) is $\tau = x - w$. In that case the investor obtains a safe product. In the low state the intermediary pays w . In the high state the firm pays the investor w and the intermediary captures the rest $x - w$. The breakeven condition for the intermediary is $\tau = \frac{\lambda\kappa}{1-\lambda} = \frac{\lambda w}{1-\lambda}$ (Lemma 1). If $\tau > \frac{\lambda w}{1-\lambda}$, the intermediary makes a positive expected profit.

Corollary 2.1

A mean reserving spread of project risks increases the ex post fee τ_{Max} that the financial intermediary can obtain.

Proof

Consider a project with fixed NPV $= (1 - \lambda)x - w > 0$. Suppose $Z \equiv (1 - \lambda)x$ is constant. If default risk λ increases, then x increases by $x = \frac{Z}{1-\lambda}$ so as to keep Z or NPV fixed. So $\tau_{Max} = x - \frac{w}{1-\lambda} + \frac{\lambda}{1-\lambda} \kappa = \frac{Z}{1-\lambda} - \frac{w}{1-\lambda} + \frac{\lambda}{1-\lambda} \kappa = \frac{Z - w + \lambda\kappa}{1-\lambda}$. It is easy to see that $d\tau_{Max}/d\lambda > 0$ since

$Z - w > 0$. This means for projects with higher probability λ of default, the intermediary can charge higher fees. *QED*

Proposition 2 and Corollary 2.1 capture two further stylized facts in the Chinese WMP and trust industry. (3) In order to sell WPMs that are backed by risky loans, trust companies (and other shadow banking entities) cooperate with and rely on banks to provide (implicit or explicit) credit guarantees. (4) Intermediaries can charge higher (ex post) fees from firms for riskier projects.

3.3. Asymmetric Perception of Credit Guarantees

From a contractual perspective, banks have no legal obligation to bear any credit risks for most WMPs (see Figure 6). However, the extensive involvement of banks in structuring and distributing the products creates the perception that credit guarantees are provided. Since these guarantees are mostly non-contractual, it is built on the faith of banks' unconditional backstop. We formalize this as asymmetric perception of information sensitivity. Appendix provides two examples that illustrate asymmetric perception of credit guarantees. In this section we call the financial intermediary just the bank since investors typically buy WMPs from or through banks.

We denote the expected loss of the investor and bank as $\pi_L^{Investor}$ and π_L^{Bank} , respectively. So if a bank provides a credit guarantee of κ its expected loss is $\pi_L^{Bank} = \lambda\kappa$ and the expected loss of the (late) investor is $\pi_L^{Investor} = \lambda(w - \kappa)$. If $\kappa = w$, a bank provides a full credit guarantee, then investors obtain an information insensitive asset. But if the bank is not liable ($\kappa = 0$), then $\pi_L^{Investor} = \pi_L$ and investors become the risk bearers. Note, $\pi_L^{Bank} + \pi_L^{Investor} = \lambda w = \pi_L$.

Definition (Asymmetric perception)

Bank and investors have *asymmetric perception of information sensitivity* if $\pi_L^{Investor} + \pi_L^{Bank} < \pi_L$.

In more than 70% of cases banks are not legally liable ($\kappa = 0$) for default of a WMP, so de jure the expected loss of a bank is $\pi_L^{Bank} = 0$. If investor expects $\pi_L^{Investor} = \pi_L - \lambda\kappa$ where $\kappa > 0$ then there is asymmetric perception of information sensitivity since $\pi_L^{Investor} + \pi_L^{Bank} < \pi_L$.

Our definition of asymmetric perception is related to the notion of “agreeing to disagree” coined by Aumann (1976).⁹ In the literature on stock trading, Harris and Raviv (1993) and Pearson and Kendal (1995) among others show that differences of opinions (dogmatic beliefs) about fundamentals generate high trading volume in equity markets.¹⁰ Now we analyze the game with asymmetric perception of information sensitivity. We assume that the bank believes that it is liable for κ^B . On the other hand (early and late) investors believe that the credit guarantee is κ^I . So $\pi_L^{Bank} = \lambda\kappa^B$ and $\pi_L^{Investor} = \pi_L - \lambda\kappa^I$. There is asymmetric perception if $\kappa^I \neq \kappa^B$. In particular, if $\kappa^I > \kappa^B$, investors expect more credit guarantees than banks are willing to provide.

Proposition 3

Suppose $\kappa^I \geq w - \frac{\gamma}{\lambda} > \kappa^B$. Asymmetric perception about information sensitivity (or credit guarantee) is (i) welfare improving if $(1 - \lambda)x > w$; and (ii) welfare reducing if $(1 - \lambda)x < w$.

Proof

Suppose the bank offers a credit guarantee of κ^B . If bank and investor have consistent beliefs (i.e. $\kappa^I = \kappa^B$), then $\pi_L^{Investor} = \lambda w - \lambda\kappa^B > \gamma$, the early investor does not buy the investment product (by Lemma 1). If investor expects a credit guarantee of $\kappa^I > \kappa^B$ such that $\pi_L^{Investor} = \lambda w - \lambda\kappa^I \leq \gamma$, then the early investor buys the WMP and the firm obtains w to

⁹ Aumann (1976) actually shows that if information structures are common knowledge rational agents cannot agree to disagree. Even if agents start with different priors their beliefs converges to the same posterior beliefs in equilibrium. Agreeing to disagree in the applied literature typically means agents have inconsistent beliefs.

¹⁰ An interesting example is how two star hedge fund managers publicly agreed to disagree about the valuation of the company Herbalife and implicitly their ability to move prices in different directions. See “Herbalife Strengthens Ties With Icahn as Ackman War Rages” by Duane D. Stanford in a Bloomberg article on 3/24/2014. In Appendix we provide three prominent examples of asymmetric perception of information sensitivity in the Chinese and US shadow banking.

implement a project with positive NPV in case (i) and a negative NPV project in case (ii). The firm has a (weakly) dominant strategy to conduct the project if it gets funding. *QED*

Brunnermeier et al (2014) and Gilboa et al. (2014) provide welfare criteria to test whether trades based on biased beliefs are welfare increasing or decreasing. Proposition 3 provides an important class of trades where asymmetric perception or biased beliefs can be welfare increasing. A disagreement about the amount of (implicit) guarantee between investors and banks enables financially constrained firms to obtain funding. If these firms have positive NPV projects then shadow banking based on asymmetric perception of credit guarantee is welfare improving.

3.4. Implicit Guarantee and the Role of the Chinese Government

A consequence of asymmetric perception (or agreeing to disagree or biased beliefs) of credit guarantees is that it generates trades. If the underlying loan defaults then ex post one party is right and the other one wrong regarding the actual payment of guarantees. In China, the resolution of asymmetric perception has been in favor of investors so far. For example, in the “Credit Equals Gold No.1” case, although ICBC refused to bail out, the very first default of a WMP was avoided because an unnamed third party stepped in (see Appendix). It is an illustrative example of a shared bailout by bank and government. Anecdotal reports suggest that when a WMP was close to default, actual defaults were avoided by partial credit support of banks or regulators interventions by “calling” banks to repay their investors or by some other joint arrangements so as to avoid public protests.¹¹

Now we introduce the government into the model. So there are three types of agents who can share the tail risks, i.e. $\pi_L^{Investor} + \pi_L^{Bank} + \pi_L^{Government} = \pi_L$. How the government is to deal with asymmetric perception of information sensitivity between banks and investors and enforce

¹¹ Although less prevalent than in China, agreeing to disagree about implicit guarantees between investors and issuers is also a mechanism that underlies US shadow banking. Appendix discusses the case of Fannie Mae and Freddie Mac. Acharya, et al (2013) show that the market for asset backed commercial papers (ABCPs) also exhibits implicit guarantees. But there were several other cases where issuers refused to compensate investors because they were not legally liable. A notable example is the dispute about implicit guarantees between Sallie Krawcheck (then CEO of Citi Global Wealth Management) and Vikram Pandit (then CEO of Citigroup). See the Fortune article (9/22/2008), “Behind Sallie Krawcheck's exit from Citi” by Patricia Sellers.

implicit guarantees depend on the social preference (utility function) of the government. The government might have moral and fairness considerations as in Chassang and Zehnder (2014).

In their setting a principal (the government in our model) can transfer resources from an active agent (bank) to a passive agent (investor). The government observes realized payoffs to the bank and investor and possibly an imperfect signal of the bank's behavior. There is no ex ante formal contracting between the government and the bank. The government cares about both ex ante efficiency (funding of positive NPV projects) and ex post fairness. The imposed transfers give rise to an informal incentive scheme which in turn determines the bank's behavior.

For simplicity we assume that $\gamma = 0$. Investors only buy the WMP if $\kappa^B = w$. Suppose the bank's costs for providing a credit guarantee κ for a trust loan is $C(\kappa)$ with $C(\kappa) > \kappa$.¹² Suppose the bank offers κ^I . If the firm defaults (in the low state), the bank pays the guarantee κ^I . In the high state the bank obtains the fee τ . The bank makes an expected profit of $\Delta_B = (1 - \lambda)\tau - \lambda C(\kappa^I)$. The bank breaks even if $\lambda C(\kappa^I) = (1 - \lambda)\tau$. The investor suffers a loss of $\Delta_I = w - \kappa^I$ in the low state.

We assume that the government has a social preference with two components. Ex ante it prefers that a project with positive NPV is funded. Ex post the government has fairness considerations in that it cares more about the utility of investors. We assume that the government does not intervene if there is no default. If there is default, the government decides how much the bank should compensate the investor, i.e. the transfer from the bank to the (late) investor is T .

Lemma 2

Suppose $\lambda C(w) > (1 - \lambda)x - w > 0$. If the government chooses $T = \Delta_I$ with probability one in the low state, the bank does not offer the WMP.

¹² Note, $C(\kappa)$ can be interpreted as the actual costs of repayment in case of default plus the opportunity costs of providing a trust loans. The bank might have to put up more capital for a risky loan. If it lends to an SEO, the loan is basically safe so capital requirement is lower and the bank can lend more. Therefore, we assume $C(\kappa) > \kappa$.

Proof

$T = \Delta_l$ means that in the low state the bank always pays w to the investor. The maximum fee the bank can obtain is $\tau = x - \frac{w}{1-\lambda}$. The cost of providing actual credit guarantee is $C(w) > w$ (see footnote 15). If expected cost $\lambda C(w)$ is larger than the expected fee $(1-\lambda)(x - \frac{w}{1-\lambda})$ then the bank does not offer the trust product. ***QED***

Lemma 2 shows that if the government always asks the bank to fully repay the investor in the low state, then the bank does not offer the WMP. Since the government cares about ex ante investment efficiency, it must either provide some subsidy or randomize its “punishment” strategy. Under the maximum fee, the maximum credit guarantee the bank is willing to provide is κ_{Max}^I such that $(1-\lambda)(x - \frac{w}{1-\lambda}) - \lambda C(\kappa_{Max}^I) = 0$. If the government provides a subsidy of $\kappa^G = w - \kappa_{Max}^I$, the bank offers the WMP and investor buys.

Proposition 4

Suppose $\lambda C(w) > (1-\lambda)x - w > 0$, $\kappa^G = w - \kappa^I$, and $q = \frac{-\Delta_B(\kappa^I)}{\Delta_B(w) - \Delta_B(\kappa^I)}$. In the low state, if the government chooses $T = \Delta_l$ with probability q and offers a subsidy κ^G with probability $1-q$, then the bank offers an investment product and investors buy.

Proof

In the low state, with probability q the bank makes an expected loss of $\Delta_B(w) = (1-\lambda)\tau - \lambda C(w)$. With probability $1-q$ the bank makes an expected profit of $\Delta_B(\kappa^I) = (1-\lambda)\tau - \lambda C(\kappa^I)$. The bank breaks even if $q\Delta_B(w) + (1-q)\Delta_B(\kappa^I) = 0$, i.e. $q = \frac{-\Delta_B(\kappa^I)}{\Delta_B(w) - \Delta_B(\kappa^I)}$. Since the subsidy is $\kappa^G = w - \kappa^I$ the bank breaks even and investor always obtains w and thus buy. ***QED***

Proposition 4 captures a typical feature of a shared bailout in Chinese shadow banking. Normally, it is not disclosed to the public how the investors are repaid if there is a default. Lemma 2 shows that if the government publicly announces that the bank always need to bailout then banks might stop issuing WMPs and there is no funding for risky projects. If the government knows that the project (always) has positive NPV then it will always bailout. Section 4.3 discusses moral hazard issues.

4. Discussion

This paper employs the concept of information sensitivity by Dang et al. (2015, 2015a) to model implicit credit guarantee, asymmetric perception of credit guarantee and the role of the government in Chinese shadow banking.¹³ In this section we provide a conceptual comparison of implicit guarantees with securitization and asymmetric perception of guarantees and risks with the notion of neglected risks and discuss moral hazard issues.

4.1. Securitization

Since WMPs have a simple structure, tail risks are only shared between the bank and investors. There is no tranching. Therefore, implicit guarantee is an important feature of the system. Another solution to share tail risks and create “safe” assets is securitization. Through financial design, such as tranching and over-collateralization, securitization vehicles (i.e. shadow banks) can distribute tail risks more efficiently to investors. Investors looking for low information sensitive investments purchase the senior tranche while more risk tolerant investors buy the junior tranche or residual equity part. Formally, there are different types of investors who can share tail risks, i.e. $\pi_L^{SeniorInvestor} + \pi_L^{JuniorInvestor} + \pi_L^{Bank} = \pi_L$.¹⁴ We can interpret this equation as a

¹³ Dang et al. (2015) provide a micro-foundation for the optimality of debt-on-debt and a theory of financial crises. Dang et al. (2015a) provide a full characterization of information sensitivity and show when this measure is a sufficient statistic in portfolio theory. Dang et al. (2017) analyse when banks dominate capital markets and how firms endogenously seek bank or market finance and discuss optimal bank portfolios. Dang et al. (2019) summarize the accumulating empirical evidences for this view.

¹⁴ In addition, ABS insurers (such as Monoline insurers) provided further credit insurance. However, most private ABS insurers went bankrupt during the financial crisis. The European Central Bank and Bank of England (2014) call for a revival of a market for prudently designed asset backed securities (ABS).

representation of the US securitization model. Because of financial engineering, $\pi_L^{SeniorInvestor}$ is small (Dang et al., 2015a). In contrast, Chinese shadow banking is characterized by $\pi_L^{Investor} + \pi_L^{Bank} + \pi_L^{Government} = \pi_L$. Because of implicit guarantees, $\pi_L^{Investor}$ is small.

Our model complements Gennaioli et al. (2013) who provide a model of US shadow banking. They analyze a banking model with loan securitization and show that securitization allows banks to diversify idiosyncratic risks while concentrating their exposure to systematic risk. This process enables them to expand their balance sheets by funding trades with riskless debt. Under rational expectations securitization is welfare improving but the system becomes fragile when agents neglect tail risks. We show that asymmetric perception of credit guarantees can also be welfare improving but the system might become fragile when the government scales back its role to enforce implicit guarantees or even forbid to honor implicit guarantees.

4.2. Asymmetric Perception of Information Sensitivity versus Neglected Risks

Our notion of asymmetric perception of implicit guarantees and information sensitivity is related to the notion of neglected risks in Gennaioli et al (2012). They assume that both investors and financial intermediaries neglect risks. In the terminology of our framework, $\pi_L^{Investor} + \pi_L^{Bank} < \pi_L$, i.e. the perceived information sensitivity is smaller than the true information sensitivity π_L . So risks are neglected. This is mathematically isomorphic to our definition of asymmetric perception of information sensitivity. Yet conceptually, we think that shadow banking in China is different from US shadow banking. Banks selling WMPs are aware of the default risks so they are not surprised as Gennaioli et al (2012) since these products are simple financial products. Second, Chinese investors' demand is driven by their beliefs that banks will bail out these products in case of default. Rather than neglecting risks, investors assert that banks will (be "asked" to) honor implicit guarantees.¹⁵

The concept of information sensitivity provides a unified theoretical approach to model securitization, implicit guarantees, asymmetric perception of implicit guarantees and neglected

¹⁵ Another important difference is that retail investors are the main buyers of shadow banking products and they are not traded in secondary markets or used as collateral in funding markets.

risks. This framework is tractable and can be employed to analyze other issues, such as the dynamics of a financial crisis. Loosely speaking, the failure of Lehman Brothers dramatically altered the perception of implicit guarantees that big banks were “too-big-too-fail”. In our terminology, $\pi_L^{Government}$, the expected loss guaranteed by the government in the equation $\pi_L^{Investor} + \pi_L^{Bank} + \pi_L^{Government} = \pi_L$ is smaller than expected. In addition, the onset of a financial crisis exacerbated investors’ concerns that issuers were not capable to honor implicit guarantees even if they wanted to do so (i.e. κ^B is smaller than expected). These changes in beliefs constitute a channel that makes outstanding securities with low information sensitivity to become information sensitive, i.e. $\pi_L^{Investor}$ is larger than expected.¹⁶

4.3. Moral Hazard, Implicit Guarantee and the Government

We do not explicitly analyze potential moral hazard issues in our model. When banks need to actively screen and monitor projects, government subsidies (or shared bailout) could weaken the incentives of banks to invest in costly monitoring so that projects with negative NPV might be funded. It is interesting to add these features to the model in which banks might have incentives to make socially inefficient actions. Chassang and Zehnder (2016) show that if the government places higher weight on ex post fairness than ex ante fairness transfer only depends on the payoff of the bank and the investor, while ignoring other information. Transfer from bank to investor at most compensates for realized inequality. In contrast, if the government cares relative more about ex ante fairness, transfers depend both on the payoff outcomes as well as on the government beliefs over the bank’s behavior. Also, transfers would depend on the expected profit of the bank. A formal analysis can yield interesting and potentially testable implications but it is beyond the scope of this paper.

We briefly discuss some Chinese specific issues regarding moral hazard concerns. One reason for the government to establish formal deposit insurance in 2015 is to have the option to let a bank fail without having (small) depositors losing their savings. So if banks engage in excessive risk taking activities then the government can allow for bankruptcy. Since depositors are insured

¹⁶ Dang et al. (2015) derive another mechanism and show how a change in macroeconomic fundamentals makes information insensitive securities information sensitive and thus causes a collapse of trade in funding markets.

this reduce the probability of a run on the whole banking system. Recent announcements suggest that the government is also moving into this direction regarding shadow banking activities. Investors of WMPs are to be told that these products can default. In order to obtain higher returns they have to bear more risks. Implicit guarantee can be provided until 2020 according to recent regulation.

5. Concluding Remarks

Shadow banking is an integral part of financial transformation in China. The rapid rise of Chinese shadow banking since 2008 has brought profound changes to how credit is priced and allocated in the economy as well as expedited the process of interest rate liberalization. Wealth management products increase the investment opportunities for investors while trust loans and entrusted loans help meet the credit demand of borrowers who have limited access to bank loans or capital markets. An important question is whether the structure and growth of Chinese shadow banking are similar to the US counterpart and thus subject to the same risks and vulnerability.

This paper provides a unified theoretical framework based on the concept of information sensitivity by Dang et al. (2015, 2015a) to show that the Chinese and US shadow banking systems are driven by different mechanisms and operate on different platforms. The US shadow banking system is a market-based system and relies on financial engineering to reduce funding costs for firms and create safe assets for investors. Its rise since the 1980s has been a transformative process of the US financial system. Only the financial crisis in 2007/08 revealed the vulnerability of this sector to runs and its impact on the whole financial system.

As an alternative shadow banking mode, the Chinese system is bank-centric and relies on implicit guarantees by banks as well as an intervening government. The rise of Chinese shadow banking is also a transformative process. An important question is how Chinese shadow banking will evolve. Shadow banking is likely to remain stable as long as the Chinese government is willing to provide backstops. However, the transition towards a more market based system with less heavy reliance on implicit guarantees and where risks are adequately priced is possibly desirable. Yet it is a delicate transition since the perception of implicit guarantees is endogenous

and constitutes an adaptive process that can trigger runs and contagious panic in different parts of the financial system if implemented in an abrupt manner.¹⁷

From the perspective of overall economic and financial reforms, Chinese shadow banking can be regarded as a typical path of “managed capitalism” that China took in the last 40 or so years. Shadow banking is consistent with China’s dual-track reform approach. While maintaining stability and tight control over the regular banking system, shadow banking is a parallel system that is more driven by market forces. The approach of adaptive informal institutions and gradual endogenous institutional changes (Tsai, 2006) that has transformed China from one of the poorest countries to a leading economy in the world is unique and thus challenges some existing economic theories and western conventional wisdom of market driven economic growth. Brunnermeier et al (2017, 2018) argue that a gradualistic approach allowed the Chinese government to learn how the economy reacts to small policy changes, and to adjust its reforms before implementing them in full. With more developed financial markets, however, private actors may front-run future policy changes, making it impossible to implement policies gradually.

Given the different nature of the Chinese system, policy implications for reforming and regulating US shadow banking might not be necessarily applicable to Chinese shadow banking.¹⁸ More theoretical and empirical research about the financial system in China is needed so as to provide a better understanding of the financial transformation process and guidance for ongoing reforms. This is important since China is an important player in the global financial system.

¹⁷ When the PBOC announced to tighten liquidity (backstop) in June 2013, the repo and other short term rates increased to almost 14% which caused a panic in interbank lending markets. Bai et al (2017) analyse the impact of liquidity dry-up in the interbank market on bank lending behaviour and the stock markets.

¹⁸ Dang et al. (2019) provide an analogous argument that insights from stock market research are not useful for understanding debt funding markets as they fundamentally differ and serve diametrically different purposes.

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Appendix

Examples of Asymmetric Perception of Information Sensitivity

Example 1 (“Credit Equals Gold No.1”)

China Credit Trust raised RMB 3 billion through a trust product called “Credit Equals Gold No.1” in 2011, which was sold to around 700 high net worth investors through the private banking arm of Industrial and Commercial Bank of China (ICBC). Most investors believed they were buying something with an implicit guarantee from the bank. There is anecdotal evidence that local bank branch managers told investors that the product was safe. The funds raised by the trust product were channelled to Zhenfu Energy company for new projects in coal mining industry in the Shanxi province and the product promised investors a yield of 10 per cent in the next three years. However, in the end of 2013, it became clear that the Zhenfu could not pay 3 billion back to the trust company due to deteriorating profits in the coal mining industry. The market became nervous when ICBC refused to bail out. Under this intense glare, the China Credit Trust announced at the last minute that it had reached an agreement with an unnamed third party to buy its shares in Zhenfu so that investors could be offered a deal to recoup their principle but not the remainder of their third year’s interest payment. With the product yielding 10 per cent in the first two years, only three per cent interest was paid in the final year.

Example 2 (YuE Bao)

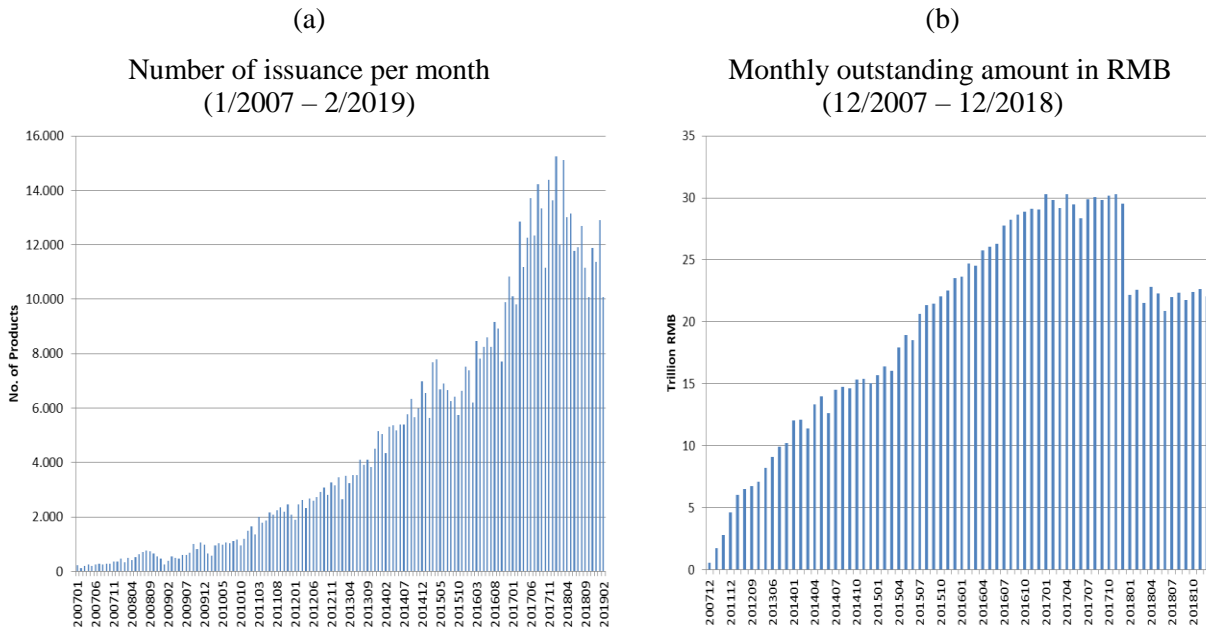
Before the internet giant Alibaba entered the money market funds (MMF) business in June 2013, the Chinese MMF sector was small and did not attract many retail investors. After Alibaba acquired about 51% of the MMF provider Tian Hong and offered saving products through YuE Bao. These products are de facto MMF or WMPs distributed via the internet. The proceeds from YuE Bao are mainly invested in interbank markets and negotiated deposits with banks, whose yields are usually benchmarked to interbank market interest rates. Relatively tight liquidity conditions in the second half of 2013 provided the ideal timing for the advent of YuE Bao, as money market interest rates increased sharply, while bank deposit rates were kept low by the deposit rate ceiling. YuE Bao’ total asset under management reached 500 billion RMB by the

end of February 2014. In 2018 YuE Bao was the world largest MMF with more than 160 billion USD asset under management, larger than JP Morgan Prime Money Market Fund. Since then its growth is capped by regulation. Our theory suggests that the rapid rise of YuE Bao is driven by the perception that these investments pay high interest and are safe. Since Chinese consumers and investors are familiar with Alibaba and its online market place, they implicitly assume that, in the case of default, Alibaba will bail out the failed investments products because of reputational concerns. Furthermore, investors have information about the financial strength of Alibaba that it is able to rescue any failed product although legally Alibaba does not provide any credit guarantees.

Example 3 (Agency MBS)

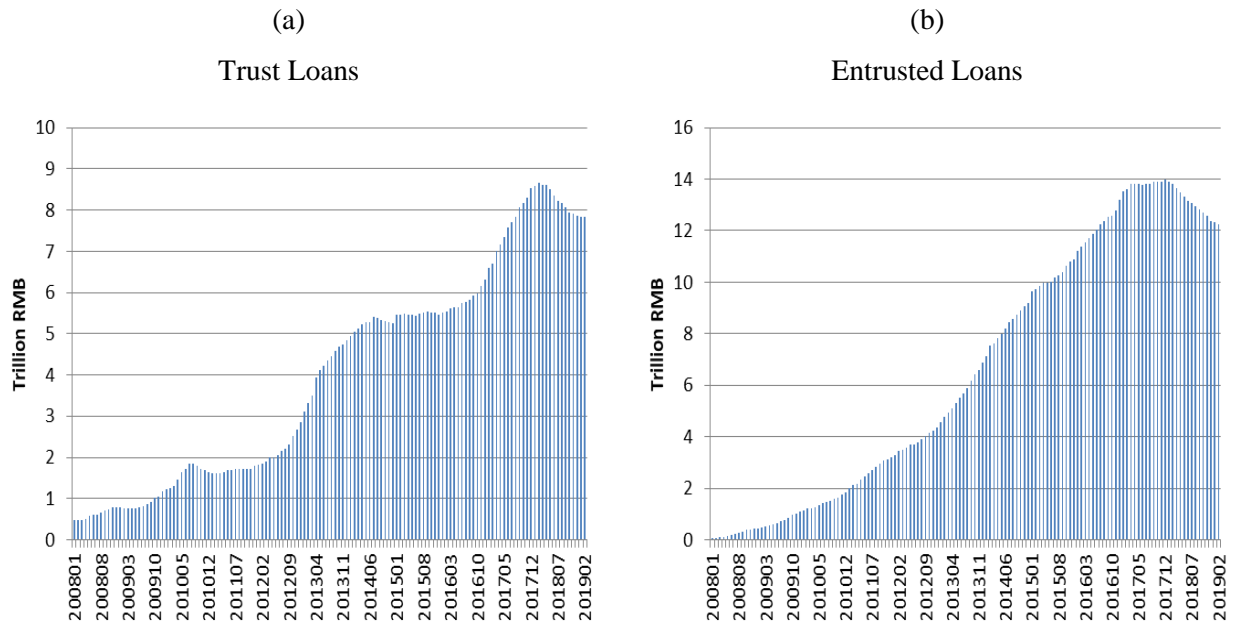
Ginnie Mae is the only mortgage-backed securities (MBS) issuer with explicit government guarantee. There were no explicit guarantees for Fannie Mae and Freddie Mac before the financial crisis, but Agency MBS investors seemed to have implicitly assumed this and were right ex post when the US government bailed out Fannie and Freddie. When the losses of Fannie and Freddie accelerated as housing prices continued to decline, the US government took both enterprises into conservatorship in early September 2008 and provided explicit guarantees so as to avoid a collapse of the primary and secondary Agency MBS markets (FHFA, 2008). After the financial crisis, the private sector of MBS issuance basically disappeared which suggests that investors looking for information insensitive products do not believe that private labeled MBSs are information insensitive.

Figure 1: Bank-Sponsored WMPs



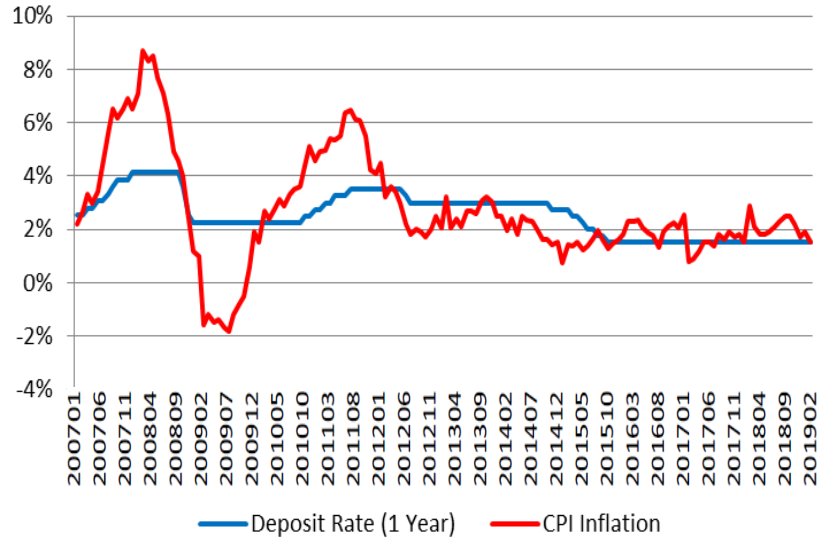
Source: Wind, chinawealth.com.cn

Figure 2: Monthly Outstanding Amount of Shadow Loans (1/2008 – 2/2019)



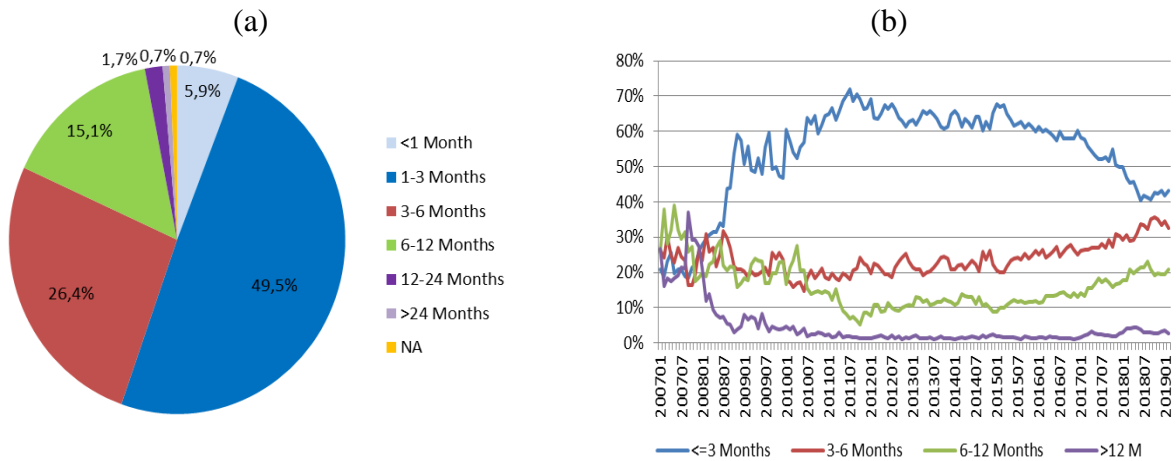
Source: Wind, People's Bank of China

Figure 3: Bank Deposit Rate and Inflation (1/2007 – 2/2019)



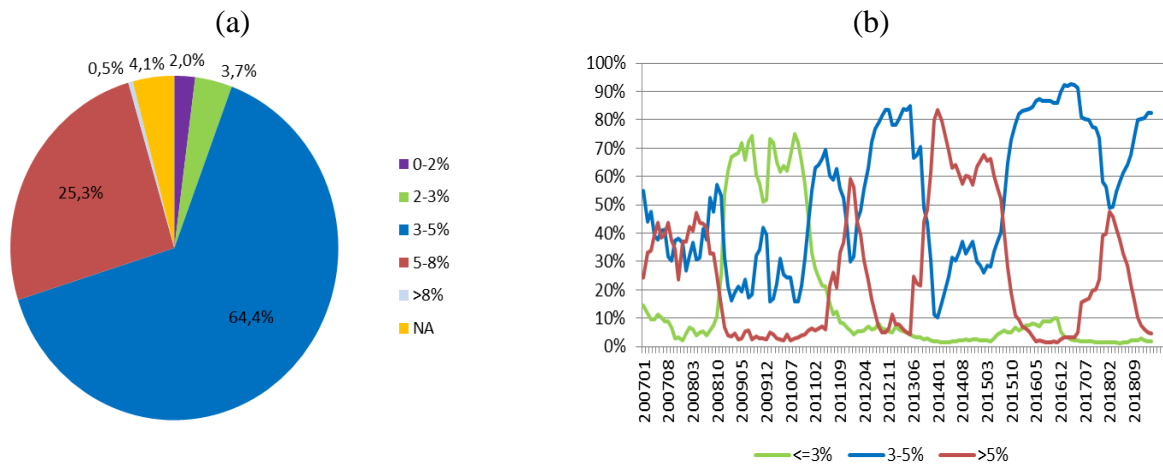
Source: Wind, People's Bank of China

Figure 4: Maturity of WMPs (1/2007 – 2/2019)



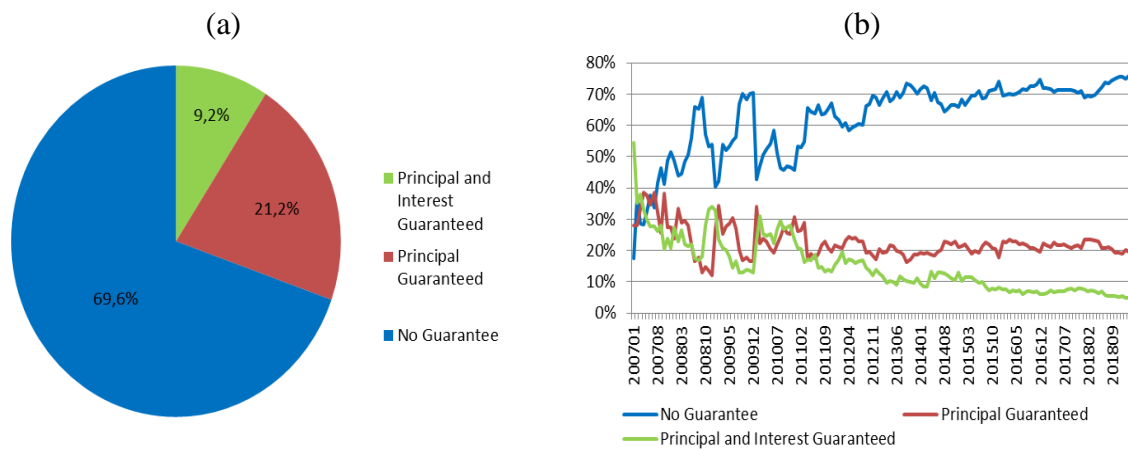
Source: Wind, chinawealth.com.cn

Figure 5: Yield of WMPs (1/2007 – 2/2019)



Source: Wind, chinawealth.com.cn

Figure 6: Guarantee of WMPs (1/2007 – 2/2019)



Source: Wind, chinawealth.com.cn

Figure 7: Outstanding Amount of WMPs by Issuer Type (1/2015 – 12/2018)

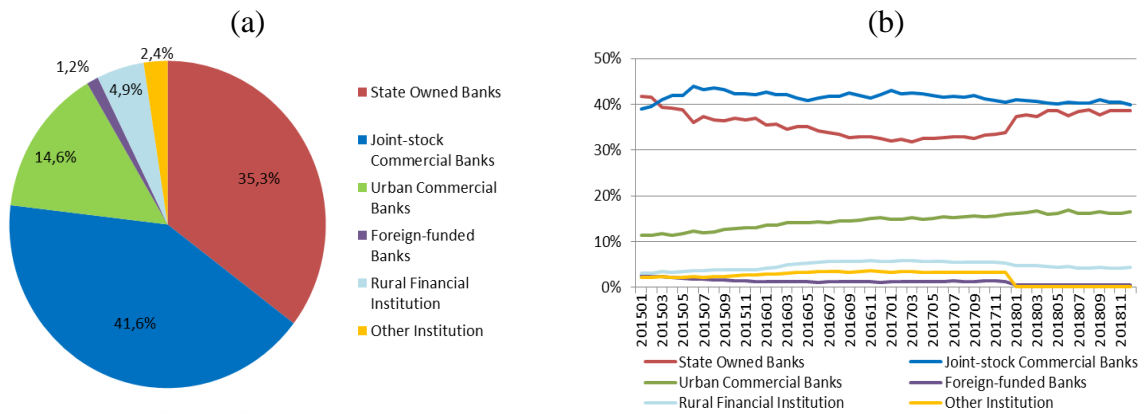


Figure 8: Asset Composition of WMPs (1/2015 – 5/2018)

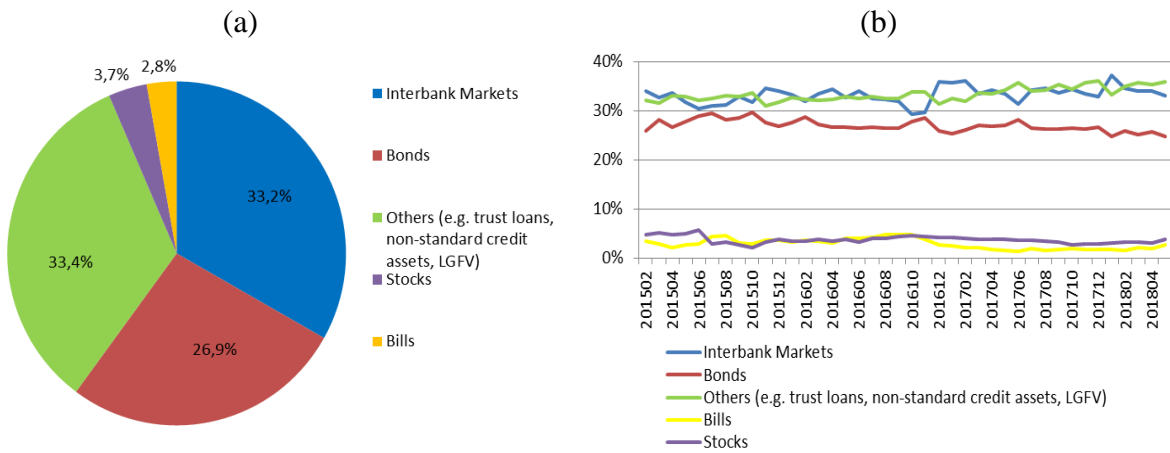
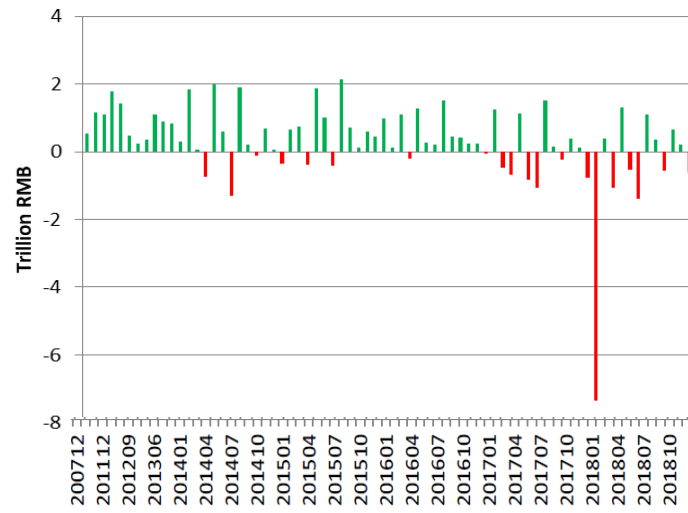
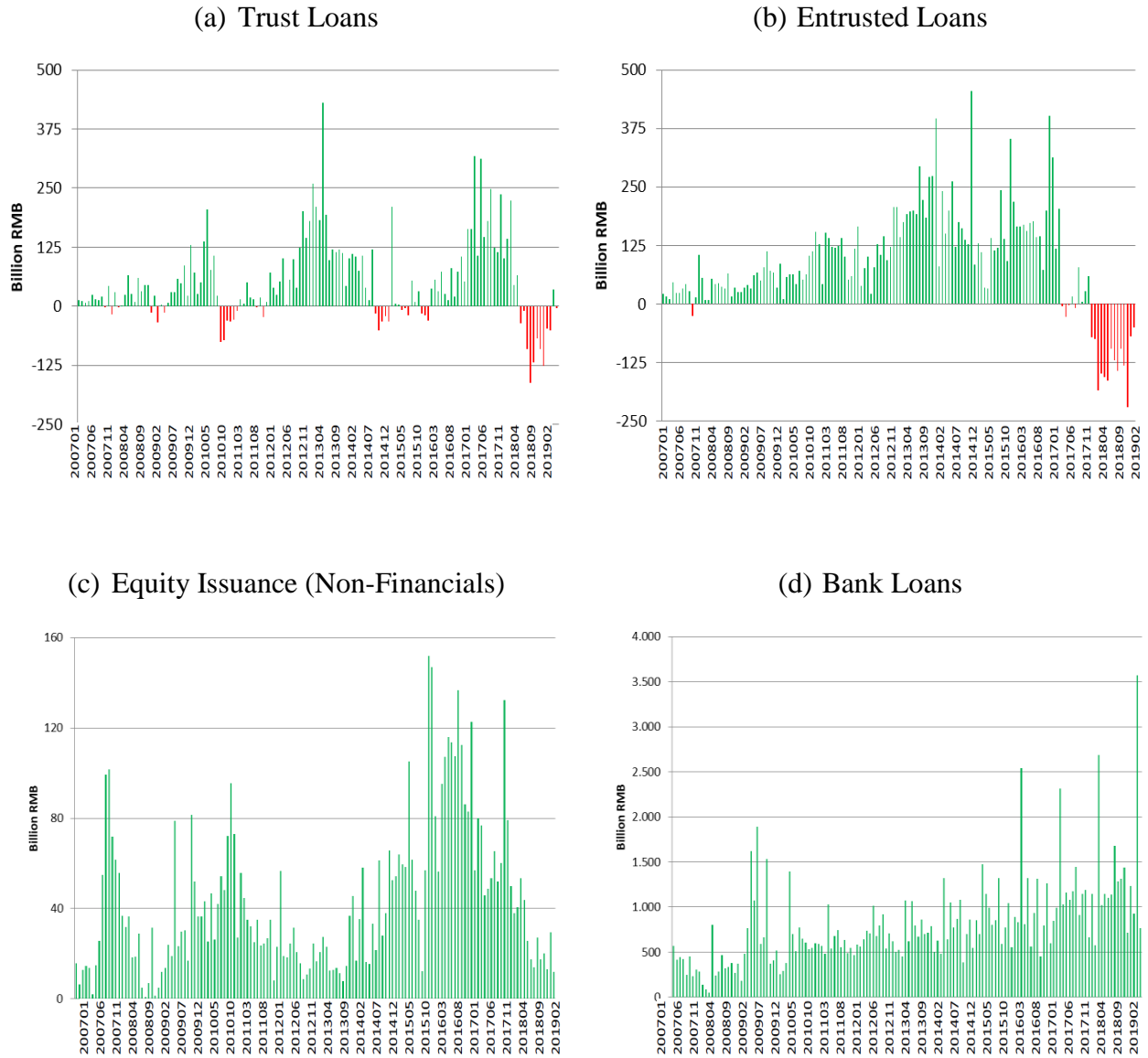


Figure 9: Net Issuance of WMPs (12/2007 – 12/2018)



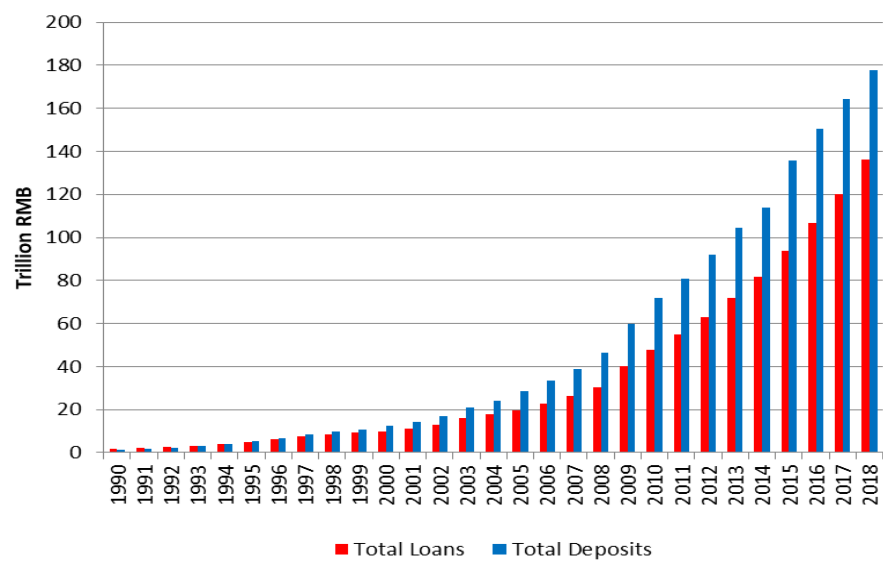
Source: Wind, chinawealth.com

Figure 10: Net Aggregate Financing to Real Economy (1/2007 – 2/2019)



Source: Wind, People's Bank of China

Figure 11: Deposits and Loans of all Financial Institutions (1990 – 2018)



Source: Wind, People's Bank of China