Shadow Banking Modes: The Chinese versus US System*

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Abstract

In this paper we provide a theoretical analysis of the rapid growth of Chinese shadow banking since 2008 and compare it to the rise of the US system in the 1980s. We show that the two systems are based on different mechanisms (implicit guarantees in China versus financial engineering in the US) and operate on different platforms (banks versus capital markets). Our model highlights why Chinese shadow banking is bank-centric and driven by asymmetric perception of implicit guarantees. In addition, we discuss the role of the Chinese government and welfare implications and formalize the conceptual differences between implicit guarantees and securitization as well as asymmetric perception of implicit guarantees and neglected risks.

JEL Classification Codes: E51, G21, G23, P51

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1. Introduction

The rapid emergence of the Chinese economy over the past three decades has been one of the most significant economic developments since the Industrial Revolution (Eichengreen et al, 2011). Over this period, the Chinese economy has grown at an annual average rate of around 10 percent, enabling it to catch up with the US as one of the two largest economies in the world. China is also the world's largest trading nation and a major force in the global financial markets, commanding foreign exchange reserves of almost USD$4 trillion in 2014. Domestically, this rapid economic expansion has brought profound changes to the society and led to enormous wealth accumulation in the private sector. China has the fastest growing middle class (Allianz, 2014) and in terms of private wealth and millionaire households it is ranked second in the world (Boston Consulting Group, 2014).

Despite this remarkable economic achievement, development in China's financial system has lagged behind. Not only does the system lack diversity as resources are concentrated in a small number of state-owned banks, but tight regulation has created distortions in the economy and political influence on state-owned banks has led to a bias in credit allocation towards state-owned enterprises (Song et al, 2009). Though such a command system might work well in the early stages of economic development, a heavily regulated financial system has constrained economic transformation in recent years and created imbalances both domestically and internationally. This has forced the Chinese authorities to speed up the pace of financial reforms.

In this paper we provide a theoretical analysis of one of the key phenomena of financial transformation, namely the rapid rise of shadow banking since 2008. Loosely defined as credit intermediation outside the formal banking system, shadow banking activities in China have experienced rapid growth since the global financial crisis. The two most important categories of shadow banking products are wealth management products (WMPs) and trust products. WMPs are typically structured and sold by banks as savings products but are recorded off banks' balance sheets, and hence, not subject to the deposit regulation. The funds raised by WMPs are mainly invested in interbank lending markets and bond markets. Trust products are structured by non-bank financial institutions like trusts, brokers and security firms. These entities typically need to cooperate with banks in reaching out to individuals or corporate savers. Funds raised by

trust products are channelled to riskier borrowers (e.g. property developers, mining companies and local government financing vehicles) as trust loans. The share of non-bank credit lending such as trust loans and entrusted loans surged from less than 10% of the system in 2008 to almost 40% in 2013.[1]

The rapid growth of Chinese shadow banking from 2008 to 2014 was driven by a number of structural and factors. Interest rate controls on bank deposits have created financial repression in the economy. Given high inflation rates, the desire for higher-return investments has created strong demand for products like WMPs and trust products, whose yields are unconstrained by the deposit rate ceiling. On the lending side, credit and macro-prudential regulation limits banks' lending capacity and biases their credit allocation towards state-owned enterprises. To fulfil the financing needs of credit-constrained borrowers, banks cooperate with shadow-banking entities to conduct credit intermediation off-balance sheet. Circumventing regulation has played a critical role in propelling the rise of shadow banking in China.

When we compare Chinese and US shadow banking there are similarities. The growth of the US money market funds (MMFs) industry in the 1970s was also driven by 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). On the lending side, trust loans in China and securitization in the US enables risky borrowers with limited access to traditional bank credits to obtain funding (Brandlee, 2011). For example, subprime borrowers obtain mortgages at affordable rates in the US while property developers obtain trust loans in China. Furthermore, these activities are implicitly endorsed by financial deregulation in 1980s which enabled banks to use these innovations to expand lending off-balance sheet. This is similar in China.

An important question is whether the growth and structure of the Chinese shadow banking system follow the US counterpart and are thus subject to the same risks and vulnerability. In this paper we argue that there are fundamental differences between Chinese and US shadow banking. In China, shadow banking relies on traditional banks to perform many basic functions of credit

[1] For institutional details and historical background see Li and Hsu (2013), Schwarcz (2013) and Dang at el. (2014a).

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 have provided 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. Furthermore, MMFs 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.

The other key difference concerns how the two shadow banking systems seek to create "safe" assets that offer higher yields than demand deposits and government bonds. MMFs and senior tranches of securitized products are financial innovations that are considered as "safe" because of financial design and engineering (Gorton and Metrick, 2012). In contrast, Chinese shadow banking products are relatively simple in structure. Chinese investors perceive WMPs and trust products 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 (implicit) guarantees by banks and enforcement by the government in the case of default since the big four commercial banks which are key players in shadow banking, are majority government-owned.

In this paper we employ a unified theoretical framework based on the concept of information sensitivity by Dang et al (2013, 2013a) to model the two shadow banking modes and explore the structural differences rigorously. The theoretical analysis focuses on three interrelated questions. Why is Chinese shadow banking a bank-centric system? How does it create "safe" assets? 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.

The remainder of the paper is organized as follows. The next section provides the institutional background of shadow banking in China. Section 3 provides a theoretical analysis. Section 4 discusses extensions of the model and the contribution to the banking literature. Section 5 concludes.

2. Institutional Background

The rapid rise of shadow banking since 2008 has been a major part of the financial transformation and liberalization in China in recent years. This section provides an overview of the Chinese shadow banking industry and discusses the supply and demand side drivers of shadow banking as well as regulatory endorsement of these activities.

2.1. An Overview of China's Shadow Banking Industry

The Financial Stability Board (FSB) defines shadow banking as a system of credit intermediation that involves entities and activities outside the regular banking system (FSB, 2013). Applying this definition, Chinese shadow banking can be classified into three broad classes based on organization structures. The first class involves banks as a direct intermediary, where wealth management products (WMPs) sold by banks or subsidiaries of banks are the main component. Despite their direct involvement, these activities are recorded off banks' balance sheets, and hence, are not subject to the deposit regulation. The lion's share of funds raised by WMPs is invested in interbank lending, bond markets, and even stock market. .

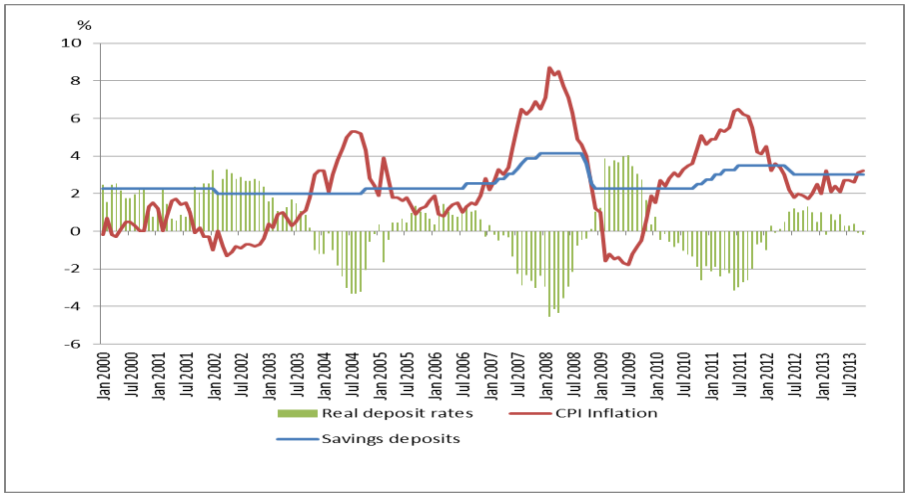
The second class of activities consists of credit intermediation conducted by non-bank financial institutions like trusts, brokers, insurance companies, and security firms. These entities can raise funds directly from investors, but most of them need to cooperate with banks in reaching out to individuals or corporate savers. The funds are typically lent to riskier borrowers, such as property developers, mining companies and local government financing vehicles. Prime examples are trust products where funds from investors are channelled to borrowers as trust loans. Banks can also play a pure intermediating role for bridging credit between two non-bank entities. An entrusted loan, for example, is when one corporate (or individual) lends to another with a bank serving as a middleman. The entrusted loan market has grown substantially in recent years, as the interest rate differential between the banking and shadow banking systems widened. Some SOEs, who can borrow cheaply from banks, have incentives to lend excess funding to others in shadow-banking markets to arbitrage the interest rate difference.

The last class of activities comprises re-lending activities by firms without banks as middlemen, lending by micro lenders, pawn shoppers, and the underground black market.[2] This is the most opaque segment of the shadow banking system.[3]

2.2. Supply and Demand Side Drivers of Chinese Shadow Banking

Despite substantial progress in financial liberalization, China's banking system is still subject to significant regulations. The deposit rate ceiling, in particular, has depressed interest rates in the economy and created financial repression. Therefore, real interest rates have been either negatives or close-to-zero in recent years except 2009 (Figure 1). Savers had started to move deposits out of banks. To limit the deposit outflows, banks needed an instrument for which they can offer higher interest rates to maintain their funding base.

Figure 1: Deposit Rates and Inflation in China



Source: CEIC

WMPs were partly created for this purpose. 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

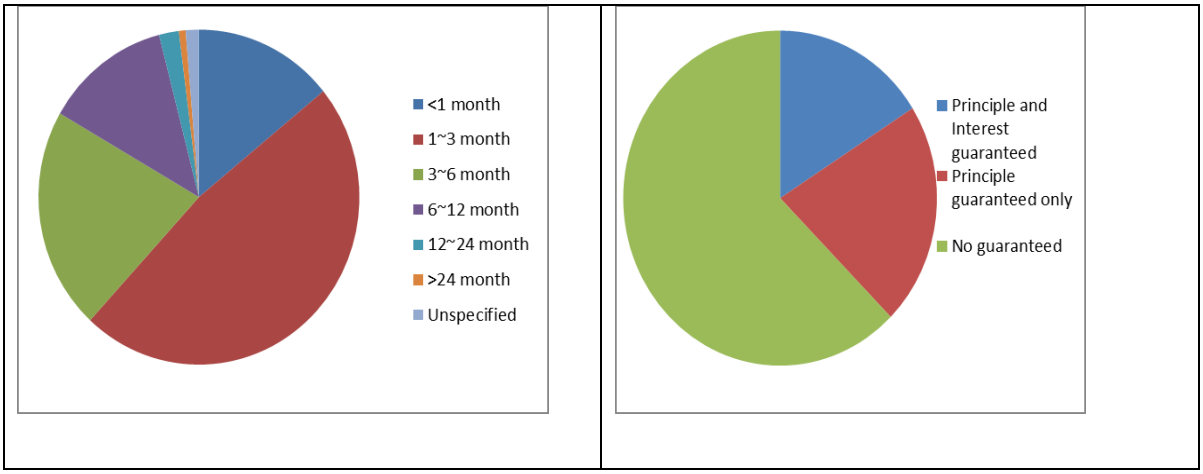
[2] In Wenzhou, where the private lending market is the most well-established, interest rates on short-term loans have been running above 20% per annum in recent years.

[3] Because of a lack of data and transparency gauging the precise size of the system is difficult. Estimates from market analysts and academia put the aggregate size at RMB15~25 trillion as of mid-2013, equivalent to 43% of GDP and 17% of the banking system at the upper end of the estimates (FSB, 2013).

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 credit and liquidity risk perspective (Figure 2). For banks, the maturity of WMPs is structured carefully to coincide with the timing at which they need to comply with the reserve requirement and loan-to-deposit ratio requirements at month or quarter end (IMF, 2012). So WMPs offer banks a tool to circumvent interest rate control so as to maintain their funding base.

In addition banks can overcome lending-side restrictions, such as the reserve requirement and credit quota, through shadow banking transactions (Acharya et al., 2013; Plantin, 2014).[4] Shadow banks are exempt from many credit and macro-prudential requirements, and their lending is subject to less official interference. By cooperating with shadow banks and conducting shadow banking activities, banks can extend credit creation beyond what is allowed by existing regulations.

Figure 2: The Distribution of WMPs by Maturities and Types (2013)



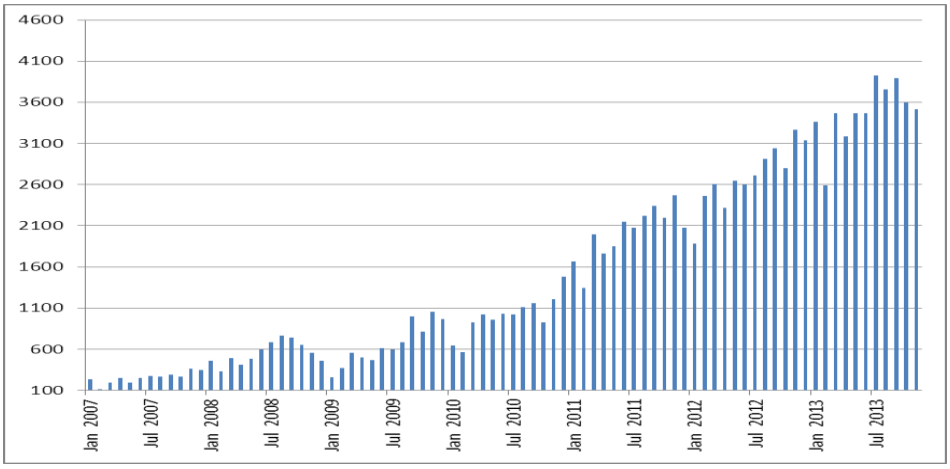
Source: WIND

Besides the supply-side push from banks, investors' desire for alternative investments also creates demand for shadow banking products. China has one of the world's highest saving rates, but there are few investment opportunities given the underdeveloped capital markets and near-closed capital account. The desire for alternative investment provides a fertile ground for the rise

[4] For example, the reserve requirement ratio (RRR) tripled from 7% in 2006 to 21% in 2011.

of WMPs and other shadow banking products. Monthly issuance of bank-sponsored WMPs has grown substantially since 2009, reaching almost 4,000 issuances per month in 2013 (Figure 3).

Figure 3: Bank-sponsored WMP issuance



Source: WIND

2.3. Growth and Regulatory Endorsement of Shadow Banking

The rise of shadow banking has been seen as a positive development to broaden the diversity of China's financial system and expedite interest rate liberalisation (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 liberalisation, 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 driven by market forces.[5]

Another driver for the recent surge in shadow banking comes from a policy change after the global financial crisis. There was a substantial policy stimulus and significant liquidity injection

[5] 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.

by the People's Bank of China (PBOC). However, by late 2010, the economy showed signs of overheating, with inflation rising 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 large and credit-intensive infrastructure projects. The long-term nature of these investments required continued credit infusion, without which there would likely be wide-spread project failures and rise in non-performing loans. As a response, banks further expanded their off-balance sheet operations and became increasingly reliant on shadow banking to intermediate credit.[6]

3. A Theoretical Analysis of Chinese Shadow Banking

In this section we provide a theoretical analysis of Chinese shadow banking with particular focus on modelling implicit guarantees, asymmetric perception of credit guarantees, the role of the government and welfare implications.

3.1. Information Sensitivity as a Tail Risk Measure

The concept of "information sensitivity" introduced by Dang et al. (2013, 2013a) is the building block our model. Consider a financial security with payoff $s(x)$, which is backed by an underlying asset x with payoff distribution function $F(x)$ and density $f(x)$ with positive support on the interval $[x_L, x_H]$. If $s(x)$ is debt, then $s(x)=min[x,D]$ where D is the face value of debt and x the underlying cash flow of the backing project or issuing firm. Dang et al. (2013, 2013a) define the information sensitivity π_L of a security $s(x)$ as:

$$\pi_L = \int_{x_L}^{x_H} \max[p - s(x), 0] \cdot f(x) dx$$

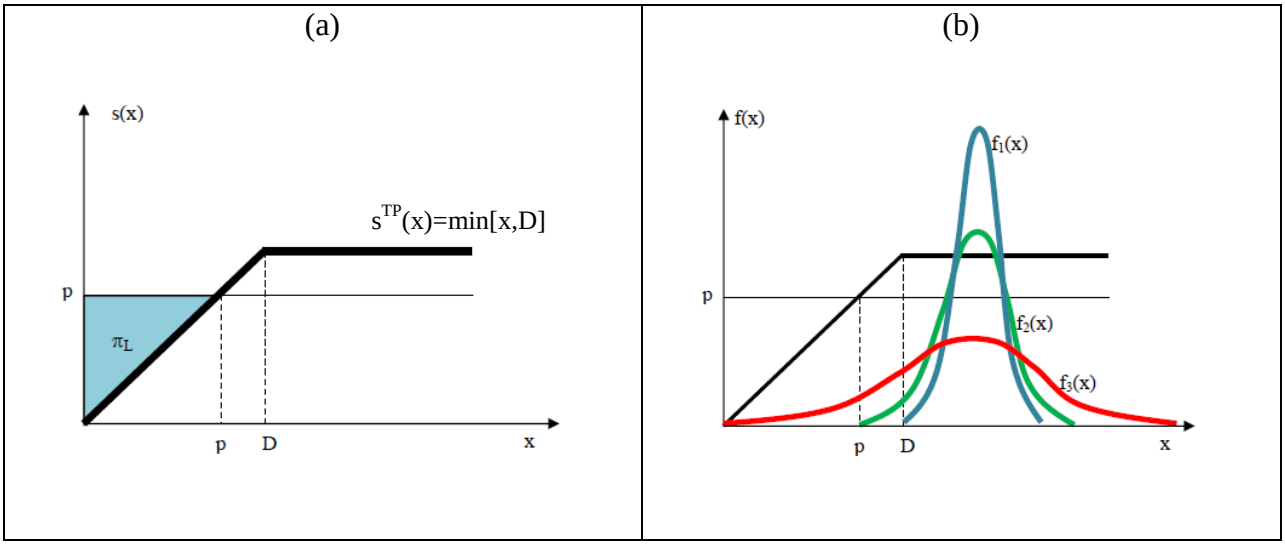
where p is the market price of the security. π_L measures the expected loss of a security in low payoff states. To see this, suppose an agent buys $s(x)$ at price p or deposits the amount p at a bank as demand deposit. If $s(x)<p$ (i.e. he is only repaid less than his deposit) he makes a loss of

[6] See Dang et al (2014a) for detailed institutional backgrounds.

s(x)-p. Integrating over all states *x* where *s(x)<p* yields the expected loss of the security or the deposit.

Figure 4 depicts the information sensitivity of a debt security such as a trust product (TP). On the liability side of the issuer is $s^{TP}(x)=min[x,D]$ where $D=p*(1+r)$ is the repayment of principal plus interest (see Figure 4(a)). This liability, $s^{TP}(x)$ is backed by some asset *x* on the asset side (trust loans). The payoff of the underlying collateral *x* can be described by the distribution function *F(x)*. Figure 4(b) depicts three different projects *x* that back the TP. If the backing asset *x* has a minimum payoff of $x_L>D$, then the principal plus interest D are safe (see density $f_1(x)$ in Figure 4(b)). If only the principal is safe then $f_2(x)$ is the density of the payoff of the underlying asset. If $f_3(x)$ has positive density on the interval $[0, x_H]$, then the TP has default risks. The triangle π_L in Figure 4(a) is the information sensitivity of the TP or the expected loss in low payoff states. If there is no positive density for *x* smaller than *p*, then the value of the triangle is zero and the principal of the TP is safe. So information sensitivity is a tail risk measure.

Figure 4: Information sensitivity of trust product



Dang et al. (2013, 2013a) show that π_L is also the value of information. Suppose an agent can learn about the realization of *x* at information cost γ before making his decision to buy the trust product. If $\gamma<\pi_L$, i.e. information cost is smaller than the expected loss the agent can avoid by

learning, then the agent will acquire information and does not buy when knowing $s(x)<p$. Information sensitivity is a key object in our theoretical analysis. In the subsequent sections we provide a theory of how the Chinese shadow banking system deals with π_L and how it is different from the US system.

3.2. A Model of the Chinese Trust Industry

In this section we develop a theoretical model to analyze the key elements of Chinese shadow banking, and especially the trust industry where banks and trust companies cooperate as a joint financial intermediary to sell trust products to investors and use the proceeds to provide trust loans to risky borrowers.[7] 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 $U_F=c_2$) 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 $U_I=c_1+c_2$) 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

[7] We frame our theoretical analysis in terms of the trust industry but it also applies to WMPs conceptually. Banks sell WMPs and the proceeds are typically lent to borrowers in the interbank markets. Since the maturities of WMPs are short-term and lending is collateralized, these products are quite safe and maturity mismatch is less an issue.

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 a trust 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 (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. Then the late investor 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.[8]

An interpretation of what is going on in the model is the following. At date 0, a property developer needs cash to make a long term real estate investment. A financial intermediary sells trust products backed by the real estate investments to some investors. At date 1, these investors need cash and redeem from the intermediary. 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 trust product defaults and the intermediary goes bankrupt.

3.3. Bank-Centric Shadow Banking

In this section we analyze the game when there is no government. Our model captures four stylized facts of Chinese shadow banking, especially of the trust industry.

[8] This model is an extension of Dang et al (2014). We use their basic model structure to analyze implicit guarantees, asymmetric perception of guarantees and the role of Chinese government in shadow banking. These elements are not present in their paper.

Lemma 1

Suppose $w \le (1-\lambda)x$ *.The early investor buys the trust product if* $\lambda(w-\kappa) \le \gamma$.

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. (2013, 2013a). If the intermediary provides a credit guarantee of κ, the 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: $\gamma \ge \pi_L - \lambda\kappa = \lambda(w-\kappa)$. 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 $x \ge w/(1-\lambda)$ (i.e. the project has positive NPV, $E[X] - w = (1-\lambda)x - w \ge 0$). 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 trust 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.[9] 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 trust product if the information sensitivity of the trust 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 like to 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.[10] The model also encompasses the special case (γ =0) where investors only invests if the product is riskless. In such a case this requires the intermediary to provide full guarantee ($\kappa = w$) for trade to occur. Our model is more general in that it allows for rollover risks.

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

Now we compare the ability of banks and trust companies to sell trust products. A unique feature of the (regular) banking system in China is that it had no formal deposit insurance in 2014 and earlier. 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

[9] 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 leans 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.

[10] 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.

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}.[11]

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 trust product 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 early investor buys the trust product 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 $\tau_{Max} = x - \frac{w}{1-\lambda} + \frac{\lambda}{1-\lambda}(\kappa^{Bank} + \kappa^{Trust})$ *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***

[11] 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.

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 charge.*

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 the *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 1 and Corollary 2.1 capture two further stylized facts in the Chinese trust industry. (3) In order to sell trust products that are backed by risky trust loans, trust companies (and other shadow banking entities) cooperate with and rely on banks to provide credit guarantees. (4) Intermediaries can charge higher (ex post) fees for riskier projects.

3.4. Asymmetric Perception of Credit Guarantees

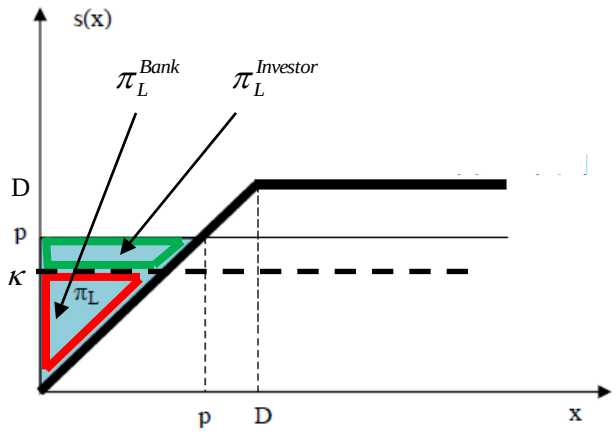
From a contractual perspective, banks have no legal obligation to shoulder any credit risks for most trust products and WMPs (see Figure 2). However, the extensive involvement of banks in structuring and distributing the products creates the perception that credit guarantees are provided. Since these credit guarantees are mostly non-contractual, it is built on the faith of banks' unconditional backstop. Appendix provides two examples that illustrate asymmetric

perception of credit guarantees. We formalize this as asymmetric perception of information sensitivity. In this section we call the financial intermediary just the bank since investors typically buy trust products 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, $\pi_L^{Bank} + \pi_L^{Investor} = \lambda w = \pi_L$.

Figure 5 provides a graphical illustration. Suppose an investor buys a trust product at price *p*, and the bank provides guarantee of the amount κ. In states *x* where $x < \kappa$, the bank has to pay the investor κ and makes a loss of $\kappa - x$. The expected loss π_L^{Bank} equals to the red triangle. For $\kappa < x < p$, the investor makes a loss of *p*-*x*. So the expected loss $\pi_L^{Investor}$ is the green shaded area. Irrespective of how information sensitivity is shared, the total information sensitivity is $\pi_L^{Bank} + \pi_L^{Investor} = \pi_L$ (blue triangle).

Figure 5: Information sensitivity sharing



Definition (Asymmetric perception)

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

In many cases banks are typically not legally liable ($\kappa = 0$) for default of the trust products, 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).[12] 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.[13] 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* $(1-\lambda)x < w$.

[12] 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.

[13] 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.

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 trust 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 trust product and the firm obtains *w* to implement a project with positive NPV in case (i) and a negative NPV project in case (ii). Note, 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 2 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.

3.5. Implicit Guarantees 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 trust product 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 trust product 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.[14]

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 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 behaviour. 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 behaviour.

For simplicity we assume that $\gamma = 0$. Investors only buy the trust product if $\kappa^B = w$. Suppose the bank's costs for providing a credit guarantee κ for a trust loan is $C(\kappa)$ with $C(\kappa) > \kappa$.[15] 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.

[14] 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.

[15] 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 $C(\kappa) > \kappa$.

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. 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 trust product.

Proof

$T = \Delta_I$ 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 20). 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 trust product. 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^I_{Max} such that $(1-\lambda)(x - \frac{w}{1-\lambda}) - \lambda C(\kappa^I_{Max}) = 0$. If the government provides a subsidy of $\kappa^G = w - \kappa^I_{Max}$, the bank offers the trust product 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 $T = \Delta_I$ with probability q and offers a subsidy κ^G with probability $1-q$, then the bank offers the trust 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 trust products and there is no funding for risky projects. In Proposition 4 there is no moral hazard issue for simplicity.[16] Section 4.3 discusses moral hazard issues.

4. Discussion

This paper employs the concept of information sensitivity by Dang et al. (2013, 2013a) to model implicit credit guarantees, asymmetric perception of credit guarantees and the role of the government. These aspects typical for Chinese shadow banking are not present in their papers.[17] 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.

[16] If the government knows that the project (always) has positive NPV then it will always bailout.

[17] Dang et al. (2013) provide a micro-foundation for the optimality of debt-on-debt and a theory of financial crises. Dang et al. (2013a) provide a full characterization of information sensitivity and show when this measure is a sufficient statistic in portfolio theory and a pricing factor in asset pricing. Dang et al. (2014) analyse when banks dominate capital markets and how firms endogenously seek bank or market finance and discuss optimal bank portfolios.

4.1. Securitization

Since Chinese shadow banking products have a simple structure, tail risks are only shared between the bank and investor. 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 plus subordination and over-collateralization, shadow banking 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. $\pi_L^{SeniorInvestor} + \pi_L^{JuniorInvestor} + \pi_L^{Bank} = \pi_L$.[18] We can interpret this equation as a representation of the US securitization model. Because of financial engineering, $\pi_L^{SeniorInvestor}$ is small (Dang et al., 2013a). 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 risk 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.

4.2. Asymmetric Perception of Risks Versus Neglected Risks

Our notion of asymmetric perception of implicit guarantees (or default risks) 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

[18] 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).

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 and trust products 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.[19]

The concept of information sensitivity provides a unified theoretical approach to model securitization, implicit guarantees, asymmetric perception of implicit guarantees and neglected 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.[20]

4.3. Moral Hazard, Implicit Guarantees 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 and thus projects with negative NPV might be

[19] Another important difference is that financial institutions are not the buyers of shadow banking products and they are not traded in secondary markets or used as collateral in funding markets so the implication for systemic risks might be different. In China it is mainly retail investors who invest in shadow banking.

[20] Dang et al. (2013) 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.

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 (2014) 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.

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 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 trust products are to be told that these products can default. In order to obtain higher returns they have to bear more risks.

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. Its expansion has increased the diversity of the financial system and helped meet the credit demand of those who have no access to bank loans or capital markets as well as expedited the process of interest rate liberalization. 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. (2013, 2013a) 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 and create safe assets for investors in the wholesale banking sector. Its rise since the 1980s has been a transformative process of the US financial system. Only the financial crisis in 2008 revealed the fragility of this sector and its impact on the whole financial system. It turned out that investors had put too much faith in the market's ability to effectively transfer and redistribute risks and handle conflicts of interests.

As an alternative shadow banking mode, the current 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 enforce implicit guarantees and 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.[21]

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 30 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 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.

Therefore, policy implications for reforming and regulating US shadow banking might not be necessarily applicable to Chinese shadow banking on a one-to-one basis. 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.

[21] 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.

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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.[22]

Example 2 (Yu'E Bao)

Before the internet giant Alibaba entered the money market funds (MMF) business in June 2013, the 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 money market funds or WMPs distributed via the internet. A lion's share of Yu'E Bao's investment is made in negotiated deposits with banks, whose yields are usually

[22] It is interesting that it was not ICBC that bailed out the product but done by an undisclosed unknown third party. If the regulatory authority is to set the precedent case that banks are liable this is likely to affect the business model of selling trust products through banks and in the consequence lending to the real economy. If a bank is (fully) legally liable for default, it might be reluctant to sell trust products with high information sensitivity. On the other hand, if the government itself bailed out the product, banks might have excessive incentive to sell trust products.

benchmarked to inter-bank market interest rates. Relatively tight liquidity conditions in the second half of 2013 provided the ideal timing for the advent of Yu'E Bao, as money market interest rates shot up sharply, while bank deposit rates were kept low by the ceiling. YuE Bao' total asset under management was blooming to RMB500 billion by the end of February 2014. Our theory suggests that this was partly driven by the (mis-)perception that these investments were 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. As long as the market is functioning well and there were no defaults of the AAA rated Agency MBS tranches, investors may have no reason to question that MBSs were information insensitive. 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.