A Peek into the Shadow: A Loan-level Investigation of Chinese Shadow Banks

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Abstract: We use a unique loan-level dataset of Chinese credit guarantors to analyze shadow bank lending. We find they charge higher guarantee rates for borrowers without access to formal banks, supporting the information capture arguments of Dell'Ariccia and Marquez (2004). In contrast to the U.S. evidences of loose credit risk control in shadow banking activities, Chinese credit guarantors seem to control credit risk well: they demand more collateral and approve shorter loan maturities for the more marginal borrowers. This is consistent with Inderst and Mueller (2007) who argue that shadow banks, forced by competition to reach out to the more marginal borrowers, increase the collateral requirements to make up for the potential shortfall at times of adversity.

1. Introduction

In China, shadow banks have been becoming more and more important, accounting for about one fifth of the financial system in terms of total outstanding balance recently (Country Analysis Unit, Federal Reserve Bank of San Francisco, 2013). The global investment community keeps an intense interest in the Chinese shadow banking system; and discussions abound on whether its disruptions could pose systemic risks to both the Chinese financial system and the global economic growth. Due to a lack of micro-level evidences, most of these discussions have used macro-level data. Observers usually assume a micro backdrop similar to those existing in the American shadow banking system (Keys, Mukherjee, Seru and Vig, 2010 and Gennasioli, Shleifer and Vishny, 2013), while the extreme financial fragility and the subsequent dire consequences are similarly implied.[1] This study aims to bridge this gap.

We use a unique micro-level credit guarantee dataset of Guangdong province to help understand the Chinese shadow banking system. The credit guarantors are used by borrowers for credit enhancement so as to gain access to funds from both the formal banks (mostly national banks) and other informal sources. They thus enhance the lending business of national banks in supporting local economic activities. For examples, they facilitate micro-lending companies in borrowing from large banks, they assist trust companies in accessing the off-balance sheet lending pools of commercial banks, and they support various credit enhancement activities of asset-backed securitizations. While some of them have credit ratings, most have limited capital bases and operate regionally in a highly fragmented market. In regional financial crises, they are always the first in line to take the brunt of financial stress.

The Chinese shadow banking system is controversial. Some view it suspiciously as a group of dark operators that take advantage of the market fragmentation and exploit the customers, possibly at the expense of accumulated systemic risk. This conservative view seems to justify the death penalties of several money operators despite significant public controversies in 2012.[2] An alternative view is that the Chinese shadow banking system involves minimum risk and enhances the formal banking system to reach out to small and medium enterprises (SMEs), which were

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[1] Chancellor and Monnelly (2013) comment on the similarity between the Chinese and the American shadow banking systems before the Lehman collapse: "trust loans that finance cash-strapped property developers have a whiff of the subprime about them; wealth management products that bundle together a miscellany of loans, enabling the banks to generate fees while keeping loans off balance sheet, bear a passing resemblance to the structured investment vehicles and collateralized debt obligations of yesteryear; while thinly capitalized providers of credit guarantees are reminiscent of past sellers of credit default insurance."

[2] Both Wu Ying and Zeng Chengjie were sentenced to death in 2012 for illegal fundraising.

formerly unable to secure bank financing. This progressive view seems to justify the first overhaul in 2007, leading to the subsequent rapid growth of the Chinese shadow banks.[3] In other words, the second view sees the shadow banking system as a useful formal banks' extension and a necessary evil in the process of financial liberalization, while the first view sees it as an unnecessary nuisance that has taken place due to the inefficient formal banking system.

The two different views on shadow banks lead to different approaches in dealing with these institutions at the time of financial crisis. During the 2011-2013 regional credit crises at Wenzhou,[4] holding a view that the shadow banks alleviated the financing difficulty of the local SMEs, the local government threw a lifeline and provided liquidity support to the shadow banking system. In contrast, at about the same time with a similar crisis, the local government of Ordos, the infamous Chinese "ghost city" in Inner Mongolia, has taken a more draconian approach. Seeing the shadow banks as a nuisance, the Ordos government by and large left the shadow banks to perish.

These opposite views are related to the banking literature which investigates the general impact of financial liberalization. Similar to the Spanish setting in Jimenez et al (2009), formal banks or national banks in China act like foreign banks or transaction lenders in the literature due to their large organizational distance from borrowers. In contrast, Chinese shadow banks or credit guarantors act like domestic banks or local relationship lenders, having significant information advantages over foreign banks or transaction lenders with respect to opaque borrowers such as SMEs.

Echoing the nuisance view, Dell'Ariccia and Marquez (2004) find that domestic banks, at the entry of foreign banks, will take advantage of their information capture. Facing the competitive pressure from the entry of foreign banks, domestic banks charge higher interest rates and finance borrowers in market segments having greater information asymmetries. Dell'Ariccia and Marquez thus assume a fragmented banking market.

Corresponding to the useful extension view, Inderst and Mueller (2007) propose the lender-based theory of collateral, assuming that local relationship lenders and transaction lenders compete imperfectly. Local relationship lenders can estimate the borrowers' default likelihood

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[3] In 2007, the Chinese Banking Regulatory Commission passed several new regulations on trust companies such as the Measures for the Administration of Trust Companies, essentially jump-starting the then-defunct trust industries.
[4] Hu Fulin, a prominent entrepreneur, fled the country amid debt crisis in September 2011. Many consider this event to mark the beginning of the Wenzhou credit crisis. His company's annual revenue was 270 million yuan, but it had to pay more than 200 million yuan just to cover interest payments on its debts, according to media report.

more precisely than transaction lenders can. By asking for more collateral, they ameliorate the financial risk of projects with a relatively high likelihood of low cash flows, and thus pick up those projects that they would otherwise reject. To compete, they can at most charge a competitive interest spread. Inderst and Mueller thus assume an integrated banking market.

On one hand, if Chinese formal banks and shadow banks operate in a fragmented market, opaque borrowers cannot access the formal banks and have to borrow from the shadow banks. The information capture allows the shadow banks to charge higher interest rates so that opaque borrowers get costly financing. On the other hand, if Chinese formal banks and shadow banks operate in an integrated market, opaque firms have a potential access to the formal banks, which exert competitive pressure upon the shadow banks. Shadow banks need to reach out to the more marginal borrowers, who can then access finance at a relatively low cost at the possible expense of pledging more collateral.

In our sample of the Chinese shadow banking loans, approximately half of the borrowers are sponsored by formal banks taking partial risk of the loans, so credit guarantors only need to take the remaining risks, whereas the remaining borrowers are not sponsored by formal banks, so credit guarantors need to take all the risk. In other words, the former group of borrowers, not the latter group, has some access to formal banks' lending. We compare these two groups for credit spread, collateral, loan maturity, and loan amount. We find that, controlling for other factors, the latter group pay higher credit spread, pledge more collateral, and are granted shorter loan maturity than the former group. The evidence for the latter group's higher credit spread is consistent with the possibility of information capture (Dell'Ariccia and Marquez). The evidence for the latter group's more collateral and shorter loan maturity is consistent with Inderst and Mueller. In other words, our evidences are consistent with both a fragmented banking market view and an integrated banking market view. A likely explanation is that financial liberalization is a long progress, so an initially fragmented market would gradually become more and more integrated.

If the latter group of borrowers are the more marginal firms as implied by Inderst and Mueller's theory, our findings suggest that credit guarantors have made deliberate efforts in managing risk. Our findings are consistent with Dybvig, Shan, and Tang (2015), who also study

Chinese credit guarantors.[5] They find a positive correlation between the guarantee fee and the borrower risk assessed by the guarantor. Their findings and ours show good contrast with the practices of American subprime lenders, where securitization leads to lax screening (Keys, Mukherjee, Seru and Vig, 2010).

In the next section, we elaborate on the Chinese financial liberalization and shadow banking system, and discuss how they are related to the relevant literature. In Section 3, we explain our hypotheses, which we test using our dataset in Section 4. In Section 5, we conclude our study.

2. Institutional background and connection to literature

2.1. *Chinese financial liberalization and shadow banks*

The explosive growth of Chinese shadow banking system represents a de facto liberalization of the financial system. Chinese formal banking sector is predominantly owned by the state. Unlike the situation in many other countries, the People's Bank of China (PBOC) has been heavily regulating both deposit interest rates and loan interest rates. Before July 2013, banks were under various restrictions in adjusting the actual loan rates above or below the PBOC base rate. Now, they are stipulated to take deposits subject to a deposit rate ceiling. In addition, the Chinese Banking Regulatory Commission (CBRC) also imposes various rules on the commercial banks. Notable regulations include the regulation of the total loan-total deposit ratio, which cannot exceed 75%, as well as lending restrictions to various industries considered to be economically risky.

Interest rate control, especially the control on the deposit rate, is a major element of "Red Capitalism" (Walter and Howie, 2011). With interest rate control, the regulators guarantee the banks' generous net interest margins – the spread between what the banks pay for deposits and receive from their loans. Large profit margins compensate the banks for making unproductive loans and provide them with the cash to conceal subsequent losses. The large banks are run by members of the Chinese Communist Party who receive instructions on how to allocate credit from their Party superiors. Loans are made at the behest of Beijing to state-owned enterprises (SOEs) and local government funding vehicles to meet industrial policy purposes (Bailey, Huang and Yang, 2011). Chinese savers, who had historically received low interest rates (often negative

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[5] Their sample consists of the deals done during 2006-2009 by one of the top three credit guarantors in China. The Finance Bureau of Guangdong provincial government provides us with a dataset of loans made during 2009–2013, involving 33 guarantors in the province.

in real terms) on their deposits, have footed the bill. They were the victims of the so-called "financial repression." Until recently, however, they had no alternative to leaving their cash in state-run banks, and capital controls prevented them from taking money out of the country.

China has an institutional setup that consists of underdeveloped and capricious legal system, weak investor protection, and overarching government control and interference in the financial system. Chinese shadow banks have grown out of the informal financing channel studied in Allen, Qian, and Qian (2005). In their widely-cited research, the authors proposed that informal financing channels such as trade credits and private credit agencies must have played an important role in Chinese economic growth; otherwise, according to the mainstream academic view (Rajan and Zingales, 1998 and La Porta et al., 1998, 2000) in the literature of "law-finance-growth," the rapid Chinese economic growth would not have been possible. Chinese authority seemed to agree. Starting from 2005, with the issuance of "Opinions on supporting and encouraging the development of private economy," the government has promulgated policies in relation to private sector financing. These policies over the past decade have transformed the initially informal financing channel into the Chinese shadow banking system.

According to the Financial Stability Board (FSB), "the shadow banking system can be broadly defined as the system of credit intermediation that involves entities and activities outside the regular banking system." Market participants in China usually refer to nonbank financial institutions, such as trust companies, credit guarantors, micro-lenders, and pawn shops, as shadow banks. Certain off-balance sheet and informal lending of banks is also often viewed as shadow banks. The rationale behind this classification is that these activities generally involve regulatory arbitrage and have the potential to increase systemic risks.

The Chinese shadow banks have been becoming more and more significant after CBRC overhauled the entire sector of trust companies in 2007. In the overhaul, starting with only 54 trust companies (down from more than 2,000 in the early 1990s), the trust sector quickly gained momentum after the global financial crisis, with their assets under management (AUM) growing six-fold between 2007 and 2012, reaching RMB 7.5 trillion (USD 1.2 trillion) by year-end 2012.[6] Trust companies, as well as all other shadow banks, rely heavily on banks to obtain funding since they cannot accept retail deposits. Trust companies engage in a wide range of businesses

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[6] The statistics reported on trust companies are collected from Chancellor and Monnelly (2013). The statistics on guarantors and micro-lenders are collected from IPO prospectus of Hanhua Financial Holding (2014).

including lending, asset management, real estate investment, and private equity investment. In the so-called "bank-trust cooperation model," banks channel funds to trusts via entrusted loans; trusts make high-yield loans to risky or small borrowers that have difficulty directly obtaining bank credit. By engaging in this type of cooperation, banks are able to "outsource" part of their lending business to trust companies and move these loans off their balance sheets. In 2010, bank-trust cooperation accounted for nearly two thirds of trust assets. In 2012, after two years of regulatory tightening, it still accounted for 27% of trust AUM of RMB 7.5 trillion.

The recent acceleration in Chinese shadow banking sector is also a consequence of tightened regulations and supervision of commercial banks following the global financial crisis. In 2009, Chinese authorities enacted a RMB 4 trillion (USD 585 billion) stimulus package. As expected, the stimulus spending spurred bank lending significantly, which in turn raised concerns over the credit quality of these new loans as well as the prospect of runaway inflation. In the following years, Chinese financial regulators significantly tightened credit controls by adopting various regulatory tools. In particular, PBOC raised the bank reserve requirement ratios 12 times in 2010 and 2011 to a record high of 21.5% for large institutions in June 2011. Consequently, nonbank institutions and underground lending markets have been attracting a larger share of savings with higher yields. Instead of keeping their money on deposit, savers now earn more from investing in wealth management products (WMPs). Issuance of WMPs has been a major source of funding that has fueled the rise in shadow banking credit. According to the CBRC, total outstanding WMPs issued by banking institutions reached RMB 7.1 trillion (USD 1.1 trillion) at year-end 2012, a 55% increase from 2011. CBRC data indicated that banks issue the majority of outstanding WMPs, which are marketed as products that are exempt from restrictions on deposits rates. Trust companies, insurance companies, brokerage firms, and private equity funds are also issuers. Issuers often pool the proceeds from various WMPs to be invested in a wide range of assets. These thus constitute a major source of funds for shadow banks. In contrast, Chinese banks' share of total lending fell to only 52% of total credit creation in 2012, down from 92% a decade ago. Chinese interest rate control is therefore being challenged from the deposit side of the system.

Shadow banks enable credit to flow to areas with great financing demands where formal banking system cannot serve. The industrial lending restrictions, for example, have by and large banned lending to both steel and construction industries. Local governments in China are also

restricted in their ability to borrow on their own account. To get around this law, they set up platform companies, commonly referred to as local government funding vehicles (LGFVs), to finance their investment activities. Shadow banking activities related to these areas mushroomed in 2009 and 2010. Examination of the asset mix of Chinese trust companies, for example, finds loans representing the largest share of trusts' AUM at 43% as of year-end 2012. Securities held-to-maturity and long-term equity interests together accounted for another 28%. Shadow banks compete and, possibly complement, the formal bank in their lending activities.

The focus of this paper is credit guarantors in China. Chinese credit guarantee businesses have enjoyed a long boom. At the end of 2008, they guaranteed a total amount of RMB 497 billion of debt. At the end of 2012, according to CBRC statistics, there were 8,590 of them guaranteeing RMB 1.46 trillion of debt. Private- and foreign-owned credit guarantors (77.8%) far outnumbered state-owned guarantors (22.2%), reflecting increasing private capital inflow into this business sector. Providers of credit guarantees, like sellers of credit default insurance, earn a small guarantee fee (credit spread) for their service. They make financing from banks and other financial institutions more accessible to SMEs and microenterprises by providing a guarantee to the lenders that they will repay the debts in case of default. They also guarantee clients' bond offerings and repurchase transactions to enhance their credit standing and make them more attractive to investors. In this regard, the credit guarantors are often deeply involved in the credit enhancement of various trust products offered by trust companies or other structured products offered by securities companies. In addition, credit guarantors often offer different types of non-financing guarantee. For examples, they may provide contract bonds to guarantee that a general contractor will perform its obligations under a contract, and they may also issue attachment bonds in legal proceedings to guarantee a party's ability to indemnify the counterparty against damages caused by a wrongful attachment.

The main business of the credit guarantee industry is related to financing of SMEs. Both the high transaction costs related to relationship lending and the high risk intrinsic to SME lending explain the reluctance of formal banks to reach out to SMEs (Beck, Klapper, and Mendoza, 2010). Thus, formal banks outsource part of their lending business to trust companies, and outsource the credit risk assessment and management process to credit guarantors (Dybvig, Shan, and Tang, 2015). Indeed, Qian, Strahan, and Yang (2015) show that information production could be costly for Chinese formal banks. As the loan amounts concerned would be small, SMEs

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may be priced out of the market due simply to a lack of economy of scale in assessing their credit risks. According to CBRC statistics, among all the outstanding loans backed by credit guarantors, 73.1% (78.4%) are the loans related to SMEs in 2008 (2012), and around a quarter of all bank loans in China carry some form of guarantees. These guarantees may come in the form of a mutual guarantee, where one company guarantees another's debts against default. Alternatively, a guarantee can be purchased from a dedicated credit guarantor. Credit guarantees are popular because regulations governing interest rates prevent Chinese banks from pricing credit risk for firms without tangible collaterals. Third-party guarantees help to reduce the lender's potential loss and hence bridge the gap between banks and SMEs that may be lack of tangible collaterals.

Credit guarantors operate with limited capital base.[7] At the end of 2012, the entire credit guarantee industry recorded a paid-in capital of RMB 828.2 billion. Among all industry participants, 54 had a paid-in capital of over RMB 1 billion each, 4,150 had a paid-in capital of RMB 100 million to RMB 1 billion each, and the remaining 3,673 had a paid-in capital of RMB 20 million to RMB 100 million each. The largest credit guarantor, Anhui Credit Guarantee Co. Ltd, had a registered capital of RMB 7 billion as of 2013. The industry is highly fragmented. According to Euromonitor, most credit guarantors operate in one or two provinces where their headquarters are based, since the procedures for setting up branch offices in different provinces are complex. This fragmented structure of guarantee industry paradoxically reduces the moral hazard problem as almost every guarantor is local; due to its local knowledge, it can monitor and control the borrower's actions better than a formal bank can.

Compared with the above-mentioned shadow banking activities, underground or informal lending perhaps has the weakest tie with the banking sector. The market of informal lending was revitalized following the rapid growth of the SMEs in the 1990s, and boomed in the 2000s after additional policy supports were granted to private businesses. Micro and small loan companies are a direct descendent of the informal lending market. Starting from May 2008, pursuant to the Guiding Opinions on the Pilot Operation of Small Loan Companies promulgated by the PBOC and the CBRC, micro and small loan companies have been granted legal status and become a platform for private capital and financial institutions servicing SMEs and microenterprises. In

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[7] The CBRC stipulates that the balance of a guarantee company's outstanding guarantees cannot exceed ten times its net assets. As the industry is in general young, paid-in capital is a key component in determining the amount of financing a company can guarantee and, consequently, its revenues.

2013, local governments and regulators supervised 7,839 micro and small lenders, which had a balance of outstanding loans of RMB 819 billion, as compared to RMB 592 billion in 2012.[8] These lenders operate in highly fragmented markets, and their credit extension activities are usually opaque. In contrast to credit guarantors, who charge customers moderate guarantee fees, the cost of borrowing from a small loan company in Wenzhou can be 21–25% per annum. Some surveys indicate that borrowers in urgent need of liquidity sometimes face annualized interest rates approaching 100%. The high rates charged on these short-term loans may be due to the speculative nature of these activities.

2.2 Connection to the literature

Financial liberalizations, such as those that have occurred recently in emerging markets and transition economies, have led to the entry of foreign banks that, relative to domestic banks, have concentrated their activities on wholesale banking and lending to large borrowers (see Berger et al., 2001; Clarke et al., 2001). These foreign (or large national) banks have difficulty in extending loans to opaque small firms (Stiglitz, 2000; Berger, Klapper, and Udell, 2001; Berger, Miller, Petersen, Rajan, and Stein, 2005). Claessens, Demirguc-Kunt, and Huizinga (2001) show further that foreign banks enjoy higher profit, and an increased presence of foreign banks leads to a lower profitability for domestic banks. This evidence has led some policymakers to believe that foreign banks "cream-skim" or "cherry-pick," leaving the worst risks to the domestic banks in emerging markets.

Many research papers follow up this issue. We will review only the few that are most relevant to our analysis of Chinese credit guarantors. Dell'Ariccia and Marquez (2004) observe market segmentation between foreign and domestic banks. In their model, foreign banks are more effective at competing away from domestic banks the borrowers for whom informational disadvantages are smaller. In turn, domestic banks reallocate their portfolios towards borrowers whose quality is less discernible by foreign lenders. When faced with greater competition from foreign banks, domestic banks reallocate credit toward more information-captured borrowers (flight to captivity). Moreover, if borrower quality and captivity are sufficiently correlated, an increase in the competitiveness of foreign banks can worsen the domestic banks' overall loan portfolios. Dell'Ariccia and Marquez make an important point with regards to the weak legal

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[8] Micro and small loan companies accounted for only 1.06% of the total balance of outstanding loans for all financial institutions (RMB 76.6 trillion as of December 31, 2013), according to PBOC statistics.

system in emerging markets. Poor legal practices increase deadweight losses both in the repossession and in the liquidation of collateral. These in turn exacerbate the difficulties that foreign entrants face in lending to opaque firms. For example, small business lending is based on "soft" information due to opaqueness and is characterized by a larger proportion of borrowers that are high-risk. In contrast, the large-firm market segment is more transparent and can be characterized by a larger proportion of borrowers that are low-risk. With a cost advantage, the foreign entrants capture all transparent and low-risk borrowers. Thus, financial liberalization increases availability of credit and reduces interest spreads only for almost all the large borrowers and those small borrowers that are transparent and low-risk. However, in market segments characterized by a high opaqueness, such as SMEs, the incumbent domestic banks, despite their cost disadvantage, capture the low-risk borrowers, which then get financing at relatively high cost. Thus, domestic banks charge higher interest rates and finance relatively less creditworthy borrowers in market segments with greater information asymmetries.

On the other hand, Inderst and Mueller (2007) observe market integration between local relationship lenders and transaction lenders, and examine the role of imperfect loan market competition for collateral. They predict that when borrowing from the local relationship lenders, observably riskier borrowers should pledge more collateral and that, holding observable borrower risk constant, collateralized loans are more likely to default ex post. In their model, local relationship lenders have access to soft private information and can estimate borrowers' default likelihood more precisely than transaction lenders, who provide arm's-length financing based on publicly available information. In their Proposition 6, cost advantages of transaction lenders lead to greater competition to local relationship lenders, who in turn charge both lower loan rates and higher collateral requirements to their respective borrowers. Collateral improves the local relationship lenders' payoff from projects with a relatively high likelihood of low cash flows, which they would inefficiently reject otherwise. Moreover, due to loan market competition, local relationship lenders increase its collateral requirements more for borrowers in whom they have weaker information advantages, such as those borrowers who are located farther away or who are new customers.

Jimenez et al (2009) investigate the lending practices of national banks versus local banks in Spain. They examine the effect of organizational distance (i.e. distance between the headquarters of the bank that grants a loan and the location of the borrower) on the use of collateral for

business loans. They find that, for the average borrower, the use of collateral is higher for loans granted by local lenders than by distant ones (national banks). They also show that the difference in the likelihood of collateral in loans granted by local lenders, relative to distant lenders, is higher among older and larger firms, than, respectively, younger and smaller firms. Overall, their results are consistent with Inderst and Mueller.

Chinese financial liberalization occurs in a different way than international experiences. Before the financial liberalization, there were only large or national banks. Instead of allowing foreign banks to enter into the market, Chinese regulators introduce shadow banks. Thus, the incumbents are formal banks (large or national banks), while the entrants are shadow banks, including credit guarantors that are our focus. Similar to the Spanish setting of Jimenez et al, Chinese formal banks are comparable to foreign banks or transaction lenders in the above literature, while the Chinese credit guarantors are comparable to domestic banks or local relationship lenders. The organizational distance between the national headquarters and their borrowers make formal banks act more like foreign banks, while credit guarantors act more like local banks. In terms of "soft" information access, credit guarantors have advantage, while formal banks have advantage in transaction and cost of funding. The fact that credit guarantors or local banks are being introduced into a system of national banks rather than the reverse should not have any bearing on applying the above theories or results in the Chinese setting.

3. Dataset and testable hypotheses

The Finance Bureau of Guangdong provincial government regulates the credit guarantors in the province. They have provided us with a dataset of 555 loans done during 2009–2013, involving 33 guarantors in the province and 18 formal banks.[9] Each guarantor has collaboration agreements with one (or more) bank, which stipulate the guarantee arrangement and the risk sharing between the guarantor and the bank. Out of these 555 loans, 349 contain no missing values. For each of these 349 loans, we have information on the credit spread, the collateral, the loan maturity, and the loan amount in addition to other useful data. Credit spread is the guarantee

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[9] The 18 banks cover the entire spectrum of banking ownership structure in China, including policy banks, state-owned banks, shareholding banks, and city commercial banks.

fee, since it is the spread that the guarantors charge for bearing the credit risk.[10] These four variables are terms of guarantee, jointly determined during the negotiation between a borrower and a guarantor. We note that for each loan in our sample, there is a clause of the recourse against the personal property of the controlling shareholder of the borrowing firm as well as any connected enterprises that she may control.

The instrumental variable used in this paper is whether a loan is partially sponsored by a formal bank or is solely sponsored by a guarantor. The general credit guarantee application process involves 2 steps. In step 1, a borrower in our sample approaches either a bank or a guarantor, which will then contact each other if the loan will need a guarantee that seems to satisfy the bank-guarantor collaboration agreements. In the bank-guarantor meeting that examines the loan application, the bank will decide whether the borrower will fall into case 1 or case 2. In case 1, the bank promises partial sponsorship in taking some of the principal risk of the loan, and step 2 will start if the guarantor is willing to take the remaining risk. In case 2, the bank refuses to sponsor, and step 2 will start only if the guarantor is willing to sponsor 100%, taking all the risk. In step 2, the guarantor informs the borrower about the bank's sponsorship (positive or zero), and a negotiation between the two, overseen by the bank, will then start to determine the credit spread, the collateral, the loan maturity, and the loan amount (i.e., variables of guarantee terms). The borrower will get the loan from the bank if its negotiation with the guarantor is successful (i.e., acceptable to all the three parties). A guarantor may negotiate with borrowers of the two cases differently. Case 1 borrower already has partial access to bank lending, so the guarantor's remaining sponsorship may be more or less straight forward. Case 2 borrower has no access to bank lending, so may rely on the guarantor's willingness to solely sponsor and take all the risk. In other words, there may be a treatment effect of positive or zero bank sponsorship, i.e., with or without partial bank access, on how the guarantor will negotiate with the borrower. Given the bank decision of its sponsorship prior to the guarantor-borrower negotiation, this treatment effect is exogenous to the variables of guarantee terms, and is instrumental in testing the hypotheses discussed below.

There are two opposite views on Chinese shadow banks. The nuisance view sees the shadow banks suspiciously as a system of dark operators that take advantage of the loan market

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[10] We do not have the data of the interest rate that banks charge. It is likely that they do not charge much higher than the base rate, since they bear little credit risk. Indeed, this is confirmed by an agreement between a major guarantor and a major bank that we have seen.

fragmentation and exploit their customers. This view corresponds well with Dell'Ariccia and Marquez: when competing with formal banks, shadow banks will take advantage of their information capture. On the other hand, the useful extension view sees the shadow banks as enhancing financing for SMEs. This view corresponds with Inderst and Mueller: shadow banks and formal banks compete imperfectly in an integrated loan market.

In our sample, there are loans that are solely sponsored by guarantors and loans jointly sponsored by both guarantors and banks. A positive (zero) bank sponsorship means that the borrower has partial (no) access to bank lending. Furthermore, as explained above, there may be a treatment effect of positive or zero bank sponsorship on how a guarantor will negotiate with a borrower. Thus, in the empirical work below, the loans solely sponsored by guarantors mirror the local-bank loans in Dell'Ariccia and Marquez or Inderst and Mueller. We thus have the following hypotheses.

Hypothesis 1 (*Information capture*): Loans solely sponsored by guarantors have higher credit spread.

Dell'Ariccia and Marquez, assuming market segmentation for information reasons, offer this prediction. Opaque firms are too unpalatable for formal banks. Credit guarantors then take advantage of their information capture to charge higher interest rates. Charging higher interest rates is also a measure to prepare against default risk. Thus, in testing this hypothesis, we need to control for possible differences in default risk so as to isolate the marginal effect of information capture on credit spread.

Hypothesis 2 (*Collateral effect for marginal firms*): Loans solely sponsored by guarantors tend to require higher level of collateral.

Inderst and Mueller's lender-based theory would offer this prediction. The competition from formal banks forces credit guarantors to reduce the interest rates even if they are lending to the more marginal firms. The higher collateral requirement is then a must so that it is economical for them to lend to those firms. In testing this hypothesis, we need to control for alternative considerations such as borrower-based theories.[11] Those theories predict that the use of collateral

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[11] They argue that collateralization is a major way of reducing credit rationing caused by information asymmetry such as the ex-ante problems of adverse selection and ex-post problems of moral hazard (Berger et al., 2011a, 2011b). First, it induces a borrower to reveal his or her default risk, acting as a signaling device (Bester, 1985; Besanko and Thakor, 1987). Second, it provides the borrower with an incentive to exert effort and reveal truthfully the state of his project after having obtained the loan (Bester, 1987, 1994).

varies across loans according to the characteristics of borrowers, bank-borrower relationships as well as the characteristics of loans, which affect information asymmetry.

Collateral may be substituted by other mechanisms to reduce credit risk and informational asymmetry, such as strength of the lending relationship, covenants, loan maturity, and loan size.[12] Our sample includes the data for loan maturity and size. Thus, we have the following, which is parallel to Hypothesis 2.

Hypothesis 3 (*Loan maturity and size for marginal firms*): Loans solely sponsored by guarantors tend to be shorter in maturity and smaller in size.

Shortening loan maturity is a means to reduce asymmetric information problems and the moral hazard problem. The shorter the loan maturity, the lower are the opportunity and incentive for the borrower to switch from low-risk to high-risk projects (the so-called asset substitution problem). Short loan maturity may also reduce the adverse selection problem by serving as signaling instruments. Similarly, moral hazard can be mitigated by reducing the loan size, since a larger loan tends to increase the incentive for default. Larger loans also tend to be riskier than smaller loans, since they increase the firm leverage and default probability (Steijvers and Voordeckers, 2009). Thus, shorter loan maturity and smaller loan size are substitutes for more collateral, and Hypothesis 3 is consistent with Inderst and Mueller.

4. Empirical results

4.1. *Data description*

In our sample, approximately half of the loans are partially sponsored by formal banks. Most of these cases involve the 10% bank sponsorship and a small number of cases involve the 20% bank sponsorship. Thus, we simply group them together with a dummy treatment variable, Shadow, taking the value of 0. For the loans purely sponsored by a shadow bank (guarantor), Shadow takes the value of 1.[13] Because the value of Shadow is known before the borrower-guarantor negotiation starts, we regard Shadow as an exogenous variable when we analyze the four endogenous variables of guarantee terms: the credit spread, the collateral, the loan maturity,

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[12] The role of relationship strength in reducing problems of asymmetric information has been extensively discussed in the literature (for an overview see Boot, 2000). In a typical situation of an emerging country the proprietary information gained by the relationship lender is highly valuable. Because the borrower is locked-in, collateral requirements may be positively related to the intensity of the lending relationship.

[13] It may be argued that 10% bank sponsorship is slightly bigger than 0%, so it should not matter. Yet, later results show strong effects of Shadow, suggesting that 10% bank sponsorship already makes a difference.

and the loan amount, which are jointly determined during the borrower-guarantor negotiation.

In the original sample of 349 loans, there are 15 that do not involve any collateral. An examination of these 15 loans finds that 13 have no formal bank sponsorship. This is not surprising, since Chinese formal banks in principle require collaterals for their loans.[14] The presence of these 15 loans in our sample will not change our results much, except the results for testing Hypothesis 2 (the collateral effect). The inclusion of these 15 cases will downwardly bias the significance of the collateral effect of Shadow, since almost all of them cannot have bank sponsorship given the regulations requiring collateral for bank loans. The downward bias is caused by an institutional distortion: if formal banks could take loans without collaterals, then these 15 loans would not be so exceptional. Thus, we decide to drop these 15 exceptional cases, and report the results based on the remaining 334 loans in our sample. In unreported analysis, we find that all the later tables, except the table for testing Hypothesis 2, are not much affected by including or excluding these 15 cases.[15]

The exogenous variables we use include firm-level accounting information such as debt-asset ratio, return on equity, current ratio, quick ratio, average collection period for account receivables, the number of days to sell inventory; firm-level banking relationship information such as the total amount of previous bank loans, the number of previous banks used, and a dummy variable to indicate whether the firm is a past guarantee user; and other firm-level information such as the number of years the firm has been in existence, a dummy to indicate whether the firm is private-owned or state-owned, a dummy to indicate whether the firm has government industrial policy support, an industry dummy, and the education level of the company CEO. In addition, we use a locale-specific variable to control for local financial development, which is computed as the ratio of total local banking credit to local GDP for the specific county of the borrower. Yearly dummies for 2009 to 2013 are also included to control for unspecified time variation in the lending practices. A detailed description of our variables is

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[14] The Chinese banking system imposes significant collateral requirement for all banking deals. For example, when commenting on the reasons why private firms are not served by the Chinese banks, Hu Xiaolian, a vice governor of Chinese central bank, said "The lack of legitimate collateral is the real bottleneck. Approximately 70% of the credit collateral received by commercial banks in China is real estate, while more than 70% of the assets of SMEs are account receivables and inventory."

[15] We have redone the table for testing Hypothesis 2 when these 15 exceptional cases are also included, using Tobit analysis (applying Heckit method is meaningless for such a small number of exceptional cases). The results show an insignificant difference in collaterals between loans with and without formal bank sponsorship, confirming that including these 15 cases will downwardly bias the significance of the collateral effect of Hypothesis 2.

shown in Table 1. We take transformation for some variables to reduce the cross-sectional skewedness.

Table 2 presents the summary statistics of our dataset. There seem to be significant time-varying patterns. The yearly dummies show that 54% of the loans were made in the first 2 years and the remaining loans were made in the next 3 years. The reason for a higher annual volume of loans in 2009–2010 than in 2011–2013 may be the four-trillion-yuan stimulus plan of Chinese government in 2009. Note that 52% of the loans are purely sponsored by shadow banks (Shadow=1). For the loans with formal bank sponsorship, 63%, 25%, 7%, 4%, and 2% were made in 2009, 2010, 2011, 2012, and 2013 respectively; for the loans without formal bank sponsorship, 3%, 22%, 36%, 21%, 18% were made in these 5 years respectively. Shen, Firth and Poon (2014) also find more formal-bank loan origination during 2009–2010.

82% of the borrowers are private firms and the portion of private firms seems to be uncorrelated with the dummy variable Shadow. 13% of borrowers report to have received some kind of government policy support. More than half of the borrowers are in the manufacturing industry, whereas 10% are in the mining & construction industry (mostly real estate developers and construction companies). The average firm size in terms of book assets is RMB 134 million (= 9.5 of the transformed variable). The smallest firm in our sample has book assets of RMB 4.6 million, and the largest firm is a property developer having book assets of RMB 17.6 billion. Borrowers with formal bank sponsorship are on average smaller. This seems a bit surprising and will be discussed later. The average age of the firms is about 7.9 years. The youngest firm was set up only one year ago, and the oldest firm is a middle school that was established 60 years ago. Firms with formal bank sponsorship are average 1.23 years older than the other firms.

We now turn to the endogenous variables. First, 221 basis points of credit spread or guarantee rate is charged for an average loan. There is no material difference in credit spread between loans with and loans without formal bank sponsorship. Collateral on average covers 112% of the loan amount (= 0.75 of the transformed variable). The largest collateral covers 15 times of the loan amount, while the smallest collateral covers 4% of the loan amount (note that we have deleted 15 loans without any collateral, as explained earlier). Loans without formal bank sponsorship on average require 44% more collateral than those with formal bank sponsorship. The average loan size is about 20% of the value of firms' assets. Borrowers with formal bank sponsorship have significantly larger loans than those without. The average loan maturity is 27

months. Loans with formal bank sponsorship are on average 8 months longer in maturity than those without.

The four endogenous variables are jointly determined after the value of Shadow is known. Table 3 reports the correlation of these endogenous variables and the treatment variable Shadow. Shadow is not correlated with credit spread only. In general, the four endogenous variables have large correlations among themselves with expected signs.

4.2. Formal bank sponsorship

Given the 2 steps of the general guarantee application process explained above, we use a Probit regression to analyze the factors for Shadow being 1 or 0. We use stepwise regressions to select the exogenous variables that are the most relevant. There is a long list of exogenous variables; stepwise regressions will help shortlist significant factors.

Table 4 reports the Probit results. First, younger firms are less likely to get formal bank sponsorship. This accords well with the literature as younger firms tend to be more opaque. The results also show that borrowers in less financially developed counties are less likely to get formal bank sponsorship, possibly suggesting a policy bias. The year dummies of 2009 and 2010 are significantly negative, indicating that in those years formal banks sponsored more, possibly due to the 2009 stimulus plan. Also, the sales industry dummy is negative and significant. Note that larger firms are less likely to get formal bank sponsorship. This seems counter-intuitive. We observe that there are heavy concentrations of infrastructure, construction, and real estate development firms among the large firms in our sample. These firms are restricted from accessing formal banks, since they are considered by bank regulators as too risky. Thus, they have to get guarantors' sole sponsorship.[16]

All in all, a lack of formal bank sponsorship seems to be unrelated to the firm's credit risk, since no credit risk variable is significant. Instead, it seems to be related to the firm's opaqueness, if the firm's age serves as a proxy for opaqueness. Notably, Table 4 shows several significant policy-related variables (yearly dummies, firm size, industry dummy, and financial development of the county), suggesting that policies or regulations are more important factors for a lack of formal bank sponsorship than the firm's credit risk is. Our findings may then highlight the importance of shadow banks in helping some firms bypass the regulatory restrictions to get bank

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[16] In unreported analysis, we find a high correlation (0.57) between firm size and a dummy variable of infrastructure and real estate business. Out of the largest 30 firms, 27 of them have not received formal bank sponsorship, and 21 of them are in infrastructure and real estate business.

financing. This seems to support Honohan (2010) who argue that the recent growth in guarantee schemes in China to a large extent is due to regulatory arbitrage.

4.3.   Credit spread, collateral rate, loan maturity, and loan amount

Table 2 shows a univariate analysis of the treatment effect of Shadow on the four endogenous variables. However, to test Hypotheses 1–3, we need to control for other exogenous variables' effects. Furthermore, because the four endogenous variables are jointly determined after the value of Shadow is known, we need to use two-stage regressions to solve the simultaneity bias problem. For each endogenous variable, we use a stepwise procedure to shortlist significant exogenous factors in the first-stage regression. In the second-stage regression, we keep the significant exogenous factors, and add the treatment variable Shadow and the predicted value of each of the other endogenous variables generated from its own first-stage regression. Then, Shadow's coefficient shows its marginal effect, keeping other potential factors constant.

Table 5 analyzes how credit spread is affected by different potential factors as well as Shadow. The first column of the table reports the first-stage regression shortlisting significant exogenous factors. The second column reports the second-stage regression when we plug in the treatment variable Shadow and the predicted value of the other endogenous variables (loan amount, loan maturity, and loan collateral). The first column shows that Fin_Dev, D2009 and D2011 are significant, suggesting credit spread is higher for firms in more financially developed counties, to be lower in 2009 and higher in 2011. However, these 3 exogenous variables lose their significance in the second-stage regression. In contrast, service industry dummy, leverage, and firm size are significant in both the first-stage and second-stage regressions. Their coefficients also appear sensible; for example, lower leverage and bigger firm size should mean lower credit risk, justifying a lower credit spread. Most importantly, Shadow's coefficient shows that firms without any formal bank sponsorship on average pay a significant additional amount of credit spread of 53 basis points as compared to firms with some formal bank sponsorship. This result supports Hypothesis 1.

We investigate the collateral effect of Shadow in Table 6. Again, the first column reports the first-stage regression results and the second column reports the second-stage results. For the exogenous variables that are significant in both stages of regression, the results show that firms in less financially developed counties pledge more collateral. This is consistent with the notion

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that guarantors, serving as new entrants, need to take on the more marginal projects, so they demand more collaterals from the borrowers. Yet, the longer time to collect account receivables is associated with smaller pledge of collateral. This seems a bit puzzling. A possible explanation is that, in our sample, the firms with longer collection periods tend to be infrastructure- and construction-related or SOEs: their long collection periods may be due to delay in payment by local governments and may not be considered as high risk by guarantors.[17] Most importantly, the dummy Shadow is related to a higher collateral requirement, supporting Hypothesis 2.

Table 7 reports the results for loan maturity. For the exogenous variables that are significant in both stages of regression, the results show that the loan maturity is shorter for younger firms, past shadow-bank users, private firms, and firms in the manufacturing or sales industry. Most importantly, firms solely sponsored by guarantors have a loan maturity 8.4 months shorter than bank-sponsored firms have. This is consistent with Hypothesis 3.

Table 8 reports the results for loan amount. For the exogenous variables that are significant in both stages of regression, the results show that the loan amount (relative to the firm size) is bigger for smaller firms and firms in the mineral-construction or service industry. Most importantly, note that Shadow is not significant, rejecting Hypothesis 3. However, this may not be too surprising: borrowers may not compromise on their loan amount given their immediate financing needs, although they may be more willing to compromise on other guarantee terms.

5. Conclusions

The Chinese economy, particularly its private sector, should be subdued at best and completely irrelevant at worst, according to the "law-finance-growth" literature. To solve this puzzle, Ayyagari et al (2010) and Firth et al (2009) offer empirical evidences of moderate efficiency in Chinese formal banking system. Chen et al (2013) present further evidences that alternative mechanisms such as corruption in a weak legal framework enable efficiency in formal bank lending. In contrast to these authors, we follow Allen et al (2005) and study a descendent of the Chinese informal financing channels: credit guarantors within the shadow banking system.

In our unique firm-level credit guarantee dataset of Guangdong province, approximately half of the borrowers are co-sponsored by formal banks and credit guarantors, whereas the remaining

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[17] Infrastructure- and construction-related firms have an average receivable collection period of 248 days (versus the average of 53 days for the rest of the sample). SOEs have an average receivable collection period of 201 days.

borrowers are sponsored by credit guarantors only. Thus, the former group of borrowers, not the latter group, has some access to formal banks' lending. We compare these two groups for credit spread, collateral, loan maturity, and loan amount. We find that, controlling for other factors, the latter group pay higher credit spread, pledge more collateral, and are granted shorter loan maturity than the former group. The evidence for the latter group's higher credit spread is consistent with the possibility of information capture (Dell'Ariccia and Marquez). The evidence for the latter group's more collateral and shorter loan maturity is consistent with Inderst and Mueller.

Our findings may highlight the importance of shadow banks in helping some firms bypass regulatory restrictions to get bank financing. For example, younger firms tend to be sponsored by credit guarantors only, so do firms that cannot offer collateral or are restricted from formal banks' lending by the government. It also seems that the much fan-fared risk of Chinese shadow banking system is overblown. If the borrowers sponsored by credit guarantors only are the more marginal firms as implied by Inderst and Mueller's theory, our findings suggest that credit guarantors have made deliberate efforts in managing risk.

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Table 1: Definitions of the endogenous, treatment, and exogenous variables (in alphabetic order)

Variable	Definition
Endogenous variables	
Amount	Total loan amount, scaled by the borrower's assets
Collateral	Equals ln(1+Collateral/Loan amount)
Credit Spread	The guarantee fee charged on top of the benchmark interest rate
Maturity	The maturity of the loan
Treatment variable	
Shadow	Equals 0 if formal banks accept 10% or 20% credit risk, and 1 if formal banks accept 0% credit risk
Exogenous variables	
Age	The number of years since the borrower's establishment
Assets	Equals ln(Total Assets of the borrower in unit of RMB10,000)
Current Ratio	Current ratio of the borrower, in ln format
D2009, D2010, D2011, D2012, D2013	Yearly dummies
Dag, Dmanu, Dmin, Dsales, Dservice, Dtrans	Industry dummies for agriculture, forestry & fisheries; manufacturing; mineral & construction; wholesale trade & retail trade; service; transportation & communications; respectively
Edu	Education achievement of the borrower's CEO. Equals 3 if she has a postgraduate degree; equals 2 if she has a bachelor's degree; equal 1 if she has attended middle school; equals 0 if she has attended elementary school.
Fin_Dev	The ratio of total banking credit to local GDP for the prefecture of the borrower
Initial Loans	The total amount of outstanding bank loans of the borrower prior to the shadow bank guarantee, scaled by the borrower's assets
Inventory	The number of days to sell inventory, in ln format
Leverage	Debt-Asset ratio (total debt/total asset) of the borrower
Past_user	Equals 1 if the borrower has previously used some guarantees, and 0 otherwise
Policy Support	Equals 1 if the borrower is supported by the government through its various industrial policies, and 0 otherwise
Prev_Banks	Number of previous banks having banking relationship with the borrower
Private	Equals 1 if the borrower is a private company, and 0 otherwise
Quick Ratio	Quick ratio of the borrower, in ln format
Receivables	Average collection period for account receivables of the borrower, in ln format
ROE	Return on book equity of the borrower, in ln format

Table 2: Summary statistics of the endogenous, treatment, and exogenous variables (in alphabetic order)

| Variable | The whole sample: N = 334 | | | | | Shadow = 0 | Shadow = 1 | Dif in mean |
	Mean	Std Dev	Min	Median	Max	Mean	Mean	t value
Endogenous variables								
Amount	0.20	0.13	0.01	0.18	0.87	0.23	0.18	3.80
Collateral	0.75	0.38	0.04	0.65	2.75	0.64	0.85	-5.52
Credit Spread	2.21	0.85	0.15	2.27	4.90	2.22	2.20	0.20
Maturity	26.97	13.26	2.00	24.00	96.00	31.10	23.17	5.85
Treatment variable								
Shadow	0.52	0.50	0.00	1.00	1.00			
Exogenous variables								
Age	7.91	5.66	1.00	7.00	60.00	8.55	7.32	1.98
Assets	9.50	1.42	6.13	9.16	14.38	8.78	10.17	-10.48
Current Ratio	0.90	0.98	-2.81	0.72	6.69	0.88	0.93	-0.43
D2009	0.31	0.46	0.00	0.00	1.00	0.63	0.03	14.74
D2010	0.23	0.42	0.00	0.00	1.00	0.25	0.22	0.68
D2011	0.22	0.41	0.00	0.00	1.00	0.07	0.36	-6.92
D2012	0.13	0.34	0.00	0.00	1.00	0.04	0.21	-5.07
D2013	0.10	0.31	0.00	0.00	1.00	0.02	0.18	-5.27
Dag	0.06	0.23	0.00	0.00	1.00	0.06	0.05	0.42
Dmanu	0.53	0.50	0.00	1.00	1.00	0.64	0.43	3.85
Dmin	0.10	0.30	0.00	0.00	1.00	0.05	0.14	-2.95
Dsales	0.12	0.32	0.00	0.00	1.00	0.16	0.08	2.14
Dservice	0.15	0.36	0.00	0.00	1.00	0.05	0.25	-5.32
Dtrans	0.04	0.21	0.00	0.00	1.00	0.04	0.05	-0.10
Edu	1.91	0.56	0.00	2.00	3.00	1.88	1.94	-1.10
Fin_Dev	0.95	0.27	0.27	0.91	1.56	1.00	0.91	3.18
Initial Loans	0.21	0.14	0.00	0.18	0.86	0.20	0.21	-0.67
Inventory	3.34	1.84	0.00	3.78	9.81	3.56	3.14	2.12
Leverage	0.37	0.17	0.01	0.34	0.84	0.35	0.39	-2.36
Past_User	0.31	0.46	0.00	0.00	1.00	0.24	0.38	-2.70
Policy Support	0.13	0.34	0.00	0.00	1.00	0.15	0.11	1.10
Prev_Banks	1.96	1.54	0.00	1.00	8.00	1.56	2.32	-4.75
Private	0.82	0.39	0.00	1.00	1.00	0.82	0.82	0.06
Quick Ratio	1.05	0.75	-0.02	0.87	6.69	1.00	1.10	-1.28
Receivables	3.12	1.66	0.00	3.48	8.11	3.41	2.85	3.22
ROE	0.13	0.16	-0.10	0.09	2.31	0.11	0.15	-2.15

Table 3: Correlation among the treatment and endogenous variables (p value in *italics*)

	Shadow	Credit Spread	Collateral	Amount	Maturity
Shadow	1.00	-0.01	0.28	-0.20	-0.30
		0.84	*0.00*	*0.00*	*0.00*
Credit Spread	-0.01	1.00	-0.20	-0.13	-0.44
	0.84		*0.00*	*0.02*	*0.00*
Collateral	0.28	-0.20	1.00	-0.02	-0.15
	0.00	*0.00*		*0.74*	*0.00*
Amount	-0.20	-0.13	-0.02	1.00	0.26
	0.00	*0.02*	*0.74*		*0.00*
Maturity	-0.30	-0.44	-0.15	0.26	1.00
	0.00	*0.00*	*0.00*	*0.00*	

Table 4: Probit regression of Shadow on exogenous regressors that are significant at 10% level (stepwise regression is used).

Variable	Coefficient	t value
Intercept	-2.23	-2.59
Age	-0.04	-2.06
Assets	0.46	4.98
D2009	-2.33	-8.53
D2010	-0.85	-3.99
Dsales	-0.73	-2.49
Fin_Dev	-0.80	-2.27
Adjusted Estrella's (1998) measure		0.60

Table 5: Regression of Credit Spread on exogenous variables, Shadow, and predicted values of endogenous variables. For each endogenous variable, we use a stepwise procedure to shortlist exogenous factors (significant at 10% level) in the first-stage regression. In the second-stage regression, we keep the significant exogenous factors, and add the treatment variable Shadow and the predicted value of each of the other endogenous variables generated from its own first-stage regression (see Tables 6–8). Heteroscedasticity-consistent t values are reported.

Variable	First-stage regression		Second-stage regression	
	Coef.	*t value*	*Coef.*	*t value*
Intercept	4.61	14.41	5.59	5.35
Shadow			0.53	4.69
Predicted Amount			-0.54	-0.36
Predicted Collateral			-0.37	-0.66
Predicted Maturity			-0.01	-1.05
Assets	-0.29	-8.50	-0.35	-4.15
D2009	-0.33	-4.06	0.00	0.03
D2011	0.39	3.34	0.19	1.56
Dservice	-0.77	-5.37	-0.73	-3.2
Fin_Dev	0.31	2.21	0.18	0.63
Leverage	0.82	2.90	0.87	3.31
ROE	-0.54	-1.06	-0.39	-0.76
Adj. R^2	0.40		0.45	

Table 6: Regression of Collateral on exogenous variables, Shadow, and predicted values of endogenous variables. For each endogenous variable, we use a stepwise procedure to shortlist exogenous factors (significant at 10% level) in the first-stage regression. In the second-stage regression, we keep the significant exogenous factors, and add the treatment variable Shadow and the predicted value of each of the other endogenous variables generated from its own first-stage regression (see Tables 5, 7, and 8). Heteroscedasticity-consistent t values are reported.

Variable	First-stage regression		Second-stage regression	
	Coef.	*t value*	*Coef.*	*t value*
Intercept	1.01	6.31	1.48	3.14
Shadow			0.11	2.62
Predicted Amount			0.52	0.8
Predicted Credit Spread			-0.15	-1.7
Predicted Maturity			-0.01	-1.05
Assets	0.03	1.81	-0.00	-0.04
D2012	0.13	2.24	0.11	1.79
Dservice	0.12	1.69	-0.05	-0.47
Fin_Dev	-0.38	-4.90	-0.28	-2.79
Receivables	-0.06	-3.12	-0.05	-2.24
Adj. R^2	0.21		0.22	

Table 7: Regression of Maturity on exogenous variables, Shadow, and predicted values of endogenous variables. For each endogenous variable, we use a stepwise procedure to shortlist exogenous factors (significant at 10% level) in the first-stage regression. In the second-stage regression, we keep the significant exogenous factors, and add the treatment variable Shadow and the predicted value of each of the other endogenous variables generated from its own first-stage regression (see Tables 5, 6, and 8). Heteroscedasticity-consistent t values are reported.

Variable	First-stage regression		Second-stage regression	
	Coef.	*t value*	*Coef.*	*t value*
Intercept	30.42	8.23	71.63	2.72
Shadow			-8.38	-4.29
Predicted Amount			-12.27	-0.84
Predicted Collateral			-15.05	-0.91
Predicted Credit Spread			-5.83	-1.78
Age	0.32	2.68	0.21	1.98
D2009	6.26	4.46	0.92	0.43
D2011	-4.91	-2.72	-1.72	-0.8
Dmanu	-8.21	-3.88	-7.55	-2.83
Dmin	-4.73	-1.36	-4.45	-1.21
Dsales	-6.43	-2.55	-7.37	-2.44
Fin_Dev	-5.16	-2.13	-10.96	-1.79
Past_user	-3.70	-2.79	-3.00	-2.21
Private	-3.93	-1.88	-3.89	-1.88
Receivables	2.06	3.53	1.24	1.08
ROE	12.09	1.86	6.38	0.9
Adj. R^2	0.23		0.28	

Table 8: Regression of Amount on exogenous variables, Shadow, and predicted values of endogenous variables. For each endogenous variable, we use a stepwise procedure to shortlist exogenous factors (significant at 10% level) in the first-stage regression. In the second-stage regression, we keep the significant exogenous factors, and add the treatment variable Shadow and the predicted value of each of the other endogenous variables generated from its own first-stage regression (see Tables 5–7). Heteroscedasticity-consistent t values are reported.

Variable	First-stage regression		Second-stage regression	
	Coef.	t value	Coef.	t value
Intercept	0.79	12.82	0.88	3.36
Shadow			0.00	0.09
Predicted Collateral			0.00	0.01
Predicted Credit Spread			-0.03	-0.89
Predicted Maturity			0.00	0.31
Assets	-0.06	-9.06	-0.06	-6.03
Dag	0.05	1.57	0.04	1.30
Dmin	0.10	3.77	0.09	3.50
Dservice	0.10	5.44	0.07	2.06
Fin_Dev	-0.06	-2.50	-0.05	-1.20
Past_user	-0.03	-2.16	-0.02	-1.64
Private	-0.04	-1.80	-0.03	-1.16
Adj. R^2	0.29		0.29	