Hidden Non-Performing Loans in China[*]

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Monday 8th November, 2021

Abstract

We study non-performing loan (NPL) resolution using proprietary data on NPL transactions in China. Rather than representing orderly NPL resolution, the transactions appear to reflect banks concealing non-performing assets from regulators as (i) transaction prices do not reflect underlying credit risks; (ii) banks fund the NPL transactions and remain responsible for debt collection, and (iii) after two years, over 95% of NPL packages are re-sold at a profit to bank borrowers who do not appear to be NPL resolution specialists. Our findings suggest banks remain at least partially exposed to the NPLs that were removed from their balance sheets.

JEL Classification: G21, G23, G28, G18, G38

Keywords: banking regulation, regulatory arbitrage, financial stability, Chinese economy

1 Introduction

Non-performing loans (NPLs), defined as loans in or close to default, weaken bank health and curtail bank credit supply and can lead to elevated risks of systemic financial crises and real economic disruptions (e.g., Bernanke et al., 1991; Calomiris and Mason, 2003; Iyer et al., 2014; Iacoviello, 2015). A common method of NPL resolution is to create designated financial institutions—asset management companies (AMCs)—to purchase and resolve banks' NPLs. This AMC model is also referred to as the "bad bank" model. This method has been viewed by policymakers as a viable method to resolve distressed banking assets (e.g., Geithner 2009; Avgouleas and Goodhart 2017) and has been widely used since the 1980s in both developed and developing economies. More recently, an expected surge of NPLs due to Covid-19 has prompted new adoptions of the AMC model for resolving NPLs.[1] However, despite the buy-in of various policymakers, systematic study of the efficiency of the AMC model has been scarce due to the lack of NPL transaction-level data. And even when data are available, the fact that the AMC model is typically used in highly targeted cases means such analyses have limited statistical power.

In this paper, we overcome these challenges by using proprietary data on NPL transactions to evaluate the effectiveness of the AMC model for NPL resolution. We use China as an empirical setting, where AMCs have been used extensively since the late 1990s. Four national AMCs were set up after the Asian Financial Crisis. A deregulation in 2012 not only allowed the establishment of local AMCs to acquire NPLs from banks but also permitted the most flexible and broadest use of the AMC model to date. Compared to other countries that had more targeted and short-term uses of AMCs to resolve NPLs, China puts no restrictions over the life-spans or scope of business

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[1]For instance, in December 2020, the European Commission proposed to "support the establishment and cooperation of national asset management companies (AMCs) at EU level" in its NPL Action Plan (see https://ec.europa.eu/info/publications/201216-non-performing-loans-action-plan_en). In February 2021, the Indian government proposed an AMC structure in its Budget 2021 (see https://www.bloombergquint.com/business/budget-2021-india-plans-a-bad-bank-like-structure-to-resolve-npas).

over AMCs. Importantly, apart from the local and national AMCs, no other entities could buy NPLs in bulk from banks. As a result, banks across the board increasingly removed NPLs from their balance sheets in recent years.[2] The prolonged and widespread use of AMCs permits both time-series and cross-sectional analyses to evaluate the effectiveness of the AMC model for NPL resolution. For our analyses, we source detailed NPL transaction-level data from a large local AMC, with a sample spanning from its establishment in 2014 through the end of 2019. During this period, the local AMC conducted transactions worth over US$23 billion from all of the Big 4 state-owned banks, 8 of the 12 joint-stock banks, as well as 70 smaller regional banks. The dataset contains information on a rich set of transaction characteristics and outcomes, including the transaction prices, NPL transaction contract details, and the AMC's handling of the NPLs.

This paper seeks to evaluate whether the NPL transactions from banks to the local AMC reflect the China Banking and Insurance Regulatory Commission's stated objective of a market-based orderly resolution of NPLs. To distinguish between alternative hypotheses, we document several facts on transaction prices, contract details, the AMC's handling of the NPLs, and financial market reactions. Altogether, we find evidence most consistent with banks using NPL transactions to evade binding financial regulations rather than truly resolving the NPLs. In other words, the transferred NPLs represent "hidden NPLs" as banks removed them from their balance sheets, but the banks nonetheless remain at least partially exposed to their risks. In the final part of our analyses, to evaluate the potential impact of these hidden NPLs, we conduct back-of-the-envelope calculations to evaluate the potential impact of these hidden NPLs on the financial system.

Our analysis proceeds in two steps. First, we document that financial regulations predict future NPL transactions. In China, banks are subject to a formula-based regulatory minimum on

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[2]In 2019 alone, Chinese banks reportedly disposed of 2.3 trillion yuan (over US$300 billion) of non-performing assets while the end-of-year reported NPLs amounted to 2.41 trillion yuan, according to Mr. Liu Guoqiang, Vice President of the People's Bank of China, in a state council press conference on April 3rd, 2020. The press conference minutes are available at http://www.gov.cn/xinwen/gwylflkjz79/index.htm.

the allowance for loan impairment losses relative to NPLs. Because selling NPLs to AMCs removes NPLs from banks' balance sheets and generates more slack in satisfying the regulatory requirement, banks under pressure to comply with financial regulations would benefit from selling NPLs. Consistent with this prediction, we find NPL sales concentrate in the week immediately before quarterly regulatory reporting, and a violation of the regulation in the past predicts NPL transfers to the AMC. We also find that banks have higher capital ratios in the year following NPL transactions and are less likely to violate NPL-related minimum regulatory ratios.

Then, we study whether NPL transactions reflect the actual resolution of NPLs. Pressure to comply with financial regulations may incentivize both legitimate orderly resolution and the illegitimate concealment of NPLs. Distinguishing between the two is important for financial stability. Resolution of NPLs would make banks safer, whereas concealment of NPLs is a means of regulatory arbitrage that obscures the risks in the financial system. We consider three hypotheses for why banks transact NPLs. First, the transactions may represent an orderly market-based resolution of NPLs, where the transaction prices reflect underlying risks. All NPL risks are completely transferred from the banks to the AMCs that resolve NPLs by writing off losses, collecting the loans, or other means such as securitization or selling to other market participants who do not pose systemic risk concerns. Second, the transactions may represent resolution with government support of banks. That is, just like the market-based resolution, all NPL risks are completely transferred from the banks to the AMC. Still, transaction prices need not reflect credit risks since it is boosted by (implicit or explicit) government subsidies and guarantees. Third, the transactions may represent concealment of NPLs from financial regulators, where banks coordinate with AMCs to remove NPLs from their balance sheets. In this case, transaction prices do not reflect credit risk and instead represent intermediation rents that AMCs collect for facilitating concealment. After the transactions, AMCs would offload the NPLs back to bank-affiliated third parties. Banks would

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then remain at least partially exposed to the transferred NPLs' risk.

We document four facts about NPL transaction characteristics and outcomes that are inconsistent with the orderly market-based and government-backed resolution hypotheses but consistent with the concealment hypothesis. First, despite the average NPL package consisting of loans whose maturity was one year with an average delinquency of over 4.5 years, the haircut on NPL transactions in our data are small, with the mean and median being only 5.1% and 0%, respectively. Additionally, more than 60% of the NPLs are traded with exactly 0% haircut. We also find that measures of NPL quality, such as the number of months in delinquency, the share of loans to state-owned enterprises, the share of secured loans, and the share of loans with longer maturities, all do not appear statistically related to NPL sale prices. Therefore, the NPL transaction pricing appears inconsistent with market-based resolutions, leaving government-backed resolution and concealment as the remaining admissible explanations.

Second, the sources of funds used by the AMCs to purchase the NPLs are arranged ad hoc. We document that over 90% of transactions were funded by the bank offloading the NPL and at the time of the NPL purchase. In all but nine NPL transactions, the financing agreement includes an appendix stating that the loans shall only be used to purchase the NPL of the issuing bank.[3] Banks provide funds for the AMC either through a direct loan or via an affiliated financial institution like a trust or security company. We find that when the regulation in July 2019 banned the direct lending from the banks to the AMCs to buy NPLs, usage of the direct loan method fell from 68% of the NPL transactions before the ban to 0% after the ban and the more implicit method increased from 27% before the ban to 88% after the ban. Although AMCs are supposed to be debt resolution specialists, all transaction contracts feature a collection delegation term whereby

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[3]In our conversation with the local AMC, the nine remaining NPL transactions that do not explicitly include the contract because of the close relationship between the bank and AMC and the NPL transaction value was deemed small.

the AMC delegates the obligation to collect the NPLs back to the banks.

Third, after two years, the AMC re-sells over 95% of the NPL packages with a strictly positive re-sale premium that ranges between 0.15% to 3% and has a median of 0.9%. Among the re-sold NPL packages, more than 80% are re-sold to third parties who are privately-owned firms located in the same cities as the original banks. Over 85% of the third parties are in the manufacturing, accommodation, food, or wholesale and retail industries, and over 98% of all third parties are existing borrowers of the originating banks. In addition, the AMC holds NPL packages for either exactly 6, 12, 18, 24, or 36 months before the re-sales, suggesting that the re-sales do not reflect naturally occurring trading. The longer the AMC's holding period of an NPL package, the higher the re-sale premium.

Fourth, using an event study, we find that the price of neither banks' publicly traded equity nor debt instruments responds to NPL sales. This analysis focuses on a subset of banks with publicly traded stocks or debt instruments and considers a one-trading-month window around transaction dates. If NPL transactions represent orderly resolutions known to public markets, we would expect a weakly positive price reaction around the sale date. On the other hand, the concealment hypothesis would predict no market response, as the NPL transactions are secretive. We interpret the null reaction as public financial markets either being unaware of the actual sale date or believing that NPL sales are not actual disposals. Further, we find that NPL transactions predict lower stock returns in the year following the transaction.

Some of the individual facts may be open for alternative interpretations. For instance, re-sold NPLs that stayed longer with AMC and had better prices could reflect endogenous selection along unobservable quality rather than a commission for longer concealment. However, all the evidence put together: (1) the low and mostly 0% haircut, (2) the ad hoc bank finance arrangement and collection obligation delegation term, (3) the over-stable re-sale premium and NPLs' integral

years' stay in AMC, and (4) the non-response of the financial market during the NPL transaction, jointly rule out the alternative explanations other than that NPL transactions from banks to the AMC are a method to conceal rather than resolve NPLs.

We find three parties are involved in the concealment process: (1) banks that want to remove NPLs from their balance sheets to comply with the quantity-based loan quality regulation, (2) the AMC that is compensated for acting as a pass-through entity, and (3) third-party bank affiliates who are existing borrowers of the banks and become the owners of the NPLs after the re-sales transactions where it used the loans issued by the bank to purchase the NPLs from the AMC. Because banks remain exposed in this concealment process, the transferred NPLs represent hidden NPLs, which are relevant for policymakers concerned about systemic risk as the NPL transactions are opaque (Thomson, 2011).

Due to the opaqueness of the market and the illicit nature of hiding NPLs, it is almost impossible to quantify the extent of NPL concealment in the broader market, making it difficult to precisely evaluate the external validity of our findings. However, we believe that NPL concealment is prevalent in the intended NPL resolution in China for four reasons. First, 82 banks of varying sizes transfer NPLs to the local AMC from which we got data. The wide coverage of this AMC's counter-party banks and empirical analyses controlling for unobserved bank heterogeneity suggest that bank-specific idiosyncratic characteristics do not drive our results. Second, banking regulators' actions are consistent with being somewhat aware of some illicit concealment activity. In July 2019, a rule was issued to ban the direct lending of banks to local AMCs to finance NPL transactions as a method of concealment. By the end of 2020, at least nine municipalities and provinces in China launched investigations and changed regulatory practices to clamp down on the past-through business of local AMCs. Third, the pervasive coupling of sales and re-sales is consistent with anecdotes from our conversations with industry practitioners. The perceived prevalence is one reason

why we were able to obtain data from the local AMC in the first place. Lastly, several local AMCs have been reported in the Chinese financial press to coordinate with banks and act as pass-through entities using structures in line with our findings. Lastly, several different local AMCs have been reported in the Chinese financial press to coordinate with banks and act as pass-through entities using structures in line with our findings.[4] Therefore, we believe the multitude of circumstantial evidence lends credence to the possibility that hidden NPLs are prevalent.

Finally, to quantify the potential implications of our findings, we conduct back-of-the-envelope calculations under the assumption that our findings are representative of local AMCs (but not national AMCs).[5] We estimate that hidden NPLs could amount to 2.81 to 4.62 trillion RMB in 2019 (between 117% to 192% higher than the official statistics), implying a total NPL ratio between 3.87–5.14% compared to the official reported NPL ratio of 1.86%. Because banks remain exposed to NPL losses through the third-party affiliates, who are borrowers of the banks, we perform several stylized stress tests to assess the distribution of NPL loss under stylized assumptions on loan recovery and contractual exposures. For example, a modest stress scenario with no hidden NPLs in national AMCs, a loss given default of 60%, and a pass-through rate from third parties to banks of 50% would erode 0.76 to 1.25 trillion RMB—equivalent to between 3.42 and 5.62% of aggregate regulatory capital in the banking sector. Such a substantial weakening of bank capitalization may result in a credit supply shortage.

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[4]For example, see this Yicai article from March 29, 2016, Sina article from July 16, 2019, and Jinxindezhiben article from January 6, 2021. More explicitly, this Sina article from January 27, 2021 documents how Ninxia Shunyi AMC, the second-largest local AMC in China with registered capital of 10 billion RMB, helped banks hide NPLs. Also, this Sina article from July 16, 2021 on Guohou AMC in Anhui province also reports a "special NPL parking structure," which follows the process described in this paper.

[5]Whether national AMCs are facilitating banks to hide NPLs has received less attention from the regulator or the media and therefore less obvious. One reason could be the decline of the role of national AMCs in banks' offloading NPLs. The four national AMCs have become financial conglomerates with various other business lines in recent years. By 2019, turning around NPLs accounted for less than 50% of the national AMCs' asset size or revenue. In contrast, local AMCs' sole business lines are in purchasing NPLs from banks. To account for the difficulty in assessing the nature of NPL transfers done by national AMCs, we explicitly remove them in our back-of-the-envelop calculations.

Our findings have implications for the policy design of non-performing debt resolution and for determining the supervisory and regulatory focus for promoting financial stability more generally. In the presence of binding financial regulations and opaque market structures, the AMC model with little oversight on NPL transactions can incentivize banks to devise transactions to hide their troubled assets without fully resolving the NPLs from the financial system (Thomson, 2011). By documenting the coordination between banks and distressed debt resolution specialists to conceal NPLs, we also shed light on the policy design of problem loan resolution. As stated in European Systemic Risk Board (2018), "macroprudential authorities should be able to monitor credit and other developments in a timely manner from a system-wide perspective, in order to identify...the risks that are building up at [the] banking system level and which may end up causing a system-wide increase in NPLs". For loans that are already delinquent for an extended time and are therefore unlikely to recover, a timely resolution is arguably an optimal strategy. At the "Corporate Restructuring: Lessons from Experience" conference organized by the World Bank (Pomerleano and Shaw, 2005), Yang Kaiseng, then President of China's Huarong Asset Management Company said, "Nonperforming loans are like an ice cream cone. If you don't get rid of them, they melt all over your hands, and you don't have anything left to sell. The key issue for the seller is the price it is willing to accept today to avoid the wait and the commitment of resources required for potential collection." Relatedly, the mandatory charge-off of retail loans that are delinquent for 180 days in the United States reflects the emphasis on timely resolution.

Relating to our setting specifically, the financial fragility in a large economy such as China can have global implications. With China's banking sector more than two times as large as the U.S. banking sector in total assets, hidden NPLs in China may have far-reaching spillover effects in the international financial system. Finally, although bank supervisors in China may be aware of some concealment activity, they may not know the quantitative extent to which banks engage in these

transactions. To this end, we believe our research is empirically relevant for both policymakers and academic research.

After discussing the related literature below, we proceed as follows: Section 2 discusses the framework of NPL management in China and the data sources. Section 3 shows the relation between bank regulations and NPL transactions. Section 4 discusses the resolution versus concealment hypotheses, then shows empirical evidence of concealment based on the transaction characteristics and outcomes including pricing, financing, re-sale, ultimate owners of NPLs, and also presents our back-of-the-envelope stress tests. Section 5 concludes.

Related Literature

The extant literature on the Chinese banking sector motivates our measures of financial regulatory pressure across different regions. For example, Fan et al. (2013) show that institutional environment is an important factor in predicting post default outcomes, and Gao et al. (2021) find that local governments selectively default on banks with weaker political strength. Therefore, our analyses relating regulatory pressure on bank NPL sale behavior consider both measures of whether local banking regulators are politically connected with the central party and whether they have strong career concerns.

Our study contributes to the literature on the measurement and resolution of NPLs. Bank distresses and failures are characterized by a high fraction of NPLs and poor asset quality (Demirgüç-Kunt, 1989; Cole and White, 2012; DeYoung and Torna, 2013). Unresolved NPLs on banks' balance sheets curtail potential credit supply. As borrowers and lenders form relationships, borrowers

cannot easily substitute for lost bank financing, leading to real economic disruptions.[6] Jiménez et al. (2017) argue that high NPLs impede bank response to countercyclical capital buffers due to binding market constraints. Therefore, accurately and timely recognizing NPLs is crucial for assessing the safety of banks and the stability of the financial system and economy as a whole.

Our study is also related to the literature on the effectiveness of financial regulation. Financial institutions are widely documented to take on risks and financial structures to circumvent the significant regulatory requirements and monitoring requirements imposed on them. Acharya et al. (2013) document that commercial banks securitize assets without risk transfers and yet reduce regulatory capital requirement prior to the Global Financial Crisis. Begley et al. (2017) find that banks strategically under-report the risk in their trading books to avoid capital surcharge. Flanagan and Purnanandam (2019) study a regulation change in India which revealed banks underreported their losses. At a broader level, banking regulation may lead to unintended consequences on other aspects of the financial system. Nadauld and Sherlund (2013) show that a 2004 change in the capital requirements for investment banks spurred them to engage in excessive securitization. In terms of banks' "regulatory arbitrage" actions, Acharya et al. (2019) document that wealth management products typically mature at quarter ends, helping the issuing banks to temporarily boost the level of deposits so as to stay below the loan-deposit limit, consistent with the seasonality in NPL sales at the end of quarters which we observe. Along a similar vein, our findings contribute to the literature by documenting an alternative means through which banks may evade regulatory scrutiny, with systemic risk implications.

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[6]Lending relationships may arise as solutions to different forms of asymmetric information, such as adverse selection of borrowers that switch lenders (Sharpe, 1990) or moral hazard problems of borrowers without enough "skin in the game" (Holmstrom and Tirole, 1997). As a result, lenders can enjoy a decline in screening or monitoring costs when lending to repeated borrowers. Numerous studies document that lending relationships are persistent and can lead to real effects on the borrowers (e.g., Dahiya et al., 2003; Bharath et al., 2007; Canales and Nanda, 2012; Chodorow-Reich, 2014; Cenni et al., 2015; Carvalho et al., 2016).

2 Institutional Setting and Data

2.1 Management of Non-Performing Loans in China

The China Banking Regulatory Commission (CBRC) and its successor, the China Banking and Insurance Regulatory Commission (CBIRC),[7] regulates banks and their asset quality. Since 1998, commercial banks in China are required to adopt a five-category risk-based classification for their loans. The five categories, in increasing order of riskiness, are "normal," "special mention," "substandard," "doubtful," and "loss." The last three categories are collectively considered NPLs. Although classifying loans over 90 days past due as NPLs is a commonly adopted standard internationally,[8] there is no direct mapping between the delinquency status and the five-category classification in China. Instead, banks are allowed to use their internal risk models to classify the loans in the five-category system.[9]

Asset management companies (AMCs) were first created by the central government between 1998 to 1999 to clean up the growing NPLs of state-owned commercial banks, which rose to 25% of total loans in the Asian Financial Crisis (Chen, 2002; Fung and Ma, 2002). A dedicated AMC was set up for each of the Big 4 state-owned banks to acquire and then resolve its NPLs. Similar to AMCs or "bad banks" in other countries such as the Resolution Trust Corporation in

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[7]The CBIRC was formed in April 2018 with the merger of the CBRC and the Chinses Insurance Regulatory Commission. In the remainder of the paper, we use the term "CBIRC" to refer to both the current regulator and its predecessor for simplicity, except in occasions where we reference specific rulings with CBRC/CBIRC in their statute numbers for accuracy.

[8]This definition is adopted by the IMF, see page 5 of https://www.imf.org/external/pubs/ft/bop/2005/05-29.pdfhttps://www.imf.org/external/pubs/ft/bop/2005/05-29.pdf.

[9]Following the main recommendations from China's 2017 Financial Sector Assessment Program (FSAP) and the Basel Committee's final guidance on the *Prudential treatment of problem assets - definitions of non-performing exposures and forbearance*, the CBIRC made the *Provisional Measures for the Risk Classification of Commercial Bank Financial Assets (Public Comment Draft)* available to the public for comment on April 30, 2019. The Provisional Measures (Public Comment Draft) require that loans over 90 days past due (including after rollovers) shall be classified as non-performing, even when collateral is assessed to be sufficient. As of this writing, the final ruling on the provisional measures has not been established.

the United States (FDIC, 1997, 1998), the AMCs are the most likely savior of the banking system (IMF, 2012). Without such specialized vehicles to absorb toxic assets, banks are forced to hold onto NPLs and may lack resources to make new loans (Fredriksson and Frykström, 2019). A total of 1.3 trillion RMB of NPLs made before 1996 were transferred from banks to the AMCs at their face value (Peiser and Wang, 2002). In the 2000s, the four national AMCs participated in several subsequent waves of NPL transfer to improve the commercial banks' asset quality for their IPOs (Luo, 2016). Following the AMC model used in the past, these national AMCs were initially established in 1999 with a tenure of 10 years. Late in 2009, their tenure was extended to an indefinite period. In addition, the restrictions placed upon the national AMCs to purchase NPLs from their specific affiliated banks are also lifted, so from then on, they were free to purchase NPLs from any financial institution. In recent years, the four national AMCs have become financial conglomerates with various other business lines.

After the Global Financial Crisis, the Chinese government adopted multiple initiatives to reduce leverage and combat distressed debt more specifically, including the permission to establish local AMCs. In 2012, the Ministry of Finance of China (MOF) and the CBRC jointly issued the *Measures for the Administration of the Batch Transfer of Non-Performing Assets of Financial Enterprises* to permit the establishment of local AMCs to acquire NPLs from banks. Initially, only one local AMC could be established per province. Furthermore, local AMCs were not allowed to sell the NPLs they acquired to other entities, and the only resolution permitted was debt restructuring. In 2016, a regulatory amendment relaxed the entry restriction to two local AMCs per province and allowed local AMCs to sell their inventory of NPLs to entities in other provinces (CBRC, 2016). The local AMCs are directly monitored and regulated by the local governments and are subject to the CBIRC certification for their distressed debt business. National AMCs, on the other hand, are deemed as non-depository banking institutions and are therefore regulated by

the CBIRC.

By the end of 2019, 59 local AMCs were set up and certified by the CBIRC. All 31 provinces in mainland China had at least one local AMC, and most provinces had two.[10] Banks transfer NPLs to AMCs in the form of NPL packages consisting of at least 10 NPLs (also called a "batch" or "bulk" transfer). In such a transaction, the risks associated with the NPLs are deemed as being transferred to the AMC, and therefore the bank removes the transferred NPLs from its balance sheet. Under the current regulatory framework, only designated national and local AMCs can receive bulk NPL transfers from banks.[11] In other words, transferring to AMCs is the only viable option for banks to dispose of large numbers of NPLs.

2.2 Data Sources

We combine proprietary and publicly available data from several different data sources for our analyses. First, we obtain information on all NPL transactions from a leading local AMC in a relatively developed province of China. For security reasons, we mask the company. It was one of the first local AMCs established and certified by the CBIRC. The AMC is owned by a mix of provincial government and private ownership, which is representative of local AMCs. The sample of NPL transactions spans from the AMC's establishment in the third quarter of 2014 through the end of 2019.

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[10]Appendix Figure A.2 shows that the establishment of the first AMC in a province is preceded by deteriorating local economic fundamentals, both in terms of the provincial GDP growth and government revenue. Due to this endogeneity, the entry of local AMCs would not be a plausibly exogenous event for a difference-in-differences analysis. We document these facts to understand the economic conditions around when local AMCs are established. The goal of this paper is to provide evidence for the concealment of NPLs using detailed transaction data, not to attempt to establish any causal relations between local AMC entry and financial or real outcomes.

[11]In 2017, the Shenzhen NPL Pilot Program was set up by China's State Administration of Foreign Exchange which allowed foreign investors to purchase NPLs directly from Chinese banks with branches in Shenzhen but only on a non-bulk basis. However, the pilot program allowed foreign investors to purchase bulk NPLs from AMCs that list their NPL portfolios on the Qianhai Financial Assets Exchange and other local exchanges. In addition, certain rules pertaining to the handling of NPLs have changed due to Covid-19, but we do not discuss them in detail as our sample and analysis ended in December 2019.

Then, we supplement the proprietary data with bank-level financial information and other characteristics from Wind and BankScope. We include measures of local economic conditions, such as local GDP growth, local tax revenue growth, and local unemployment rate, as control variables in our regression analyses. As in Chen et al. (2019), we also include the percentage change in electricity usage as an alternative measure of local economic conditions, which may be less susceptible to manipulation. Data on economic indicators are obtained from the National Bureau of Statistics of China, OECD, the World Bank, and other publicly available sources through the Wind and CEIC data aggregators. Whenever the same variables are available in multiple databases, we cross-check the data to ensure consistency and accuracy.

[Table 1 here]

Our sample covers 257 NPL transactions with a total amount traded of 165 billion RMB (approx. US$23 billion), consisting of a total of 29,555 loans from 22,230 borrowers coming from 82 banks spanning over 20 provinces across China. The sample includes all Big 4 state-owned commercial banks, 8 joint-stock banks, and 70 smaller regional banks. In addition, 7 of the banks in our sample are headquartered in first-tier cities, 12 banks in second-tier cities, and 62 banks in third-tier cities. Table 1 reports the characteristics of banks covered in our sample. The median total loan is 51 billion RMB (approx. US$7.3 billion), and the median profits are 1.36 billion RMB (approx. US$194 million). The median bank-year observation satisfies the bank capital regulation with a 13% capital ratio, and the minimum capital ratio is 10.8%, slightly above the 10.5% regulatory minimum.

As our data come from one local AMC, it is important to assess the representativeness of our data. Appendix Section A.2 studies the sample selection based on observable characteristics and finds that the most important predictor for sample entry is the distance from a bank to the

AMC's headquarter. Appendix Section A.6 further assesses the representativeness of our AMC with respect to the whole market using AMCs' financial data.

3 Bank Regulation and NPL Transactions

In this section, we test the importance of financial regulation as a determinant of NPL transactions. We describe the quantity-based loan quality regulation in China and then document that regulatory pressure predicts NPL transactions.

3.1 Regulatory Setting

In China, banks are required to report three key ratios of loan quality: (1) the NPL ratio, defined as the balance of NPLs relative to the total balance of loans and advances to customers; (2) the allowance-to-NPLs ratio, defined as the allowance for loan impairment losses relative to the total balance of NPLs; and (3) the allowance-to-total loans ratio, defined as the allowance for loan impairment losses relative to the total balance of loans and advances to customers. Banks disclose the balance of NPLs and these three ratios in their quarterly, semi-annual, and annual financial reports.

Since 2011, the two allowance ratios have regulatory minimums and stipulate how banks set aside allowance for loan losses. More NPLs force banks to set aside higher allowances which reduces their profits. This quantity-based loan quality regulation approach differs from the mandatory charge-off of delinquent loans in other countries.[12] Under the minimum allowance regulation, Chinese banks are not required to charge off delinquent loans.[13]

Originally, in 2011, the regulatory minimums for the allowance-to-NPLs ratio and the allowance-to-total loans ratio were set to be 150% and 2.5%, respectively (CBRC, 2011). Then, in 2018, the

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[12]For instance, the Uniform Retail Credit Classification and Account Management Policy in the United States require banks to charge off all retail loans past due for 180 days.

[13]For example, ICBC, the largest bank in China, reported that 0.57% of its total loans (95.5 billion RMB or approx. US$13.6 billion) were past due for over one year as of December 31, 2019.

CBIRC relaxed the requirements by allowing the regulatory minimums for the allowance-to-NPLs ratio and the allowance-to-total loans ratio for certain banks to be as low as 120% and 1.5%, respectively (CBRC, 2018). The exact regulatory minimum for a particular bank mainly depends on the accuracy of loan classification, disposal of NPLs, and capital adequacy. The banking regulator issues risk warnings and rectification orders to banks in violation of the regulatory standard and may take other regulatory measures pursuant to China's Banking Supervision Law (Article 23 of CBRC, 2011).

3.2   The Effect of Bank Regulation on NPL Transactions

We first study the premise that bank regulation in China affects banks' NPLs transaction behavior. If NPL regulations are not binding, we would expect no relationship between the stringency of financial regulation and NPL sales, as banks would not have any incentive to move NPLs off balance sheets in the first place and violate the required thresholds. We find two pieces of suggestive evidence that are consistent with binding financial regulations driving NPL sales.

[Figure 1 here]

First, Figure 1 shows clustering of NPL transactions in the week before each quarter-end, the point of time when reporting of financial conditions to the regulator is due. Studying the calendar month cyclicality of sales across our sample from 2014 to 2019, we find the average number of transactions in March, June, and September account for around half of all transactions in the first, second, and third quarters, respectively. In addition, the average number of transactions in December alone is two-thirds of all transactions in the fourth quarter. Altogether, transactions in the last month of each quarter account for double the number of transactions in non-end-of-quarter months. This finding is consistent with extant evidence that regulation based on a non-continuously-sampled point-in-time evaluation of bank risk introduces window dressing incentives

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(Paish, 1939; Allen and Saunders, 1992; Hoag, 2016; Du et al., 2018; Cai et al., 2019).

Figure A.4 shows the histogram of the two regulatory allowance ratios in the bank-year sample. Both allowance ratios appear binding. The top panel shows bunching to the right of the 150% minimum allowance-to-NPLs ratio, and the bottom panel shows bunching to the right of the 2.5% minimum allowance-to-total loans ratio. In untabulated analyses, we find no obvious bunching around the cutoffs of other regulatory ratios such as the capital ratio or the loans-to-deposits ratio. In subsequent analyses, we focus on the 150% minimum allowance-to-NPLs ratio as there appears to be stronger bunching in the regulatory cutoff of this ratio. The allowance-to-NPLs ratio is more sensitive to the amount of NPLs on a bank's balance sheet than the allowance-to-total loans ratio.

Second, we directly test whether NPL regulation violations predict more NPL sales in a linear panel regression using a balanced bank-year sample.[14] We use the following specification,

$$NPL\ Transaction_{i,t} = \alpha_i + \alpha_t + \beta Violation_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t}, \tag{1}$$

where $Violation_{i,t-1}$ is an indicator of whether a bank i violated the 150% minimum allowance-to-NPLs ratio in year $t-1$, and $X_{i,t-1}$ are controls, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province. α_i and α_t represent bank and year fixed effects. The outcome variable $NPL\ Transaction_{i,t}$ is a measure of NPL transactions, including an indicator of whether any transaction is observed. We cluster standard errors by bank to allow for within-bank correlation in the error term.

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[14]Although the indicator of regulation violation is a binary variable, we adopt a linear model as our baseline specification. We include bank fixed effects, which absorb unobserved bank-specific heterogeneity that may confound our variables of interest. The alternative is to use a nonlinear binary choice model such as the probit or logit model. Due to the incidental parameters problem, fixed-effects probit and logit models result in estimates inconsistent in the large sample and biased in the small sample. Nonetheless, in untabulated analyses, we obtain estimates from a probit model that are qualitatively and quantitatively similar to the linear estimates in Table 2 Panel A.

Panel A of Table 2 shows that banks in violation of the 150% minimum allowance-to-NPLs ratio are more likely to conduct NPL transactions. Column (1) shows the reported NPL ratio – the statistic reported to the banking regulators – does not predict NPL transactions. Column (2) shows banks in violation of the minimum of the allowance-to-NPLs ratio are 25-percentage-points more likely to have any NPL transaction in a given year. In addition, Appendix Section A.5 study additional mechanisms interacting with regulation: bank health, financial regulatory strictness, and financial market pressure. We find the estimated effect of violating the minimum allowance-to-NPLs ratio on NPL sales is more pronounced among smaller banks, banks facing stricter regulators, and banks with a higher dependence on the interbank market.

Altogether, the quarter-end clustering of NPL transactions, the bunching of loan quality ratios around regulatory thresholds, the relation between NPL regulatory tightness and NPL sales, and additional analyses based on bank size, regulator characteristics, and financial market pressure in the Appendix Section A.5 jointly suggest financial regulation is a driver of NPL sales.

3.3 NPL Transactions and Future Bank Health

By reducing NPLs on banks' balance sheets, NPLs transactions improve banks' balance sheet health, which may allow them to make new loans after the transaction. To study NPL transactions and future bank health, we consider a panel regression specification of the form:

$$y_{i,t+1} = \alpha_i + \alpha_t + \beta \, Sold \, NPL_{i,t} + \phi Violation_{i,t} + \psi \left(Sold \, NPL_{i,t} \times Violation_{i,t} \right) +$$
$$\gamma Reported \, NPL_{i,t} + X'_{i,t}\Gamma + \varepsilon_{i,t+1}, \tag{2}$$

where $Sold \, NPL_{i,t}$ is an indicator variable taking the value of one if a bank i had NPL transactions in year t and other variables are defined analogously as in Equation (1). The outcome variables

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$y_{i,t+1}$ are measures of future bank health, including future loan expansions, future capital ratio, and future violations of the 150% allowance-to-NPL ratio. As before, standard errors are clustered by bank. The coefficients of interest are β and ψ, which summarize the predictive relationship between past NPL transactions and the future bank health measure y_{t+1}. β is the coefficient for whether a bank sold NPLs that year and ψ is the differential coefficient for a bank sold NPLs and also violated the 150% allowance-to-NPLs ratio requirement in the previous year.

Panel B of Table 2 shows that NPL transactions in the previous year predict more loan expansion (Columns (1) to (3)), higher capital ratios (Columns (4) to (6)), and a lower probability of violating the 150% minimum allowance-to-NPLs ratio (Columns (7) to (9)). As further corroborating evidence that financial regulation appears binding, banks violating the NPL regulation are less likely to violate the same rule in the future, a consequence of selling NPLs. In Column (3), we find banks that previously violated the 150% minimum allowance-to-NPLs ratio increase loans even more if they sell NPLs in the previous year. As in the previous analyses studying drivers of NPL sales, reported NPL ratios do not statistically significantly correlate with any of the three measures of future bank health.

Overall, NPL transactions appear to respond to the stringency of financial regulation, and banks with NPL sales appear healthier in the subsequent year in terms of capital adequacy and loan growth, and they are also less likely to violate the 150% minimum allowance-to-NPLs ratio.

4   Are NPL Transactions Resolution or Concealment?

In this section, we examine whether NPL transactions represent actual resolution or mere concealment of NPLs. The empirical patterns we document in Section 3 are consistent with both actual resolution of NPLs as well as concealment of NPLs from financial regulators. Resolution of NPLs would make banks safer, whereas concealment of NPLs is a means of regulatory arbitrage that obscures the risks to which banks are exposed. We discuss the plausible scenarios and their

corresponding empirical predictions for the NPL transaction characteristics and outcomes below.

4.1 Empirical Predictions

NPL transactions can either be actual means of resolving bad debt or concealment from financial regulators. We consider three scenarios, two corresponding to resolution and one corresponding to concealment.

Scenario 1: Orderly Market-Based Resolution

The first plausible scenario is that NPL transactions represent an orderly market-based resolution of NPLs where price discovery through market mechanisms is used to allocate NPLs from banks to AMCs, consistent with Kane (1990), who highlights the importance of transparent market-based pricing to appropriately allocate NPLs across financial institutions in the aftermath of the S&L crisis. In China, the 2012 deregulation aims to cultivate a functioning market of distressed debt with the over-arching objectives "to revitalize the non-performing assets of financial firms, enhance risk resilience, and promote financial deepening to support economic development" (Article 1 of MOF and CBRC, 2012). Consistent with the market-oriented goal, the policy document details specific clauses for local AMCs' corporate governance, due diligence, price discovery, contract enforcement, and dispute resolution, among others.[15] In this market-based resolution scenario, one should expect to see that the AMCs acquire NPLs from banks at fair prices and work to resolve the NPLs.

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[15]For instance, for NPL valuation, the policy document stipulates that "to determine asset transfer pricing, financial firms should conduct the sell-side due diligence, adopt scientific valuation methods, predict the recovery of non-performing assets loan by loan, and reasonably estimate the value of assets" in Article 11. In Article 16, the policy document explicitly requires that "financial firms shall determine the transferee AMC in accordance with the principle of market economy."

Empirical Predictions. If the NPL transactions from banks to AMCs represent market-based resolution, the transaction prices should reflect fundamentals under risk-based pricing. This generates the following cross-sectional predictions. Firstly, the transaction prices should have a discount (a positive haircut) relative to the face value, as all the transferred NPLs are, by definition, non-performing, and the recovery rate will be weakly lower than 100%. Secondly, risk-based pricing indicates that NPLs with higher credit risk should be transferred at higher haircuts. Thirdly, we expect NPLs transferred by banks that violate the allowance-to-NPLs ratio to have higher haircuts than NPLs transferred by other banks because the violating banks are more desperate to remove NPLs from their balance sheets.

In this scenario, banks transfer the risks associated with the NPLs to AMCs. After the NPL transactions, AMCs engage in a resolution process. One possibility is that AMCs engage in debt collection. If AMCs sell the NPLs in the secondary markets, the risks are further transferred to other market participants. The duration at which NPLs stay with the AMCs should vary with the underlying quality of loans. On the one hand, worse quality NPLs may be more difficult to resolve and, therefore, lower resolution value. On the other hand, AMCs are more willing to hold on to better NPLs for longer and may hold out for a better resolution value.

Scenario 2: Government-Backed Resolution

An alternative resolution mechanism involves explicit or implicit government support. The AMCs can act as agents of the governments to bail out the troubled banks through their acquisitions of NPLs from banks. We refer to this alternative resolution scenario as a "government-backed resolution." In systemic financial crises where the market cannot self-heal due to externalities, government support may be necessary to restore the banking sector. Historically, AMCs are often

government-backed, such as WestLB in Germany after the Global Financial Crisis,[16] or the creation of national AMCs in China to clean up the national banks' NPLs in the late 1990s. As local AMCs are primarily owned by local governments (Panel A of Appendix Table A.6), they may be used as part of a government-backed resolution. The acquisition prices in the government-backed resolution may be higher than the fair prices, with the difference corresponding to the magnitude of the government subsidy. In this scenario, one would also expect to see that after the AMCs acquire NPLs from banks, they resolve the NPLs.

Empirical Predictions. Suppose the NPL transactions from banks to the local AMCs represent government-backed resolution. In this case, the transaction prices may not reflect fundamentals: Firstly, we may see NPL transactions at a lower discount or even at a premium relative to the face value. Secondly, the positive relationship between credit risk and haircut under risk-based pricing can break down and even turn negative if the government support is disproportionately allocated to unhealthy banks. Thirdly, we might also observe that bank health is not related to the haircuts of the loans sold by the bank. In this scenario, the NPL transactions correspond to a transfer of risks from banks to AMCs and will be followed by a resolution process (similar to Scenario 1). As the AMCs act as agents of the governments, other government entities may also participate in the resolution.

Scenario 3: Concealment

Regardless of whether the resolution is market-based or government-backed, the risks of NPLs are resolved outside of the banking sector. However, the resolution is not guaranteed. The regulatory permission to off-load NPLs via AMCs does not fully prevent banks from devising strategies to conceal their NPLs without proper resolution. The concealment incentive is particularly strong

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[16]See https://www.ft.com/content/2dd5e784-b36b-11de-ae8d-00144feab49a.

when the loan quality regulation severely constrains banks. That banks hide losses or manipulate transactions to avoid binding regulatory constraints has been documented in the academic literature, using data both in developed and developing markets. For example, Acharya et al. (2013) document such behavior in the United States prior to the Global Financial Crisis, and Begley et al. (2017) document such behavior in India.

Empirical Predictions. If the NPL transactions from banks to AMCs reflect concealment of NPLs from regulatory scrutiny, banks, and AMCs coordinate to arrange non-market-based transactions. The pricing of NPL transactions may not reflect fundamentals, similar to the predictions laid out for Scenario 2 above. However, the key difference from Scenario 2 is that the coordination between banks and AMCs to conceal NPLs from regulatory scrutiny also implies that the AMCs are not engaged in the actual resolution of the NPLs.

In this scenario, banks retain some risk exposure to the transacted NPLs, contrary to the intended full risk transfer, which is reflected in the accounting treatment of removing NPLs from their balance sheets. A concealment arrangement may also show other patterns inconsistent with full risk transfer. For example, banks may provide funding to the AMC to purchase the NPLs from themselves. Another possibility is that banks may still retain the credit risks of the NPLs through off-balance-sheet vehicles. If so, the initial transactions of NPLs from banks to AMCs are likely to be followed by subsequent sales of NPLs from AMCs to other entities as AMCs themselves off-load the NPLs from their books. The prices and the buyers observed in the re-sale transactions are useful to assess the nature of the re-sales. If AMCs negotiate with banks to get more intermediation revenue, we will observe that the longer the NPLs stay with the AMCs, the lower the re-sale haircut relative to the AMCs' purchase prices.

All three plausible scenarios are multi-faceted. Therefore, making the distinction requires a

holistic approach that covers multiple relevant facets. In what follows, we adopt such a holistic approach and jointly examine different aspects of transaction characteristics and outcomes to evaluate which of the three scenarios is supported by the data.

4.2   Characteristics of NPL Transactions

Table 3 presents the characteristics of the 257 NPL transactions in our sample. Panel A reports the composition of NPLs in the packages. The mean and median size of the transacted NPL packages are 642 million and 264 million, respectively. The average transacted NPL package includes 108 loans from 82 borrowers and has average delinquency of 55 months. Around 85% of the loans are corporate loans with contractual maturity of less than one year. Therefore, although a typical loan in the transacted package matures in less than one year, the borrower has not repaid the loan for over 4.4 years. Around one third of the loans are collateralized and the rest are either guaranteed[17] or unsecured.

[Table 3 here]

Panel B shows the characteristics of the transaction contracts. The AMC earns an average annual commission fee for holding the NPL of 0.542%. In addition, every transaction contract contains an NPL collection delegation term, whereby the AMC appoints the bank to continue collecting the loan.

4.3   Pricing of NPL Transactions

The haircut of the NPL transaction price relative to the face value of the loans has a mean of 5.1% and a median of 0%. Figure 2 shows the empirical cumulative distribution of haircut across the 257 NPL transactions. Despite the NPLs having average delinquency of almost 4.5 years, NPL transactions prices show low, even negative, haircuts: 8% of all transactions had a premium relative

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[17]A guaranteed loan is a loan in which a third party (guarantor) agrees to pay in the event that the borrower defaults.

to face value. Around 60% of all transactions had exactly zero haircuts, and 30% of transactions had a positive haircut, but less than 3% had a haircut of 30% or more relative to the book value of the loans. The haircuts observed in our sample are in stark contrast to the typical haircuts in NPL sales: For example, in China, several individual (as opposed to bulk) NPLs were held in the publicly available platform Taobao in the same period, with an average haircut between 20 to 60% (McMahon, 2019). In Japan, the Cooperative Credit Purchasing Company (CCPC) purchased NPLs backed by real estate at 62% haircut from 1992 to 1998 (Packer, 2000).

The summary statistics in Table 3 and Figure 2 suggest NPL pricing patterns do not appear to compensate for credit risk. We test this conjecture more directly below in a panel regression to assess the relation between haircut and the characteristics of sold NPLs. We consider the following specification:

$$Haircut_{i,t} = \alpha_i + \alpha_t + \beta Quality_{i,t} + \phi Capital\ Ratio_{i,t-1} + \gamma Violation_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t}, \quad (3)$$

where i indexes a bank and t indexes a year. We collapse all the NPL packages a bank sells to the AMC in a year into one bank-year observation and compute value-weighted haircut and characteristics using the face value of NPL packages as weights. The outcome variable, $Haircut_{i,t}$, is the weighted-average haircut of NPL packages sold by bank i in year t, $Quality_{i,t}$ is a weighted-average measure of NPL quality in NPL packages sold by bank i in year t, $Capital\ Ratio_{i,t-1}$ is the capital ratio of bank i in year $t-1$. Apart from considering the capital ratio as an explanatory variable of interest rather than simply a control variable, other specification details follow those in Equation (1).

[Table 4 here]

Table 4 presents the results for four different measures of characteristics of sold NPLs: the av-

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erage delinquency, the share of loans to state-owned enterprises (SOEs), the share of secured loans, and the share of loans with maturity greater than 1 year. In Column (1), we find NPL packages with a one-standard-deviation higher average delinquency of 14 months carries a lower haircut of 2.8 percentage points (approx. 28% of one standard deviation). So, worse-performing NPL packages are sold at a higher price, the exact opposite of what we would expect if the transaction price were market-based. In addition, we find NPL sales from banks with a higher capital ratio have a higher NPL haircut. In contrast, we would have expected banks with lower capital ratios – more unhealthy banks – to sell at lower prices if they were more eager to offload NPLs.

Furthermore, there is no statistically significant relation between NPL transaction pricing and whether a bank violates the 150% minimum allowance-to-NPLs ratio. The other three measures of NPL quality – the share of loans to SOEs, the share of secured loans, and the share of loans with a maturity greater than one year – in Columns (2) to (4) are all not statistically significantly associated with the haircut.

Therefore, NPL transaction pricing appears inconsistent with the market-based resolution hypothesis as the transaction prices of NPLs do not appear related to the underlying quality of the NPLs, or whether a bank is under more pressure to sell the NPLs.

4.4 Financing of NPL Transactions

Our data also include information on how each NPL transaction was financed. If the financing comes from the originating banks, we observe three possible exact sources of funds: a direct loan from the originating bank, a financing agreement from the originating bank via a trust company[18], and a financing agreement from the originating bank via a securities company. For a transaction whose source of funds does not fall into one of these three categories or is unavailable, its source of funds is recorded as "other means." Anecdotally, employees at the local AMC suggest the residual

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[18]A trust company in China is a non-depository banking institution that is regulated by the CBIRC.

category still traces back to the originating banks but through more complicated channels. Thus, to be conservative, we treat this last category as not being funded by banks in our analyses.

[Table 5 here]

In July 2019, a rule was issued by the CBIRC to ban the direct lending of banks to local AMCs to finance NPL transactions. The composition of the source of funds changed significantly after the July 2019 ruling. Panel A of of Table 5 shows that before the restriction, over two-thirds (68.5%) of transactions were financed via a direct loan; around a quarter of NPL transactions were financed through a bridge financing agreement via either a trust company or a securities company. Only 4% of transactions were financed through other means. After the July 2019 restriction banned direct loan financing, 88% of transactions were financed via a bridge financing agreement, and 12% through other means (Panel B).

Panel C of Table 5 studies whether banks are more likely to provide a direct loan to the AMC to finance the NPL transaction based on their characteristics. Lending directly to the AMC to finance an NPL transaction is more detectable than indirect financing through a trust or securities company. Therefore, before the July 2019 rule change, we posit that banks with poorer health would be more likely to use direct loans than banks that could afford to arrange affiliated vehicles to finance the transaction. We test this prediction using a regression of the form

$$Direct\ Loan_{i,t} = \alpha_i + \alpha_t + \beta Quality_{i,t} + \phi Capital\ Ratio_{i,t-1} + \gamma Violation_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t},$$

(4)

where we convert the NPL transactions into the bank-year level where i indexes a bank and t indexes a year and compute value-weighted variables using the face value of NPL packages as weights. *Direct Loan*$_{i,t}$ is the value-weighted share of whether an NPL transaction was financed

by the bank's direct loan to the AMC. Other specification details are as in the Equation (3).

We find that the quality of the NPL does not affect whether banks made a direct loan to the AMC to finance the transaction. Instead, we find that a bank with a lower capital ratio or one that violated the 150% minimum allowance-to-NPL ratio in the previous year is more likely to finance the NPL transaction directly through a loan. This implies that banks more desperate to sell their NPLs are more likely to make a direct loan to the AMC to finance the transaction.

4.5 Prevalence of NPL Re-sales

The analysis of NPL transaction prices in Section 4.3 raises a puzzle: Why would the AMC ever pay more than the face value for NPLs? A possible explanation is that the AMC expects to make a profit through its handling of the loans. In this sub-section, we study how the AMC handles the NPL packages after purchasing them from the banks. As discussed in Section 4.1, AMCs may either resolve NPLs themselves or off-load the NPLs to other entities. If AMCs resolve the NPLs through debt collection, they can never collect more than the face value of those loans, and therefore will never be able to make a profit. Therefore, trading the loans to other entities seems plausible for seeking a profit. We next explore whether AMCs re-sell the NPLs, the entities to which they re-sell the NPLs, and the prices at which the NPL re-sales occur.

[Table 6 here]

Table 6 Panel A traces out the decomposition of the AMC's handling of NPL packages conditional on the time elapsed since the initial NPL transactions. Within the first year after the initial NPL purchases from banks, the AMC keeps 67.7% of NPL packages while selling 2.94% of the packages to another AMC and 27.4% to a different entity, which we call a third-party. The probability of re-sales reaches almost one-third within one year. The AMC sells the vast majority of the NPL packages to other entities in about two to three years. After two years, the fraction of NPL

packages staying with the AMC further drops to 3% or below, and the fraction of re-sold packages is greater than 96%. Third-parties are the major buyers of the NPL packages in the re-sales. Over-all, re-selling the NPL packages is the dominant approach that the AMC adopts to handle the NPL packages it purchases from banks, and it on average takes the AMC about two to three years to complete the re-sales.

Panel B presents summary statistics of the re-sale transactions and the characteristics of the third-party buyers. On average, an NPL package stays with the AMC for 21 months, ranging from 6 months to 48 months. 100% of the re-sold NPLs are sold at a premium relative to AMC's purchase price: The minimum premium is 0.15%, and the maximum is 3%, with a mean of 1% and a median of 0.9%. Even among the NPLs purchased at a premium relative to face value, we find an average of 0.6% re-sale premium. None of the re-sold NPL packages undergoes another round of bundling or re-packaging ("re-syndication").

As for the characteristics of third-party buyers in the re-sales, although we do not observe their exact identities due to confidentiality reasons, we obtain information on their ownership structure, location, industry, and relationship with the original banks. 5% of the re-sold packages specify the identity of the third-party buyers in the contracts of initial transactions. All of the third-party buyers are located in the same cities as the original banks. In addition, none of the third parties are state-owned enterprises (SOEs), making a government-sponsored bailout of banks through SOEs an unlikely explanation. In terms of the industry of third parties, the modal industry is in manufacturing, followed by accommodation, and then wholesale and retail industries. These three industries comprise over 85% of the third-party buyers. To the extent that some NPLs were collateralized by land or real estate, we expect third parties to be real estate companies. Yet, only a little over 2% of the third parties are in the real estate industry. Therefore, the third parties that become the owners of the NPL packages after the re-sales do not appear to be debt resolution

specialists. Last but not least, the majority of the third parties are affiliates of the original banks: 95% of the third parties are borrowers of the banks, and an additional 3% are discounted bill users of the banks. Only 1.4% of the third parties do not have a prior borrowing relationship with the banks and therefore are classified as "others."

Next, we study the relation between NPL re-sale prices and the quality of the NPL and originating bank characteristics using the following panel regression specification:

$$Re\text{-}sale\ Premium_{i,t} = \alpha_i + \alpha_t + \beta\, Stay\ Months_{i,t} + \phi\, Quality_{i,t} + \gamma\, Haircut_{i,t} + \tag{5}$$

$$\eta\, Capital\ Ratio_{i,t-1} + \theta\, Violation_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t},$$

where, as before, we convert the NPL transactions into the bank-year level where i indexes a bank and t indexes a year and compute value-weighted variables using the face value of NPL packages as weights. *Re-sale Premium*$_{i,t}$ is the weighted-average premium of re-sold NPL packages originally from bank i in year t relative to the AMC's purchase price. *Stay Months*$_{i,t}$ is the weighted-average number of months the NPL packages originally from bank i in year t stay with the AMC. Other specification details are as in the Equation (3).

[Table 7 here]

Table 7 presents the estimates obtained with the four measures of characteristics of sold NPLs as before. All columns show that the number of months for which the NPL stays with the AMC is positively related to the re-sale premium. Interestingly, the quality of the NPL packages does not appear to affect the re-sale premiums on the NPL packages. There is no discernible relationship between the haircut in the initial sale and the re-sale premium. Neither is there a statistically significant relationship between bank health and the re-sale premium.

These regression results show a statistically significant relation between the re-sale premium

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and the AMC's holding period. One interpretation is that the AMC chooses to hold on to packages with better fundamental values for longer and can eventually re-sell them at higher premia. In this scenario, the positive relationship between the re-sale premium and the AMC's holding period reflects the AMC's endogenous selection and timing of re-sales. Two additional results rule out this interpretation.

First, if the AMC had information advantage on the fundamental values of the NPL packages as this alternative interpretation requires, it would exploit the superior information and re-bundle the NPLs to achieve better valuation in the re-sale transactions. In the data, however, there is no further syndication or bundling of the NPL packages. All re-sold packages are sold in the original form.

[Figure 3 here]

Second, we calculate the AMC's holding period using the transaction dates of initial and re-sale transactions and examine its relationship with the re-sale premium. The scatter plot of the length of the AMC's holding period and the re-sale premium (Figure 3) shows that for an NPL package which is eventually re-sold, the AMC holds the package for either exactly 6, 12, 18, 24, or 36 months. The re-sale premium appears to be a step function of the length of the AMC's holding period—the longer the holding period, the higher the re-sale premium. Observing the precise transaction dates (as opposed to transaction months) allows us to detect a holding period that is not rounded to the nearest month. Nonetheless, the AMC's holding period exhibits exact clustering in multiples of 6 months in the data, which appears inconsistent with the alternative interpretation of patient resolution. If NPLs were sold to the AMC with no pre-arranged re-sales, and the AMC considers re-selling the NPLs through auctions or other markets, there should be no obvious clustering in the AMC's holding periods. However, if the re-sale transactions were part of

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the coordination between banks and AMCs, the AMC's holding period is likely to be agreed upon ex ante, where NPL intermediation periods in multiples of 6 months may emerge.

Therefore, the positive relationship between the AMC holding period and the re-sale premium likely reflects compensation for the AMC to temporarily hold on to NPLs. The positive relationship between the length of the AMC's holding period and the re-sale premium is effectively a fee schedule that the AMC charges for intermediating the NPL transfer. The AMC would charge a higher intermediation fee for holding on to an NPL package longer with its balance sheet capacity. Overall, the analysis on the re-sale prices and counter-parties shows that the AMC passes through the NPL packages from banks to third-parties who are close affiliates of the originating banks. It is compensated proportionally to how long it is holds on to NPL packages.

4.6 Effect of NPL Transactions on Banks' Stock and Public Debt Prices

As our final piece of evidence, this subsection studies whether public financial markets react to NPL transactions. If NPL sales are orderly resolutions of NPLs known to public markets, we would expect a weakly positive price reaction around the sale date because NPL sales would be in line with the financial regulator's desired outcomes and boost the bank's profit.[19] The reduction of NPLs in the bank's balance sheet lowers the amount of allowance of loan losses the bank has to set aside to satisfy the allowance-to-NPLs ratio, increasing the bank's profits.

[Figure 4 here]

In an event study focusing around the NPL transaction dates, both panels in Figure 4 show that neither the stock market nor public debt market appears to respond in either direction. There-

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[19]Given our previous finding that the NPL transaction prices do not appear to reflect credit risks, we would expect an even bigger positive response compared to a scenario where pricing reflects underlying credit risks. We also note that, hypothetically, if the NPL transactions were an effective means to conceal NPLs without risk of prosecution or penalty, which adds value to shareholders by deflating the true liabilities of the bank, financial markets may also respond positively. However, concealing NPLs is unlikely to be without risk. In Table 9, we list what we believe are the primary predictions for both the resolution and concealment hypotheses in the appropriate columns.

fore, the results are consistent with either the financial markets are unaware of NPL sales, or they are aware of NPL sales but do not price in the effect of NPL sales.[20] A predictive regression corroborates the former interpretation and suggests the public equity market does not account for NPL sales. Table 8 shows that NPL transactions predict slightly lower returns among the subset of banks with publicly-listed stocks, both unconditionally and when accounting for bank-specific risk exposures through bank fixed effects and macroeconomic shocks through year fixed effects. Column (3) shows that banks with an NPL transaction have a 0.184% lower stock return next year, and Column (4) shows NPL sales worth 1% of total loans outstanding correspond with a -1.44% lower stock return next year.

4.7   Piecing Together the Process to Conceal NPLs

So far, we have presented empirical results on the transaction prices, contract details, the AMC's handling of the NPLs, and financial market reactions. While some of the individual findings may be open for alternative interpretations, they jointly reject the resolution hypotheses in favor of the concealment hypothesis as Table 9 summarizes.

[Table 9 Here]

Any other alternative interpretations for the transfers of NPLs from banks through AMCs to third parties must reconcile with all pieces of evidence which we document: (1) the non-risk-justified prices for the initial NPL transfers from banks to the AMC, (2) banks retaining the debt servicing obligations, (3) funding from banks to the AMC directly, (4) funding from banks to third-party affiliates, (5) the inflated prices and clustered timing of the NPL re-sales from the AMC to third-party, (6) the characteristics of the third-parties as non-resolution specialists but who end up

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[20]This may occur, for example, if financial markets knew the transaction date, amount, and price with certainty, as asset prices would already perfectly price it in (i.e., if financial markets are strong-form efficient). This case is included in our hypothesis of weakly positive price response. Alternatively, financial markets may know the NPL sales dates, amount, and price but do not believe it is a true resolution.

being the ultimate owners of the NPLs, and the (7) statistically insignificant reaction of financial markets to NPL transactions. In particular, an alternative interpretation of our empirical results would require non-SOE third-parties that currently borrow from the banks but that do not appear to be debt-resolution specialists to be the ultimate holders of the NPLs. Thus, collectively, the empirical evidence is more consistent with NPL transactions being concealment rather than the full resolution of NPLs.

The documented evidence above shows that three entities are involved in the concealment process: (1) banks that want to remove NPLs from their balance sheets in order to comply with the quantity-based loan quality regulation, (2) the AMC that is compensated for acting as a pass-through entity, and (3) third-party bank affiliates that are the ultimate holders of the NPLs. Figure 5 shows the movement of NPLs among the three entities.[21]

[Figure 5 Here]

Participating in the sale and re-sale process generates a sizable profit for an AMC. For the average transaction amount of 438 million RMB (approx. US$62.6 million), a median 0.9% re-sale premium is 3.94 million RMB (approx. US$604,000) for holding the NPLs on their books temporarily before re-selling it to the bank's third-party affiliates. Thus, across all transactions from 2014 to 2019, the AMC would have earned around over 1 billion RMB (approx. US$150 million) in revenues for participating as a pass-through entity.

The tri-party structure is costly for banks, but there are few alternatives. AMCs are the only type of institutions allowed to receive batch transfers of NPLs from banks. The intermediate fees that

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[21]In practice, several types of contracts that involve banks, AMCs, and third parties have been devised to conceal NPLs. For example, a May 12, 2015 article published in the leading crowd-sourced financial content platform Xueqiu (available at https://xueqiu.com/3037882447/43711786) and an April 5, 2019 article written by an alternative asset valuation specialist Niu AMC (available at https://www.niuamc.com/190405.html) describe such contract structures. In real contracts which we have reviewed but are not able to show for confidentiality reasons, we verify the existence of explicit repurchase agreements in the initial sales of NPLs to channel funds.

banks pay to the AMC represent a direct financial cost, but bypassing the AMCs in the concealment process would not be possible as the CBIRC closely monitors NPL transfers.[22]

The tri-party structure is also self-enforcing. As a bank, the exposure of the contracts would expose not only their conduct of NPL concealment but also their high NPL rate. As an AMC, the exposure of contracts means that their reputation among banks would be damaged, jeopardizing other transactions of the same kind. Therefore, our results are more consistent with NPL transactions being a method to conceal rather than resolve troubled bank assets. Because banks remain exposed, the sold NPLs represent hidden NPLs that should be recognized in calculating total NPLs. The prevalence of hidden NPLs casts doubt on whether reported NPL statistics adequately reflect financial crisis risks. Next, we consider a stress test of these hidden NPLs to study how potential realized losses may affect the financial system.

4.8 Sizing up and Stress Testing the Hidden NPLs

Because the hidden NPLs are deep in delinquency, any eventual resolution at low values could propagate losses through the financial system and potentially threaten financial stability. In this last analysis, we consider implications for the broader Chinese financial system. Although our findings are based on data from one local AMC, we believe that NPL concealment broadly represents the wider NPL market in China for four reasons. First, the wide coverage of this AMC's counter-party banks and transaction-level analyses controlling for unobserved bank heterogeneity suggests that bank-specific idiosyncratic characteristics do not drive our results. Second, the CBIRC's banning the direct lending of banks to AMCs to finance NPL transactions in July 2019 reveals that the regulators are aware of some illicit concealment activity. In addition, by the end

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[22]Our conclusion is also consistent with the empirical evidence in Section A.5: banks that previously violated the 150% allowance-to-NPLs ratio, those under more regulatory scrutiny, and those more reliant on financial markets are more likely to conceal NPLs. In addition, banks farther away from local financial regulators would also be more likely to conceal NPLs. Finally, concealing the NPLs does appear to satisfy the desired outcome of appearing healthier to financial regulators and financial markets.

of 2020, at least nine municipalities and provinces in China launched investigations and changed regulatory practices to clamp down on the past-through business by local AMCs.[23] Third, our findings of the pervasive coupling of sales and re-sales are consistent with anecdotes from conversations with industry practitioners (not just those at the AMC from which we get data. In fact, the perceived prevalence is one reason why we were able to obtain data from the local AMC in the first place.) Lastly, several local AMCs have been reported in the Chinese financial press to coordinate with banks and act as pass-through entities using structures in line with our findings.[24]

We consider implications to the entire Chinese financial system under the assumption that our findings are representative of local AMCs and, therefore, can be extrapolated to the overall market. We exclude national AMCs in our back-of-the-envelope calculations because although they were originally deployed to clean up the Big 4 state-owned commercial banks in the late 1990s and early 2000s, they have become financial conglomerates with various other businesses in recent years. By 2019, turning around NPLs accounted for less than 50% of the national AMCs' asset size or revenue. In contrast, local AMCs' sole business lines are in purchasing NPLs from banks.

We perform a stylized stress test to assess the distribution of NPL loss under hypothetical stress scenarios in Appendix Section A.7.[25] We estimate that in 2019, hidden NPLs amount to between 5.13 and 6.94 trillion RMB, driving total NPLs to be 213% to 288% higher than the official statistics. Even if we remove the NPLs transferred to national AMCs in our calculation, hidden NPLs amount to between 2.81 and 4.62 trillion in 2019, driving total NPLs to be 117% to

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[23]See media coverage by this Sina article from June 17, 2021 and this CB article from January 9, 2021.

[24]For example, see this Yicai article from March 29, 2016, this Sina article from July 16, 2019, and this Jinxindezhiben article from January 6, 2021. More explicitly, this Sina article from January 27, 2021 documents how Ningxia Shunyi AMC, the second largest local AMC in China with registered capital of 10 billion RMB, helped banks hide NPLs. Also, this Sina article from July 16, 2021 on Guohou AMC in Anhui province also reports a "special NPL parking structure" which follows the process described in this paper.

[25]In this stress testing analysis, we focus on the hidden NPLs. As a result, our findings can be used to complement stress-testing based on banks' reported exposures (either on-balance-sheet exposures or off-balance-sheet exposures that are required to be recognized under the current accounting and regulatory framework).

192% higher than the official statistics. As a result, the NPL ratio is 3.87% to 5.14%, instead of the reported NPL ratio of 1.86%.

Although banks remove NPLs from their balance sheets through the NPL transactions, they remain liable for the NPL losses to the extent that those losses propagate from the third-party affiliates, who are borrowers of the banks, in the form of another layer of default. Should the NPLs take substantial losses, equity holders of third-party affiliates could be wiped out and pass losses to the originating banks themselves. To quantify the magnitude of such a propagation, we perform several simple back-of-the-envelope stress tests to assess the distribution of NPL loss under stylized assumptions on loan recovery and contractual exposures. In a conservatively calibrated stress scenario, where we (1) fully remove the NPLs transferred to national AMCs, (2) assume a modest loss given default of 60%, and (3) assume a pass-through rate from third-parties to banks of 50%, we find 0.76 to 1.25 trillion RMB—or 3.42 to 5.62%—of aggregate regulatory capital in the banking sector would be eroded. While the analysis is not a projection or prediction, should the default risks of the NPLs materialize, there can be a substantial weakening of bank capital.

Our back-of-the-envelope estimates are broadly consistent with concurrent analyses of China's debt problem. The Bank for International Settlements Credit Statistics shows that China's non-financial-debt-to-GDP ratio almost doubled from 139% at the end of 2008 to 259% at the end of 2019.[26] Risky debt increases to a high level against the backdrop of increasing leverage: Adopting a definition of a "loan potentially at risk" as a bank loan to a borrower that has an interest coverage ratio below one, the IMF points out that the share of loans potentially at risk tripled from 4% to more than 12% from 2010 to 2016. Using a different methodology, FitchRatings (2016) estimates that close to 20% of bank loans are *de facto* non-performing.

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[26]Available at https://www.bis.org/statistics/totcredit.htm.

5 Conclusion

The accurate recognition and timely resolution of NPLs are crucial for safeguarding the banking system and the broader economy. Since 2012, the Chinese banking regulator has permitted the transfer of NPLs from banks to local AMCs to resolve banks' troubled assets. However, despite the size of the NPL transaction market – over US$300 billion of NPLs were transferred in 2019 alone – we do not know whether those NPLs are truly resolved. The lack of data has thus far hindered a systematic study on these important questions.

We use detailed transaction-level proprietary data from a leading local AMC and document that banks devise NPL transactions to conceal NPLs from regulators and financial markets. Banks remain exposed to the transferred NPLs through the AMC financing and affiliates that repurchase the NPL packages from the AMC. Our back-of-the-envelope calculation suggests the actual aggregate NPL level is two to four times the reported amount in the official statistics. Such a large stock of non-performing loans can lead to financial fragility if risks of NPLs materialize and banks are forced to recognize the losses through their affiliates. As the Chinese economy – the second largest in the world – is predominantly bank-financed, the stability of China's banking sector is a first-order concern globally (Blagrave et al. 2016; IMF 2017b; 2017a; 2018).

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6 Tables & Figures

Table 1: Bank Characteristics

The table below shows summary statistics at the bank-year level showing both bank characteristics in Panel A and local economic conditions in Panel B. The panel contains 82 banks and 409 bank-year observations. Where a bank has more than one NPL transaction in a year, we sum the size of NPL transactions and value-weight by face value to get the average NPL delinquency in months. Local economic conditions refer to province characteristics in a bank' headquarter province. "bn" refers to billions and "mn" refers to millions, and all level figures are reported in Chinese Yuan (RMB). "dec" refers to decimal and "N" refers to the count. Apart from counts, which are shown as integers, all figures are rounded to either three significant digits or three decimal places, whichever is shorter.

Panel A: Banks Characteristics							
Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Total Loans (bn)	999	2,600	0.00	9.30	51.2	315	16,100
Total Deposits (bn)	1,290	3,390	2.90	16.7	79.9	523	23,600
Profit (bn)	18.1	48.2	0.029	0.169	1.36	7.81	300
ΔLoans (dec)	0.306	0.157	-0.339	0.177	0.317	0.381	0.812
ΔDeposits (dec)	0.151	0.193	-0.402	0.078	0.124	0.188	2.25
Loans-to-Deposits Ratio (dec)	0.692	0.166	0.000	0.608	0.685	0.774	1.46
Capital Ratio (%)	13.1	1.60	10.8	11.8	13.0	14.2	16.8
Average Delinquency of Transferred NPLs (months)	53.9	15.6	15.7	44.0	53.7	67.1	95.3
Panel B: Local Economic Conditions							
Variables:	Mean	S.D.	Min	P25	Median	P75	Max
ΔGDP (%)	7.80	5.70	-32.4	5.50	8.30	10.9	63.4
ΔTax Revenue (%)	6.30	10.5	-49.3	2.70	7.60	10.5	87.1
ΔElectricity Usage (%)	8.40	10.9	-47.6	2.50	8.00	11.7	99.4
Unemployment Rate (%)	3.10	0.700	1.30	2.80	3.20	3.50	4.50

Figure 1: Timing of NPL Transactions

The figures below show the number and amount of NPL transactions over our sample period from 2014 to 2019. The left two plots show a time series plot where the light shaded bars are quarter ends and the darker shaded bars are calendar year ends, which coincide with banks' fiscal year ends. The right two plots show the average number and average amount of transactions by month where the shaded bars are quarter ends.

(a) Total Number of NPL Transactions by Week
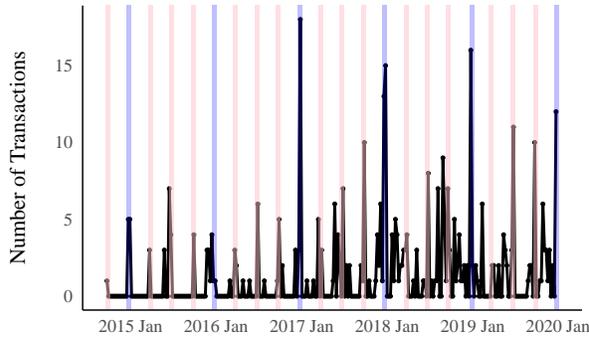
(b) Number of NPL Transactions by Month
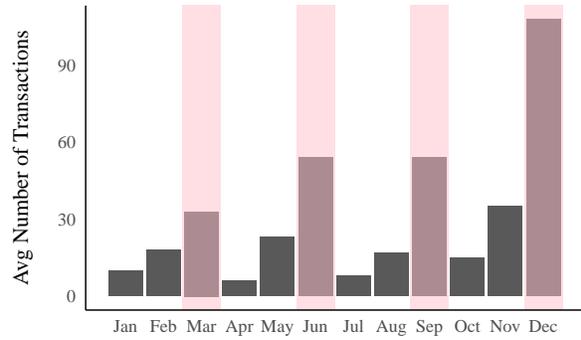
(c) Total Amount of NPL Transactions by Week
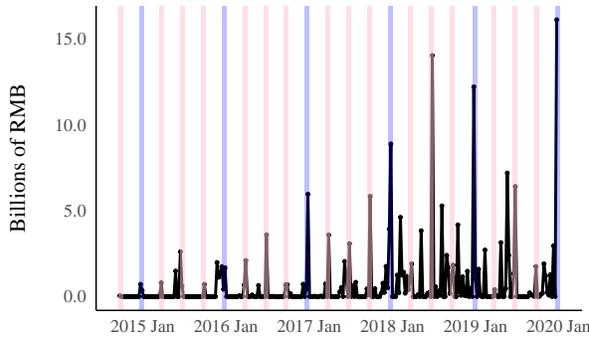
(d) Amount of NPL Transactions by Month
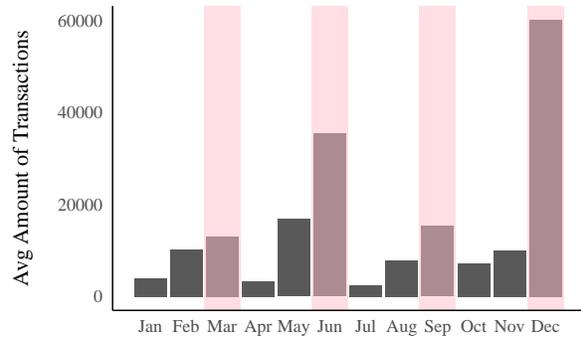
Table 2: NPL Transactions and Bank Performance

This table examines the determinants of NPL transactions in Panel A and shows whether NPL transactions predict future bank performance in Panel B. Observations are at the bank-year level. In Panel A, the dependent variable is an indicator for NPL transactions. All regressions in this Panel include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. In Panel B, the dependent variables include the loan growth rate of the bank in the next year, capital ratio in the next year, and whether a bank violates the 150% minimum allowance-to-NPL ratio in the next year. All regressions include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. In both panels, the T-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Panel A: What Drives NPL Transactions?

Dependent Variable:	$1\{\text{NPL Transaction}_t\}$	
	(1)	(2)
Reported NPL $_{t-1}$	3.214	
	(1.46)	
Allowance/NPLs$_{t-1}$ < 150%		0.250***
		(2.85)
N	409	409
R^2	0.452	0.457

Panel B: NPL Transactions and Future Bank Performance

Dependent Variable:	Loan Expansion$_{t+1}$			Capital Ratio$_{t+1}$			Violation$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$1\{\text{NPL Transaction}_t\}$	0.104***	0.104***	0.093***	0.006**	0.006**	0.006**	-0.061*	-0.061*	-0.063*
	(7.02)	(7.01)	(6.11)	(2.41)	(2.38)	(2.30)	(-1.81)	(-1.84)	(-1.88)
Reported NPL Ratio$_t$		0.234	0.242		-0.308	-0.483		-1.662	-1.900
		(0.53)	(0.59)		(-1.18)	(-1.58)		(-0.94)	(-0.97)
Violation$_t$			0.038			0.003			-0.204***
			(1.04)			(0.39)			(-3.75)
Violation$_t$ × $1\{\text{NPL Transaction}_t\}$			2.067**			-0.190			-0.829
			(2.43)			(-0.53)			(-0.35)
N	327	327	327	307	307	307	327	327	327
R^2	0.618	0.618	0.709	0.995	0.995	0.995	0.528	0.532	0.548

Table 3: NPL Transaction Details

The table below shows summary statistics at the transaction level, showing information for NPL transactions and package characteristics. Observations are at the NPL transaction level and we observe 257 transactions. "bn" refers to billions in Chinese Yuan (RMB)."dec" refers to decimal and "N" refers to the count. Apart from counts, which are shown as integers, all figures are rounded to either three significant digits or three decimal places, whichever is shorter.

Panel A: NPL Package Characteristics

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Size (bn)	0.642	0.988	0.002	0.090	0.264	0.686	5.392
Number of loans in the NPL package (N)	115	45.8	42	78	108	148	232
Number of borrowers in the NPL package (N)	86.5	37.7	30	52	82	114	180
Average delinquency (months)	53.1	14.0	11	42	55	64	98
Average Borrower Type:							
State-Owned Enterprises (dec)	0.087	0.043	0.000	0.050	0.090	0.120	0.220
Private Firms (dec)	0.846	0.080	0.620	0.79	0.860	0.900	1.000
Consumer Loans (dec)	0.067	0.065	0.000	0.000	0.060	0.110	0.310
Average Loan Maturity:							
<1 Year (dec)	0.926	0.027	0.850	0.910	0.930	0.950	1.000
1-3 Years (dec)	0.059	0.022	0.010	0.040	0.060	0.070	0.120
>3 Years (dec)	0.015	0.011	0.000	0.010	0.010	0.020	0.050
Frac. of Loan Backing Type:							
Collateralized (dec)	0.332	0.115	0.010	0.260	0.330	0.410	0.710
Guaranteed (dec)	0.432	0.110	0.160	0.350	0.430	0.510	0.760
Unsecured (dec)	0.238	0.145	0.000	0.120	0.240	0.340	0.660
Average Delinquency:							
<1 Year (dec)	0.032	0.040	0.000	0.000	0.030	0.050	0.300
1-3 Years (dec)	0.224	0.187	0.000	0.080	0.160	0.300	0.860
3-5 Years (dec)	0.347	0.150	0.000	0.240	0.380	0.460	0.730
5-9 Years (dec)	0.316	0.218	0.000	0.110	0.350	0.490	0.700
>9 Years (dec)	0.025	0.05	0.000	0.000	0.000	0.030	0.240

Panel B: NPL Sales and Contract Types

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
NPL Sale Haircut (%)	5.10	10.1	-11.3	0.000	0.000	6.40	6.50
Annual Commission Fees (%)	0.542	0.297	0.300	0.300	0.500	1.00	1.00
NPL Collection Delegation to Bank (dec)	1	0	1	1	1	1	1

Figure 2: Empirical Distribution of NPL Transaction Haircut

This figure shows the empirical cumulative distribution function of the haircut of the NPL transaction price relative to the face value of the NPLs in the AMC's purchases from banks. Positive (negative) x-axis values mean an NPL package was purchased by the AMC at a discount (at a premium).

Empirical CDF of NPL Purchase Haircuts

NPL Purchase Price Haircut Relative to Face Value (%)
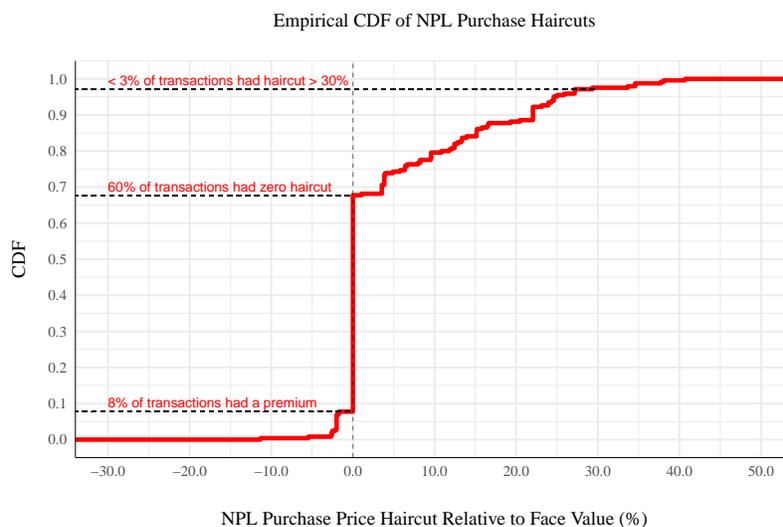
Table 4: The Pricing of NPL Transactions

The table shows the relation between NPL package characteristics and prices. Observations are at the bank-year level. All regressions include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. T-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Dependent Variable:	Haircut of NPL Sale Relative to Loan Face Value$_t$			
	(1)	(2)	(3)	(4)
NPL Quality Measure =	Num. Months Delinquent	Share of Loans to SOEs	Share of Secured Loans	Share of Loans with Maturity > 1 year
NPL Quality Measure$_t$	-0.002**	-0.003	0.039	-0.051
	(-2.50)	(-0.03)	(0.60)	(-0.20)
Capital Ratio$_{t-1}$	0.353***	0.352***	0.360***	0.351***
	(10.74)	(9.54)	(9.70)	(9.52)
Violation$_{t-1}$	0.0420	0.0251	0.025	0.0240
	(1.30)	(0.80)	(0.77)	(0.78)
N	159	159	159	159
R^2	0.599	0.565	0.566	0.565

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Table 5: Source of Funding for NPL Transactions

The table below shows summary statistics of the source of funds the AMC uses for each NPL transaction. Panel A shows the financing from before the July 2019 rule banning banks from lending directly to AMCs to finance NPL sales, and Panel B shows the financing after the rule. "dec" refers to decimal and "N" refers to the count. All figures are rounded to either three significant digits or three decimal places, whichever is shorter. In Panel A and B, observations are at the NPL transaction level. In Panel C, observations are at the bank-year level. All regressions in this Panel include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. T-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Panel A: Before July 2019 Ruling (N = 208)

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Direct Loan from Bank (dec)	0.685	0.465	0	0	1	1	1
Indirect Funding from Bank via a Trust Company (dec)	0.147	0.354	0	0	0	0	1
Indirect Funding from Bank via a Securities Company (dec)	0.125	0.331	0	0	0	0	1
Other Means (dec)	0.043	0.204	0	0	0	0	1

Panel B: After July 2019 Ruling (N = 49)

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Direct Loan from Bank (dec)	0	0	0	0	0	0	0
Indirect Funding from Bank via a Trust Company (dec)	0.510	0.505	0	0	1	1	1
Indirect Funding from Bank via a Securities Company (dec)	0.367	0.487	0	0	0	1	1
Other Means (dec)	0.122	0.331	0	0	0	0	1

Panel C: Direct Loans and Bank Characteristics in the Pre-July 2019 Sample

Dependent Variable:	$1\{$Source of Funds from Bank is a Direct Loan$_t\}$			
	(1)	(2)	(3)	(4)
NPL Quality =	Num. Months Delinquent	Share of Loans to SOEs	Share of Secured Loans	Share of Loans with Maturity > 1 year
NPL Quality$_t$	0.004	0.371	0.133	0.853
	(1.11)	(0.61)	(0.25)	(0.75)
Capital Ratio$_{t-1}$	-0.456**	-0.533***	-0.511**	-0.523***
	(-2.30)	(-2.83)	(-2.26)	(-2.68)
Violation$_{t-1}$	0.595**	0.560**	0.553**	0.575**
	(2.56)	(2.58)	(2.59)	(2.60)
N	159	165	165	165
R^2	0.606	0.569	0.567	0.569

Table 6: Ultimate Owners and Re-sale Transactions

The table below shows summary statistics at the transaction level, showing information for NPL transactions and package characteristics. Observations are at the NPL transaction level and we observe 257 transactions. "bn" refers to billions and "mn" refers to millions, and all level figures are reported in Chinese Yuan (RMB). "dec" refers to decimal and "N" refers to the count. Apart from counts, which are shown as integers, all figures are rounded to either three significant digits or three decimal places, whichever is shorter.

Panel A: Conditional Distribution of the AMC's handling of NPL packages

Time after the AMC purchases an NPL package from banks:	Prob. of staying with the AMC	Prob. of re-selling to another AMC	Prob. of re-selling to a third-party	Prob. of re-sales (to either another AMC or a third-party)
< 1 year	67.7%	2.94%	29.4%	32.4%
1–2 years	17.7%	8.06%	74.2%	82.3%
2–3 years	3.03%	9.09%	87.9%	97.0%
> 3 years	1.43%	14.3%	84.3%	98.6%

Panel B: Re-sale Transactions and Third-Party Identities

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Characteristics of Re-sale Transactions:							
Time of NPL with the AMC (months)	21.0	7.60	6	18	18	24	48
NPL Package Re-sale Premium (%)	1.000	0.700	0.15	0.50	0.90	1.50	3.00
Re-syndication of the NPL (dec)	0.000	0.000	0	0	0	0	0
Characteristics of Third-Parties:							
Pre-arranged Identity (dec)	0.051	0.220	0	0	0	0	1
Is in the Same City as Bank (dec)	1.000	0.000	1	1	1	1	1
Is an State-owned Enterprise (dec)	0.000	0.000	0	0	0	0	0
Industry of Third-Parties:							
Manufacturing (dec)	0.453	0.499	0	0	0	1	1
Accommodation and Food (dec)	0.279	0.450	0	0	0	1	1
Wholesale and Retail (dec)	0.137	0.345	0	0	0	0	1
Construction (dec)	0.063	0.244	0	0	0	0	1
IT & Software (dec)	0.032	0.175	0	0	0	0	1
Real Estate (dec)	0.021	0.144	0	0	0	0	1
Leasehold and Business Services (dec)	0.016	0.125	0	0	0	0	1
Third-Party's Relationship with Bank:							
Bank Borrower (dec)	0.953	0.213	0	1	1	1	1
Bank Discounted Bill User (dec)	0.034	0.181	0	0	0	0	1
Others (dec)	0.014	0.116	0	0	0	0	1

Table 7: The Pricing of NPL Re-sale Transactions

The table shows the relation between NPL package characteristics and re-sale prices. Observations are at the bank-year level. "t" refers to the timing of the initial NPL transaction from banks to the AMC. The haircut in the initial NPL transaction is in percentage points. All regressions include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. T-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Dependent Variable:	Re-sale Premium$_t$ (%)			
	(1)	(2)	(3)	(4)
NPL Quality =	Num. Months	Share of	Share of	Share of Loans with
	Delinquent	Loans to SOEs	Secured Loans	Maturity > 1 year
Num. of Months NPL Package Stays with AMC$_t$	0.002***	0.002***	0.002***	0.002***
	(5.33)	(6.26)	(5.80)	(6.13)
NPL Quality$_t$	-0.0002	0.230	0.236	1.068
	(-0.09)	(0.54)	(-0.94)	(1.18)
Haircut in Initial NPL Transaction$_t$	0.003	0.003	0.003	0.002
	(0.53)	(0.48)	(0.50)	(0.39)
Capital Ratio$_{t-1}$	0.033	0.026	-0.010	0.047
	(0.16)	(0.11)	(-0.05)	(0.21)
Violation$_{t-1}$	0.074	0.083	0.069	0.098
	(0.66)	(0.69)	(0.64)	(0.80)
N	135	135	135	135
R^2	0.594	0.591	0.596	0.596

Figure 3: Length of the AMC's Holding Period and the Re-sale Premium

This figure shows the scatter plot between the length of the AMC's holding period and the re-sale premium.


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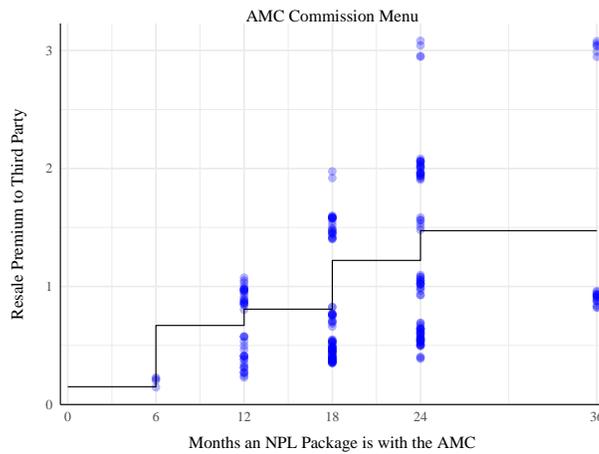
Figure 4: Public Financial Market Reactions to NPL Transactions

This figure shows the cumulative market reaction in a (-20,20) window around the date of transfer of NPLs. Figure 4a shows the average cumulative abnormal returns (CARs) of all banks with publicly-listed equity in the solid line. Figure 4b shows the premium of publicly traded commercial paper issued by the bank, defined relative to China's sovereign bond yields of the same maturity, in the solid line for all banks that have ever issued debt in the interbank market. The premium is adjusted to be mean zero at day 0 by subtracting the level of the premium at day 0. If there is no issuance of the bank at day 0, we use the averaged premium of 5 days around day 0. In both figures, the dashed lines are the 95% confidential interval.

(a) Stock Returns

(b) Publicly-Traded Debt Premiums
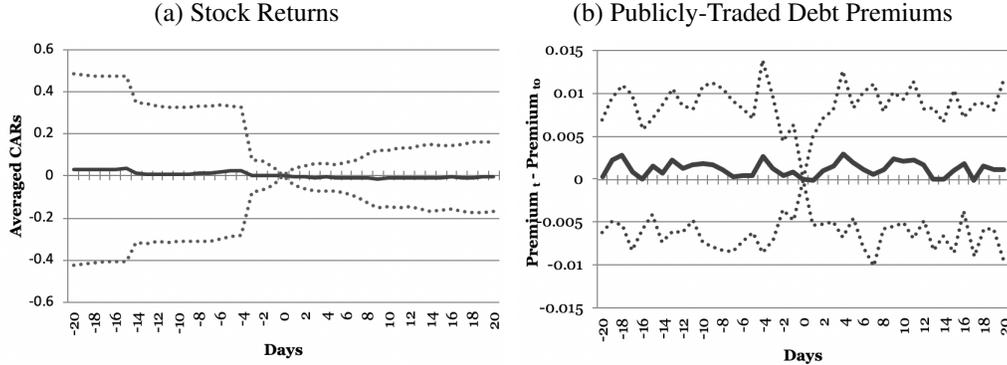
Table 8: Bank Returns, Valuations, and NPL Transactions

The table below studies the relationship between stock returns and NPL transactions in the subset of publicly listed banks. Observations are at the bank-year level. The $1\{\text{NPLs Sold}_t > 0\}$ is an indicator taking the value of one if a bank sold some NPLs in a particular year and Total NPLs Sold_t is the cumulative amount of NPLs sold scaled by previous total loans outstanding, represented as a percentage. All regressions include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province. T-statistics testing the coefficients with zero are shown in parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Dependent Variable:	Returns_{t+1}			
	(1)	(2)	(3)	(4)
$1\{\text{NPLs Sold}_t > 0\}$	-0.155*		-0.184**	
	(1.761)		(2.000)	
Total NPLs Sold_t		-1.322*		-1.438*
		(1.712)		(1.892)
N	89	89	89	89
FE: Bank			✓	✓
FE: Year			✓	✓
R^2	0.083	0.080	0.570	0.555

Table 9: Are NPL Transactions Resolution or Concealment? Hypotheses and Results

Aspect of the NPL transactions	Empirical predictions under each scenario			Empirical Results
	Scenario 1: Orderly market-based resolution	**Scenario 2:** Government-backed resolution	**Scenario 3:** Concealment	
1. NPL transaction price	Risk-based pricing: haircut is large, increasing in credit risk, & decreasing in bank health	Can be higher than risk-based fair prices	Can be higher than risk-based fair prices	Most transactions have 0 haircut, some even at a premium (Table 3, Figure 2). Haircut is decreasing in delinquency and increases with bank health (Table 4).
2. Who services NPLs?	AMCs	AMCs	Banks	All transactions have collection delegation terms that delegate the banks to continue collecting the NPLs (Table 3 Panel B).
3. Who supply funds for the AMCs?	Debt holders & equity holders of the AMCs	Government	Banks	Banks. The dominant form changes from direct lending to indirect lending following the July 2019 regulator's ruling that banned direct lending (Table 5 Panel A and B).
4. Does the AMC sell NPLs to someone else?	Unlikely	Unlikely	Re-sales are prevalent.	More than 90% of NPL packages are re-sold in 2 years (Table 6 Panel A).
5. Price in the re-sales	At a discount	At a discount	At a premium (to compensate the AMC)	All re-sales have a positive premium (Table 6 Panel B); re-sale premium appears to be a step function of the length of the AMC's holding period (Table 7; Figure 3).
6. In re-sales, who buy from the AMC?	Can be anyone	Government entities	Banks' affiliates	More than 95% third-party buyers are borrowers/clients of the banks (Table 6 Panel B).
7. Market reaction to banks' transferring NPLs	Positive price response	Positive price response	Null or negative price response	No response in stock and public debt prices around NPL transaction dates (Figure 4); NPL transactions predict slightly lower stock returns (Table 8).

Figure 5: Movement of NPLs in the Concealment Process

The figure shows the movement of NPLs among banks, the AMC, and third-party bank affiliates. In our sample, over 90% of the third-parties are existing borrowers of the banks.

Third-Party
Bank Affiliates

Loans

Payment for
2nd sale
(0.9% premium)

NPLs
(90% of NPLs
re-sold this way
in 2-3 years)

NPLs

Collection obligation

Banks

AMC

Payment for 1st sale
(0% haircut)
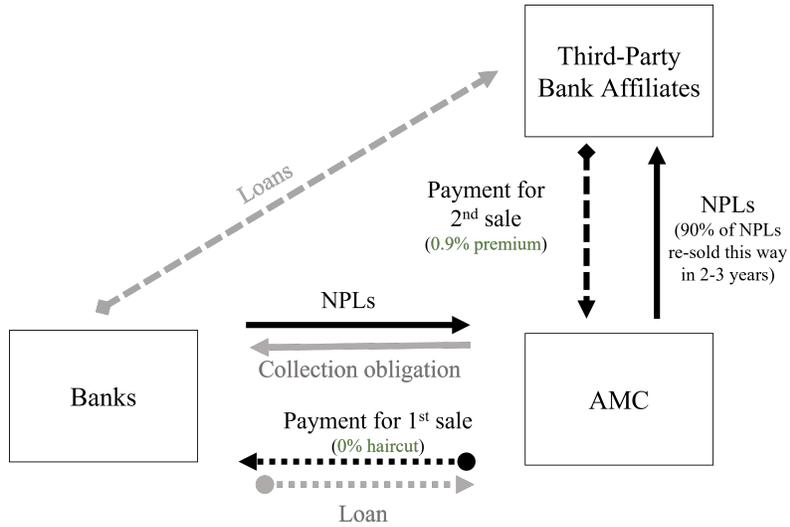
Loan

A Internet Appendix for *Hidden Non-Performing Loans in China*

This appendix contains supplementary material, tables, and figures.

A.1 Establishment of Local AMCs

The 2012 reform, which allowed local AMCs to be set up, was followed by a burgeoning wave of local AMCs (Figure A.1). Figure A.2 shows the dynamic pattern of local economic variables its residualized with respect to time and province fixed effects, shown from year from $t-5$ to $t-1$, relative to the level in year 0 (the year t when the first AMC is set up). We find that the establishment of the first AMC in a province is preceded by deteriorating local economic fundamentals, both in terms of the provincial GDP as well as government revenue.

Alternatively, we can predict the timing of establishment of local AMCs. The first method is linear regression for the change in the number of AMCs in the balanced province-year panel. Linear regression permits many levels of fixed effects without triggering the incidental parameters problem. The first approach essentially treats the opening of the first AMC and subsequent AMC(s) the same. We may be more interested in the opening of the first AMC.

Therefore, we use a second method to forecast the first AMC opening with Shumway (2001)'s hazard procedure. The procedure essentially fits a logit model for the sample of province-year observations for which the "have AMC" indicator is zero or for which the year is the first year if the "have AMC" indicator is one. The procedure then corrects the statistics given by the standard logit procedure by the average number of years per province, per cross-sectional unit to correct the statistics. In practice, this correction produces more conservative standard errors than clustered standard errors in the standard logit procedure. Including year fixed effects in the logit model results in a lot of observations dropped due to a problem known as "one-way causation by a dummy variable".

Figure A.1: Establishment of local AMCs

The figures below show the total number of local AMCs and the combined total of their registered capital over our sample period from 2014 through 2019, with the last date of entry being at the end of 2017. As of January 2020, there were 58 asset management companies (AMCs) in operation, with various starting dates. The mean registered capital is 3.5 billion yuan with a median of 2 billion yuan. The minimum registered capital is 1 billion yuan and maximum registered capital is 36.64 billion yuan.
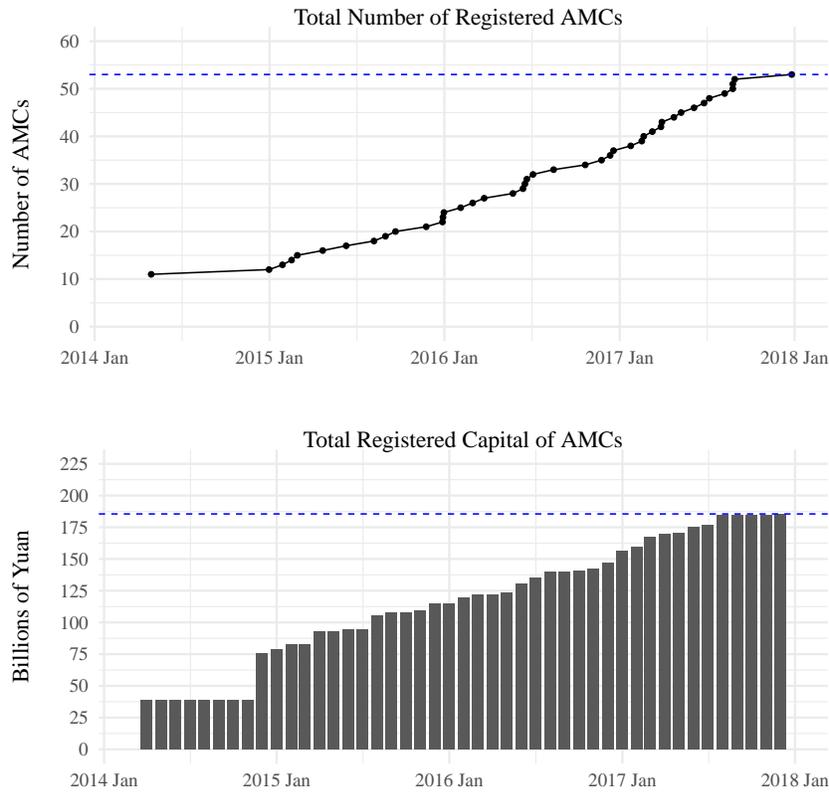
Registration Year	1999	2003	2005	2006	2008	2013	2014	2015	2016	2017	Total
Num. New AMCs	1	1	1	2	1	4	2	7	8	2	29
%	3.45	3.45	3.45	6.9	3.45	13.79	6.9	24.14	27.59	6.9	100
Cumulative %	3.45	6.90	10.34	17.24	20.69	34.48	41.38	65.52	93.10	100	

Figure A.2: Local Economic Conditions Prior to AMC Opening

This figure shows the dynamic pattern of local economic variables its residualized with respect to time and province fixed effects, shown from year from $t-5$ to $t-1$, relative to the level in year 0 (the year t when the first AMC is set up).

(a) ΔGDP (in decimal)
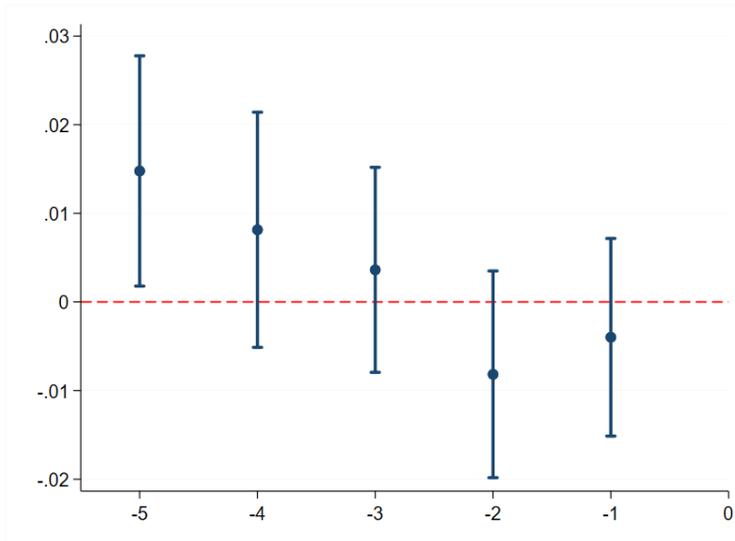
(b) ΔLocal Government Revenue (in decimal)
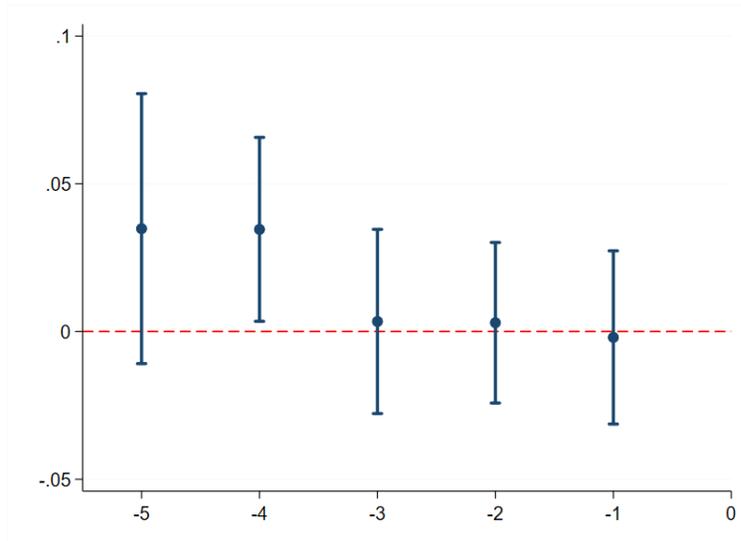
Table A.1: Predicting AMC Opening

In the table below, Panel A uses a linear regression and Panel B uses the Shumway (2001) hazard model. In Panel A, t-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. In Panel B, standard errors are produced by the Shumway (2001)'s hazard procedure, implemented in Stata via Judson Caskey's package; the corresponding z-statistics are reported in brackets. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Panel A: Linear Regression								
Dependent Variable:	Change in the Number of AMCs$_{j,t}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth$_{j,t-1}$	-1.291***	-1.347***	-0.373	-0.402				
	(-10.30)	(-10.46)	(-1.53)	(-1.55)				
Local Gov't Revenue Growth$_{j,t-1}$					-1.030***	-1.055***	0.045	0.185
					(-6.96)	(-6.86)	(0.19)	(0.77)
Province FEs		✓		✓		✓		✓
Year FEs			✓	✓			✓	✓
R^2	0.074	0.099	0.283	0.305	0.110	0.152	0.271	0.316
N	559	559	558	558	341	341	341	341

Panel B: Shumway (2001) Hazard Model								
Dependent Variable:	1{First AMC Opening in Province$_{j,t}$}							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth$_{j,t-1}$	-16.742	-17.920	-6.720	-7.248				
	(-1.14)	(-1.15)	(-0.29)	(-0.29)				
Local Gov't Revenue Growth$_{j,t-1}$					-16.399*	-15.423*	-5.336	-5.067
					(-1.67)	(-1.68)	(-0.55)	(-0.48)
Partial Province FEs		✓		✓		✓		✓
Partial Time FEs			✓	✓			✓	✓
Pseudo R^2	0.110	0.115	0.006	0.006	0.258	0.241	0.019	0.014
N	440	440	439	439	233	233	233	233

Table A.1 shows that in many years during the 1999–2017 period, no province launched its first AMC. To still sweep out variation in certain dimensions, we consider economic and financial variables that are residualized with respect to one or more levels of fixed effects as explanatory variables. In what follows, we call these "partial fixed effects". In untabulated analyses, we find similar patterns for the deposit growth and government revenue growth.

A.2   Selection into Sample

There are 82 banks that have some NPL transaction with the AMC in the period from 2014 to 2019 and hence are included in our sample. There are 798 other banks whose financial data are available in either Wind or BankScope databases. The universe of Chinese banks therefore includes 880 banks. Table A.2 compares the characteristics of banks covered in our sample against the universe of Chinese banks. Across all observable characteristics, banks in our sample are comparable to the average bank in the universe.

Next, we consider the effect of distance between a bank and the AMC on whether the bank is included in our sample. We calculate the number of province borders between a bank and the AMC as the minimum number of province borders one has to cross to get from the headquarter of the bank to the AMC. For instance, if a bank is located in the same province as the AMC, the number of province borders equals to 0. For a bank that is in the neighboring province to the AMC, the number of province borders equals to 1. Table A.3 shows the percentage of banks in our sample by different levels of the number of province borders between a bank and the AMC. The farther away a bank is from the AMC, the less likely the bank does any NPL transaction with the AMC.

Finally, we also test the effect of geographic distance on sample selection in a regression framework (Table A.4). Both the distance from a bank to the AMC and the number of province borders between a bank to the AMC negatively predict inclusion into the sample.

Table A.2: Comparison of Banks in Our Sample and the Universe of Chinese Banks

The table below shows the mean values of bank characteristics and local economic conditions in the bank-year panel from our sample, the universe of all banks, and the difference between the banks in our sample versus whole universe of banks. The dataset contains the 82 banks in our sample and other 798 banks whose financial data are available in either Wind or BankScope. For the difference, values in the parentheses represent the t-statistics comparing the difference to zero. The whole universe of banks includes all samples we can find from the Wind and BankScope database. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

	Universe	Sample	Difference
Bank Characteristics:			
Total loan (Billion RMB)	220.7	298.0	-77.350
			(-0.79)
Total loan growth rate	0.167	0.169	-0.001
			(-0.12)
Total deposit (Billion RMB)	287.8	396.1	-108.300
			(-0.82)
Total deposit growth rate	0.145	0.136	0.008
			(0.67)
Profit (Billion RMB)	3.981	4.932	-0.951
			(-0.52)
Loan deposit rate	0.672	0.664	0.008
			(0.54)
Capital rate	0.107	0.0891	0.012
			(1.52)
Allowance ratio	2.371	2.297	0.074
			(0.764)
Local Economic Conditions:			
Local GDP growth rate	0.0854	0.0914	-0.006
			(-1.25)
Local tax growth rate	0.0571	0.0598	-0.003
			(-0.48)
Local electricity consumption growth rate	0.0768	0.0705	0.006
			(1.13)
Local unemployment rate	2.977	3.061	-0.084
			(-1.60)

Table A.3: Provincial Distribution of Banks in Our Sample

The table shows the percentage of banks in our sample by different levels of the number of province borders one has to cross to get from a bank to the AMC. The number of province borders between a bank and the AMC is the minimum number of province borders one has to cross to get from the headquarter of the bank to the AMC. For instance, if a bank is located in the same province as the AMC, the number of province borders equals to 0. For a bank that is in the neighboring province to the AMC, the number of province borders equals to 1.

Number of provinces borders between a bank and the AMC	Number of Banks in Our Sample	Number of Other Banks	Total Number of Banks	Percentage of Banks in Our Sample
0	18	52	70	25.7%
1	30	304	334	9.0%
2	18	200	218	8.3%
3	9	110	119	7.6%
4	6	102	108	5.6%
5	1	30	31	3.2%
Total	82	798	880	9.3%

Table A.4: Sample Entry, Bank Characteristics, and Local Economic Conditions

The table below shows a probit model studying the determinants of the banks to have transactions with the AMC. Observations are at the bank-year level for the universe of banks. The dependent variable is a dummy variable that equals to one if the bank has the transaction with the AMC in a particular year and zero if otherwise. The province borders between the bank and the AMC is the minimum number of provinces borders one has to cross to get from the bank to the AMC. For instance, if the AMC and the bank are in the same province, this number is 0. If the AMC and the bank are located in the neighboring provinces, this number is 1. All regressions include year fixed effects. The values shown are the marginal effects estimated at the mean for continued variables and the change from 0 to 1 for dummy variables. The z-statistics are reported in the parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Dependent Variable:	1{Bank is in Our Sample}			
log(Distance to the AMC)	-0.0159***			
	(-3.533)			
Provinces borders between the bank and the AMC		-0.0265***	-0.0269***	-0.0241***
		(-3.200)	(-2.730)	(-3.066)
Allowance			-0.0232**	
			(-2.211)	
Capital ratio				-0.392**
				(-2.096)
Total loan	0.000	0.000	0.000	0.000
	(0.378)	(0.762)	(0.989)	(0.486)
Total loan growth rate	0.0949	0.106	0.163	0.102
	(1.095)	(1.246)	(1.234)	(1.106)
Total deposit	0.000	0.000	0.000	0.000
	(1.511)	(1.431)	(1.303)	(1.513)
Total deposit growth rate	-0.0695	-0.0818	-0.112	-0.0775
	(-1.270)	(-1.438)	(-1.441)	(-1.365)
Loan deposit rate	-0.0257	-0.0451	-0.148	-0.0465
	(-0.610)	(-1.053)	(-1.322)	(-1.042)
Profit	-0.00271	-0.00289	-0.00541	-0.00253
	(-0.799)	(-1.054)	(-1.339)	(-1.368)
Local GDP growth rate	0.409	0.756	0.847	0.706
	(0.889)	(1.452)	(1.364)	(1.489)
Local tax growth rate	0.00679	0.0488	0.0589	0.0617
	(0.030)	(0.222)	(0.210)	(0.292)
Local electricity consumption growth rate	-0.263	-0.191	-0.263	-0.186
	(-1.123)	(-0.819)	(-0.848)	(-0.815)
Local Unemployment rate	0.0563	0.0585	0.0486	0.0521
	(0.843)	(1.047)	(0.742)	(0.672)
R^2	0.0584	0.0513	0.0484	0.0596
N	3,993	3,993	3,993	3,993

A.3 NPL Transactions over Time

Figure A.3 shows the average NPL delinquency, maturity, haircut, and re-sale premium over our sample. We find that the average delinquency of NPLs rises from around 3.25 years to over 4.5 years over our sample. The average maturity, average haircut, and re-sale premium remained steady across our sample. When testing explicitly for a linear time trend, we find a slight positive time trend on maturity where the average NPL maturity increases by 3.6 days a month and a slight negative time trend for the haircut where the haircut falls by 9 basis points a month. Delinquency and re-sale premiums do not exhibit any statistically significant linear time trend. Nonetheless, none of the trends, if any, are not economically significant relative to their summary statistics. Therefore, although local AMCs were set up during our sample as local economic conditions deteriorate, they do not seem to meaningfully correlate with the NPL transaction characteristics which we observe.

Figure A.3: NPL Transactions Over Time

The plots below show the characteristics of all 257 observed NPL transactions over time. The line of best fit is from a non-parametric LOESS estimation with 95% confidence intervals.
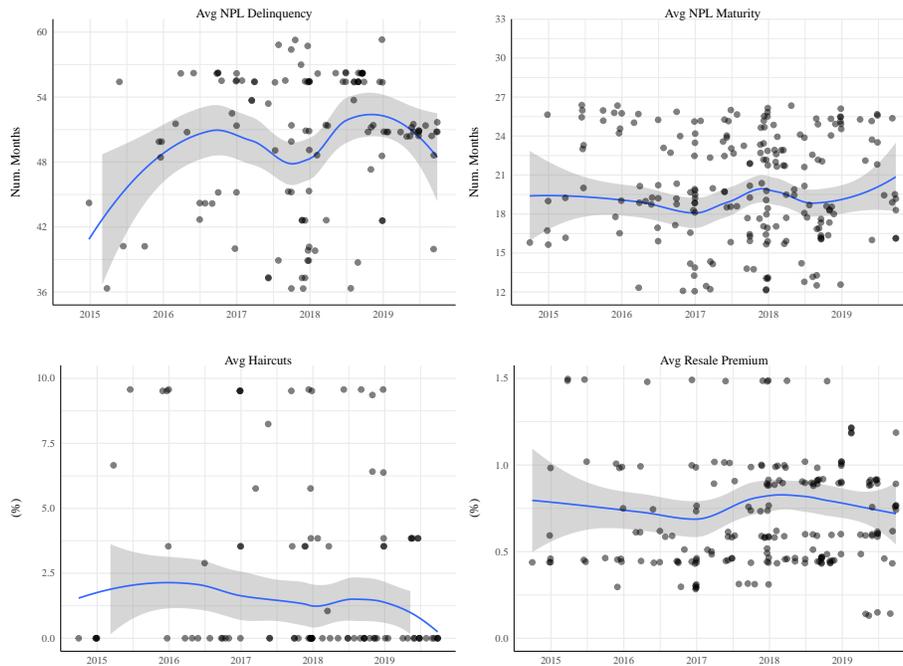
A.4 How Binding is the NPL Regulation?

Figure A.4 shows the histogram of the two allowance ratios in the bank-year sample. Both panels suggest both allowance ratios appear binding, with the top panel showing bunching to the right of the 150% minimum allowance-to-NPLs ratio and the bottom panel showing bunching to the right of the 2.5% minimum allowance-to-total loans ratio. There exhibits a stronger bunching behavior in the former ratio.

Figure A.4: Regulatory ratios of loan quality

This figure shows the histograms of two allowance ratios which are subject to regulatory minimums. In Figure A.4a, the vertical bar denotes 150%, the regulatory minimum for the allowance-to-NPLs ratio. In Figure A.4b, the vertical bar denotes 2.5%, the regulatory minimum for the allowance-to-total loans ratio.

(a) The allowance-to-NPLs ratio (regulatory minimum: 150%)
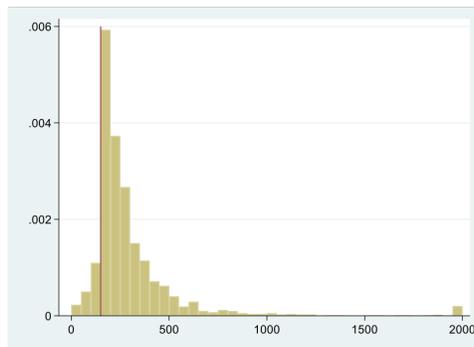
(b) The allowance-to-total loans ratio (regulatory minimum: 2.5%)
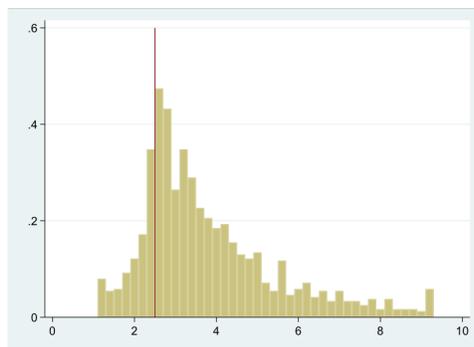
A.5 Bank Characteristics, Regulatory Intensity, and Other Governance

In this subsection, we study additional cross-sectional characteristics affecting the relation between the violation of the 150% minimum allowance-to-NPLs ratio and NPL sales. We consider three classes of variables studying the impact of bank characteristics, regulators, and competition and

financial markets, using an empirical specification of the form

$$1\{NPL\ Sale_{i,t} > 0\} = \alpha_i + \alpha_t + \beta Violation_{i,t-1} + \gamma(Violation_{i,t-1} \times Z_{i,t-1}) + \Gamma'X_{i,t-1} + \varepsilon_{i,t}, \quad (6)$$

where $Violation_{i,t-1}$ is whether a bank i violated the 150% minimum allowance-to-NPLs ratio in year $t-1$, $Z_{i,t-1}$ is a bank, regulator, or market characteristic. The outcome variable is whether the bank has an NPL sale in a particular year, and other variables and specification details are the same as in Equation (1).

Table A.5: Mechanisms Affecting NPL Transactions

The table below shows traded NPLs with regulator characteristics, competition and financial market conditions, and corporate governance characteristics. Observations are at the bank-year level. Panel A studies variables related to corporate governance, Panel B studies variables related to regulators, and Panel C studies variables relating to competition, financial markets, and bank managers' career concerns. Time-invariant bank characteristics are absorbed by bank fixed effects. Small banks are defined as those below median in total loans outstanding and rural banks are those not headquartered in tier 1 and 2 cities. All regressions include controls for bank health and local economic conditions, including the lagged deposit growth, the lagged loan growth, the lagged reported GDP growth in the banks' headquarter province, and the lagged growth in electricity usage in the banks' headquarter province, as well as year and bank fixed effects. Violation is an indicator for violating the 150% minimum for allowances-to-NPLs ratio. T-statistics testing the coefficients with zero are shown in parentheses, where standard errors are clustered by bank. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Panel A: Type of Banks				
Dependent Variable:		Bank has some NPL Sales in Year t		
$Z_{i,t-1} =$	Small Bank	Rural Bank	Bank Operates in >1 Province	Distance to Nearest CBRC Office > Median
	(1)	(2)	(3)	(4)
Violation_{t-1}	-0.336***	0.074	0.240***	-0.297*
	(-3.81)	(0.58)	(2.68)	(-1.83)
$\text{Violation}_{t-1} \times Z_{i,t-1}$	0.621***	0.218	0.240***	0.145***
	(4.80)	(1.49)	(3.14)	(3.87)
R^2	0.460	0.458	0.458	0.469
N	409	409	409	409

Panel B: The Impact of Regulators				
Dependent Variable:		Bank has some NPL Sales in Year t		
$X_t =$	Young Regulator	Connected Local Regulator	Reserve Req. Decrease	After Relaxing NPL Regulation in 2018
	(1)	(2)	(3)	(4)
Violation_{t-1}	0.205**	0.307***	0.348***	0.578***
	(2.10)	(3.40)	(2.70)	(3.03)
$\text{Violation}_{t-1} \times Z_{t-1}$	0.287**	0.198*	-0.129	-0.382**
	(2.00)	(1.71)	(-1.19)	(-2.06)
Z_{t-1}	-0.066	-0.091		
	(-0.96)	(-1.44)		
R^2	0.462	0.465	0.458	0.465
N	409	409	409	409

Panel C: Impact of Competition, Financial Market, and Career Concerns				
Dependent Variable:		Bank has some NPL Sales in Year t		
$Z_{i,t-1} =$	Dependence on the Interbank Market	Stock Analyst Forecast > Median	Local Competition > Median	Salary > Median
	(1)	(2)	(3)	(4)
Violation_{t-1}	0.265***	0.288***	0.216**	0.035
	(2.88)	(3.62)	(1.99)	(0.17)
$\text{Violation}_{t-1} \times Z_{i,t-1}$	0.225**	-0.164	0.107	0.298
	(2.09)	(-0.67)	(0.85)	(1.42)
Z_{t-1}	0.113	-0.029		
	(1.09)	(-0.30)		
R^2	0.459	0.459	0.458	0.460
N	409	409	409	409

Bank Characteristics. Panel A of Table A.5 shows that smaller banks in violation of the NPL regulation are more likely to sell NPLs in the next year. The relation is also stronger for rural banks, although the results are not statistically significant. Column (3) shows banks in violation of the NPL regulation that operate in multiple provinces are twice as likely as those operating only in one province to sell NPLs. Therefore, banks more exposed to financial regulation across multiple jurisdictions/CBIRC offices appear more sensitive to financial regulation. However, we find banks that are farther from the closest CBIRC office in violation of the NPL regulation are more likely sell NPLs. If NPL sales are an orderly means of disposal, and financial regulators pressure banks to dispose of NPLs, we would have expected those closer to the regulator to sell more NPLs as they may be under more scrutiny, all else equal. On the other hand, banks farther from local CBIRC offices, which are likely to be more rural banks, may have more NPLs in the first place and are more likely to sell NPLs. So, we are unable to interpret this latter result on its own. Therefore, to get a better understanding of the role of regulators, we explicitly consider detailed information on regulator qualities below.

Regulation Intensity. Panel B of Table A.5 shows the cross-sectional tests of regulation intensity. As a measure of regulator strictness, we consider a regulator as young if they are younger than 52, the median age across top regulators across all CBIRC offices, and consider a regulator as connected to the central government based on whether the regulator has working experience with the central CBIRC. Both types of regulators are stricter: young regulators have more career concerns and those centrally connected are both inclined to be more strict in enforcing financial regulations and more likely to facilitate orderly disposals. The positive coefficients of β in Columns (1) and (2) show that banks in violation of the NPL regulation facing stricter regulators are more likely to sell NPLs. Corroborating this conclusion, Columns (3) and (4) suggest when financial regulation is relaxed in terms of lower reserve requirements or more flexible NPL regulation, banks with an

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allowance-to-NPLs ratio below 150% are less likely to sell NPLs, although the result on the impact of the lower reserve requirement is not statistically significant at conventional levels. Overall, banks appear more likely to sell NPLs when regulation is stricter and less likely to sell NPLs when the regulation is relaxed.

Other Governance Mechanisms. We further study the role of two alternative external governance mechanisms: competition and financial markets, as well as one internal governance mechanism: bank managers' career concerns. In all these situations, a more stringent governance mechanism would increase adherence to regulatory compliance. Banks more dependent on financial markets and those whose managers have more career concerns should be more likely to sell NPLs. Panel C of Table A.5 shows banks more dependent on the interbank market and in violation of the NPL regulation are more likely to sell NPLs. Column (1) uses whether total interbank borrowing is above the sample median. Column (2) uses whether a bank's equity analysts (if there is one, since not all banks are publicly listed) produce a target P/E ratio greater than the median P/E ratio of the analysts' forecast. Column (3) uses a measure of bank competition counting the total number of banks operating in the same area. Column (4) uses a measure of bank manager career concerns, using an indicator of high salary, defined as a binary variable equal to one if the manager's salary is more than 1 million RMB. Bank managers who are paid more should be more career-concerned, and more career-concerned managers would adhere to financial regulations more. Apart from the dependence on the interbank market, no other pressure from the equity market through stock analyst forecasts in Column (2) and local competition with other banks in Column (3) appear to affect the likelihood of banks selling NPLs when they are violating the 150% minimum allowance-to-NPLs ratio. However, we find in Column (4) that bank managers earning more than the median salary are more likely to sell NPLs, consistent with bank managers' career concerns to remain at their job, although the result is not statistically significant at the 5% level with a p-value of 0.16.

Therefore, we find some suggestive evidence that stronger alternative governance mechanisms predict more NPL sales, but the results are not as strong as regulatory intensity.

A.6 Capital Structure of Local AMCs

To inform the representativeness of our AMC with respect to the whole market as well as to understand local AMCs' financial structure, we gather equity ownership and capital structure information of local AMCs. Equity ownership is collected from China's National Enterprise Credit Information Publicity System[27]. In total, we have equity ownership information for 58 out of the 59 local AMCs. Capital structure information is collected from various sources. Where available, we prioritize data from Wind for publicly listed AMCs or those with publicly traded corporate bonds, then check the AMC's official websites, and then finally check any other references in the financial news. In total, we have capital structure information for 35 out of the 59 local AMCs.

Using the most recent data available for each AMC, we find the median AMC has a book leverage ratio of 62%, and three-quarters of AMCs have a leverage ratio above 50%. Local AMCs finance themselves using equity from a combination of private investors and local governments, and debt from banks or the inter-bank market.

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[27]http://www.gsxt.gov.cn/corp-query-homepage.html

Table A.6: Equity Ownership and Capital Structure of Local AMCs

The table below shows summary statistics of the book leverage ratios of central and local AMCs by year, and the local AMC leverage ratio by province. The equity ownership data is collected from China's National Enterprise Credit Information Publicity System. The capital structure data is hand-collected from various sources, prioritizing the Wind database where possible, then the individual AMC's websites, then financial news websites.

Panel A: Equity ownership structure of local AMCs (N = 58)					
Year	Mean	SD	P25	Median	P75
Registered capital (Billion RMB)	3.71	5.1	1	2.61	4.51
Fraction of state shares	61%	35%	28%	71%	98%
incl. central government shares	5%	11%	0%	0%	3%
incl. local government shares	56%	36%	18%	61%	94%
Fraction of non-state shares	39%	35%	2%	29%	72%

Panel B: Book leverage ratio of local AMCs By Year (N = 35)					
Year	Mean	SD	P25	Median	P75
2013	42.7	20.2	33.5	48.6	57.8
2014	45.8	19.0	32.8	47.7	60.7
2015	54.2	22.0	38.6	58.9	71.5
2016	43.3	27.6	17.7	46.8	68.0
2017	53.7	23.0	42.9	58.3	68.6
2018	59.6	19.3	51.0	62.8	75.2
2019	63.3	15.1	55.6	63.2	74.7

Panel C: Local AMCs Leverage Ratio Rank (N = 35)					
Rank	Province	Median Book Lev. Ratio	Rank	Province	Median Book Lev. Ratio
1.	北京 (Beijing)	15.4	14.	天津 (Tianjin)	62.8
2.	西藏 (Tibet)	15.5	15.	江苏 (Jiangsu)	63.8
3.	新疆 (Xinjiang)	28.0	16.	四川 (Sichuan)	65.1
4.	宁夏 (Ningxia)	35.6	17.	安徽 (Anhui)	66.5
5.	上海 (Shanghai)	38.4	18.	山东 (Shandong)	68.1
6.	海南 (Hainan)	39.3	19.	福建 (Fujian)	68.4
7.	陕西 (Shaanxi)	44.9	20.	浙江 (Zhejiang)	71.6
8.	内蒙古 (Mongolia)	45.8	21.	河南 (Henan)	74.0
9.	辽宁 (Liaoning)	46.8	22.	重庆 (Chongqing)	74.5
10.	湖北 (Hubei)	49.0	23.	广东 (Guangdong)	75.6
11.	广西 (Guangxi)	52.3	24.	山西 (Shanxi)	77.8
12.	湖南 (Hunan)	59.2	25.	江西 (Jiangxi)	79.2
13.	河北 (Hebei)	59.5			

A.7 Stress Testing the Hidden NPLs

We perform a stylized stress test to assess the distribution of NPL loss under hypothetical stress scenarios. In this stress testing analysis, we focus on the hidden NPLs. As a result, our findings can be used to complement stress-testing based on banks' reported exposures (either on-balance-sheet exposures or off-balance-sheet exposures that are required to be recognized under current accounting and regulatory frameworks).

We first estimate the *true* amount of NPLs in the aggregate as follows:

1. First, we calculate the annual flow of NPL transfers for the period from 2014 to 2019. We observe a total of 53.9 billion yuan of sold NPLs in 2019 in our sample, corresponding to 2.34% of the 2.3 trillion NPL transfer that the People's Bank of China reported.[28] We scale the annual flow of transfers received by the AMC by the same share to estimate that the total annual transfer amount of NPLs from 2014 to 2018.

2. Next, we convert the flow to the total stock of hidden NPLs. A choice must be made regarding the horizon for the hidden NPLs to be resolved. This horizon reflects the aggregate efficiency of NPL resolution. The longer it takes for NPLs to be resolved, the longer hidden NPLs remain relevant for systemic risk consideration. Based on the observation that NPL packages take 2–3 years to be resolved by the AMC (through transferring to either a third party or another AMC) in our sample, we assume a resolution horizon of 2 to 3 years.

Panel A of Table A.7 shows the magnitude of total NPLs under different resolution horizons. Our preferred resolution horizon of 2 to 3 years implies that in 2019, hidden NPLs amounts to 5.13 to 6.94 trillion, driving total NPLs to be 213% to 288% higher than the official statistics. To account for the difficulty in assessing the nature of NPL transfers done by national AMCs, we also

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[28]The regulators do not disclose the total transfer amount for previous years.

consider removing the NPL transfers by national AMCs in this calculation. We hand collected the information on the end-of-year balance of non-performing credit assets from the annual reports of the four national AMCs. We then deduct the total size of national AMCs' non-performing credit assets from our estimated total stock of hidden NPLs. This leads to a conservative estimate as it assumes that national AMCs do not facilitate banks to hide NPLs and therefore ignores potential coordination between banks and national AMCs. Excluding national AMCs entirely implies that in 2019, hidden NPLs amounts to 2.81 to 4.62 trillion, driving total NPLs to be 117% to 192% higher than the official statistics. As a result, the NPL ratio is 3.87–5.14%, as opposed to the reported NPL ratio of 1.86%.

We next consider counterfactual stress scenarios where large losses materialize in the hidden NPLs. Losses on hidden NPLs are borne by both the AMCs and third-party bank affiliates, with the latter passing through a fraction of losses to banks. Although we intentionally focus on unfavorable situations in the stress-testing analysis, our findings are still informative for financial stability considerations even if the NPLs we observe from one AMC were lower in quality than the average hidden NPL in the entire financial system.

We assume a loss given default ranging from 60% to 80%, equivalent to a recovery rate from 40% to 20%, for the stress scenarios.[29] We assume AMCs and third-parties bear 10% and 90% of the losses, respectively, based on the steady state distribution of ultimate owners of the transferred NPLs shown in Table 6 Panel A. As third-parties are bank borrowers, they may pass through losses to banks. Several factors affect the pass-through in a stress scenario, including the contractual terms between banks and third-parties, the capital structure and the size of equity buffers of third-parties, and the correlation between the third-parties' and the NPLs' credit risks. We do not have enough

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[29]For reference, the average asset recovery rate and cash recovery rate in the national AMCs' resolution of NPLs in early 2000s were 32% and 21%, respectively (Pomerleano and Shaw, 2005). According to Moody's Ultimate Recovery Rate reports, the loss given default of senior secured loans during recessions (1992, 2002, 2008, and 2009) is 56%.

data to model the pass-through rates directly, and instead take a stylized approach by considering a range of pass-through rate from 10% to 100%. Although it is not estimated directly from the data, this stylized approach has the advantage of being transparent and also extendable to a more sophisticated stress testing framework if more data were to become available to characterize the pass-through rate more realistically.

Panel B of Table A.7 presents the stress test calculations for hidden NPLs including national AMCs. For the 5.13–6.94 trillion total hidden NPLs as of 2019 (from the calculation in Panel A), the total losses under stress range from 3.08 to 5.56 trillion under a loss given default ranging from 60% to 80%. A stress scenario with a loss given default of 60% would erode 1.39–1.88 trillion or 6.24–8.44% of aggregate regulatory capital in the banking sector under a pass-through rate from third-parties to banks of 50%. In a more severe stress scenario with a 80% loss given default, 1.85–2.50 trillion or 8.32–11.25% of aggregate regulatory capital would be wiped out.

Panel C of Table A.7 presents the stress test calculations for hidden NPLs excluding national AMCs. For the 2.81–4.62 trillion total hidden NPLs excluding national AMCs as of 2019 (from the calculation in Panel A), the total losses under stress range from 1.69 to 3.70 trillion under a loss given default ranging from 60% to 80%. A stress scenario with a loss given default of 60% would erode 0.76–1.25 trillion or 3.42–5.62% of aggregate regulatory capital in the banking sector under a pass-through rate from third-parties to banks of 50%. In a more severe stress scenario with a 80% loss given default, 1.01–1.63 trillion or 4.56–7.49% of aggregate regulatory capital would be wiped out.

Regardless of whether we include national AMCs in estimating hidden NPLs, we estimate sizable hidden NPLs which can incur large losses in stress scenarios. Should the losses from hidden NPLs realize, bank capitalization substantially weakens, which may handicap extension of new credit by banks.

Table A.7: Implied Aggregate NPLs for Banks and AMCs

The table below shows the aggregate implications of total NPLs implied from our sample. For reference, at the end of 2019, the net capital in the banking sector amounts to 22.2 trillion, total risk-weighted assets reach 152 trillion, and the capital-to-risk weighted assets ratio stands at 14.6%. All level figures are reported in Chinese Yuan (RMB).

Panel A: Hidden NPLs in 2017-2019

Year	Reported NPLs (trillion)	Reported NPL ratio	Under 2 year resolution				Under 3 year resolution			
			Including national AMCs		Excluding national AMCs		Including national AMCs		Excluding national AMCs	
			Hidden NPLs (trillion)	Revised NPL ratio	Hidden NPLs (trillion)	Revised NPL ratio	Hidden NPLs (trillion)	Revised NPL ratio	Hidden NPLs (trillion)	Revised NPL ratio
2017	1.71	1.74%	2.58	4.26%	0.75	2.44%	3.2	4.84%	1.37	3.04%
2018	2.03	1.83%	4.64	5.78%	2.63	4.03%	5.41	6.4%	3.39	4.67%
2019	2.41	1.86%	5.13	5.59%	2.81	3.87%	6.94	6.85%	4.62	5.14%

Panel B: Back-of-the-Envelope Stress Testing the Hidden NPLs (including national AMCs) in 2019

Hidden NPLs (trillion)	Loss given default	Loss born by AMCs (billion)	Loss born by third-parties (billion)	Under 10% pass-through from third parties to banks		Under 50% pass-through from third parties to banks		Under 100% pass-through from third parties to banks	
				Loss born by banks (billion)	relative to total regulatory capital	Loss born by banks (billion)	relative to total regulatory capital	Loss born by banks (billion)	relative to total regulatory capital
	60%	308	2,770	277	1.25%	1,385	6.24%	2,770	12.5%
5.13	70%	359	3,232	323	1.46%	1,616	7.28%	3,232	14.6%
	80%	410	3,694	369	1.66%	1,847	8.32%	3,694	16.6%
	60%	416	3,748	375	1.69%	1,874	8.44%	3,748	16.9%
6.94	70%	486	4,372	437	1.97%	2,186	9.85%	4,372	19.7%
	80%	555	4,997	500	2.25%	2,498	11.25%	4,997	22.5%

Panel C: Back-of-the-Envelope Stress Testing the Hidden NPLs (excluding national AMCs) in 2019

Hidden NPLs (trillion)	Loss given default	Loss born by AMCs (billion)	Loss born by third-parties (billion)	Under 10% pass-through from third parties to banks		Under 50% pass-through from third parties to banks		Under 100% pass-through from third parties to banks	
				Loss born by banks (billion)	relative to total regulatory capital	Loss born by banks (billion)	relative to total regulatory capital	Loss born by banks (billion)	relative to total regulatory capital
	60%	169	1,517	152	0.68%	759	3.42%	1,517	6.8%
2.81	70%	197	1,770	177	0.80%	885	3.99%	1,770	8.0%
	80%	225	2,023	202	0.91%	1,012	4.56%	2,023	9.1%
	60%	277	2,495	249	1.12%	1,247	5.62%	2,495	11.2%
4.62	70%	323	2,911	291	1.31%	1,455	6.56%	2,911	13.1%
	80%	370	3,326	333	1.50%	1,663	7.49%	3,326	15.0%