Hidden Non-Performing Loans in China*

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Abstract

We study non-performing loan (NPL) resolution using proprietary data on NPL transactions in China. We find these transactions – driven by tighter financial regulation – are consistent with banks concealing non-performing assets from regulators as (i) transaction prices do not compensate for credit risks; (ii) banks fund the NPL transactions and remain responsible for debt collection; and (iii) over 70% of NPL packages are re-sold at inflated prices to bank borrowers. Therefore, banks remain exposed to the NPLs that were removed from their balance sheets. Our findings highlight the importance of resolution monitoring for effective NPL treatment.

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

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

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1 Introduction

Non-performing loans (NPLs), defined as loans in or close to default, weaken bank health and curtail bank credit supply, leading to elevated risks of systemic financial crises and real economic disruptions.[1] Removing NPLs from the banking sector facilitates the clean-up of bank balance sheets and promotes financial stability. The creation of designated financial institutions to purchase and resolve NPLs from banks, referred to as the asset management company (AMC) model,[2] has been viewed by policy makers as a viable method to resolve distressed banking assets (e.g. Geithner, 2009). Such a model has been widely used to resolve financial crises since the 1980s in both developed and developing economies. More recently, a surge of NPLs due to COVID-19 has prompted discussions on the potentials of the AMC model for resolving NPLs.[3] However, despite the buy-in of various policy makers, systematic study of the efficiency of the AMC model has been scarce due to the lack of transaction-level data and the limited statistical power in targeted uses.

In this paper, we use detailed transaction-level proprietary data from an AMC to evaluate the effectiveness of the AMC model for NPL resolution. We use China as an empirical setting, where originally, national AMCs were used around the Asian Financial Crisis to buy NPLs from banks. Then, a 2012 deregulation permitted the establishment of local AMCs to do the same. Apart from the local and national AMCs, no other entities are permitted to buy NPLs in bulk from banks. This reform arguably permits the most flexible and broadest use of the AMC model to date, as it imposes few restrictions on banks' offloading NPLs through AMCs.[4] Compared to other countries which had more targeted and short-term uses, China's prolonged and wide-spread use of AMCs permits both time-series and cross-sectional analyses to evaluate the effectiveness of the AMC model of NPL resolution. Our NPL transaction dataset contains records of all transactions from a

[1] For example, Bernanke et al. (1991), Calomiris and Mason (2003), Iyer et al. (2014), and Iacoviello (2015) study macroeconomic evidence and models and highlight the impact of a credit crunch in amplifying adverse macroeconomic shocks as well as slowing the recovery.

[2] These AMCs are also referred to as "bad banks," to reflect that they hold non-performing banking assets.

[3] 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).

[4] In recent years, banks across the board increasingly remove NPLs from their balance sheets. 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.

large local AMC with a sample that ranges from 2014 through the end of 2019. This local AMC has conducted transactions totally over US$23 billion with all of the Big 4 state-owned banks, 8 of the 12 joint stock banks, and over 70 urban commercial banks. The wide coverage of counter-party banks suggests that this dataset is plausibly representative of the wider NPL resolution market in China.

We find evidence that the vast majority of NPL transactions do not fully transfer NPL risks. Instead, we argue that banks use NPL transactions for regulatory evasion, contrary to the 2012 policy objectives. We proceed by documenting the relevance of bank NPL regulations on NPL transactions, then evaluating whether the NPL transactions appear consistent with orderly resolution. Because banks remain exposed to those transacted NPLs in the concealment process, we call the transferred loans "hidden NPLs." Finally, we conduct a simple stress test to evaluate the potential impact of these hidden NPLs on the financial system.

First, we document evidence that banking regulation appears to drive NPL transactions, a necessary premise for regulatory arbitrage. Banks in China are subject to a formula-based regulatory floor on the ratio of the allowance for loan impairment losses ("allowance") relative to NPLs. Selling NPLs to AMCs allows banks to remove NPLs from their balance sheets and generate more slack in satisfying the regulatory requirement. Consistent with this prediction, banks appear to sell NPLs in response to the pressure of complying with the regulation: NPL sales concentrate in the week immediately before quarterly regulatory reporting, and banks in violation of the regulation in the past are more likely to sell NPLs. Following NPL transactions, banks make more loans, increase capital ratios, and are less likely to violate the NPL regulation in the following year.

Then, we study whether NPL transactions represent actual resolution or mere concealment of NPLs, both of which can be consistent with the observed relation between NPL transactions and financial regulation. On the one hand, more pressure to comply with financial regulations may incentivize more orderly resolution of non-performing assets. On the other hand, that same pressure may also incentivize banks to conceal NPLs from financial regulators. The distinction, however, is important for financial stability. Resolution of NPLs would make banks safer whereas concealment of NPLs is a means of regulatory arbitrage. From a policymaker's perspective, concealment may be even worse than no resolution mechanism at all, as it also obscures the true risks in the financial system.

We consider three plausible scenarios, two of which are resolutions and the remaining of which is concealment from regulators. First, the transactions may represent orderly market-based resolu-

tion of NPLs, where the transaction prices reflect fundamentals under risk-based pricing. After the transactions, AMCs resolve NPLs by writing off losses, collecting on the loans, or other means.[5] In this scenario, all NPL risks are transferred from the banks to the AMCs. Second, the transactions may represent resolution with explicit or implicit government support of banks, where transaction prices may exceed fair value and premiums reflect government subsidies. After the transactions, AMCs would engage in the resolution as in the scenario above, possibly with additional government support. In this scenario, all NPL risks are effectively transferred from the banks to the government and/or the AMCs. Third, the transactions may represent concealment, where banks coordinate with AMCs to remove NPLs from their balance sheets, and transaction prices need may not be linked to the underlying NPL quality but instead be related to the intermediation rents which AMCs collect for facilitating the concealment. After the transactions, AMCs would offload the NPLs to bank-affiliated third parties. In this scenario, NPL risks may be partially to the third-party or not transferred from the banks at all.

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, the mean and median haircut on NPL transactions in our data are only 5.1% and 0% respectively, despite the average NPL package being over 4.5 years delinquent.[6] In fact, 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 correlate with NPL sale prices. Further, NPLs originating from less capitalized banks have lower haircuts. Therefore, the pricing results appear inconsistent with a market-based resolution hypotheses, leaving government-backed resolution and concealment as the remaining admissible explanations.

Second, although AMCs are supposed to be debt resolution specialists, all transaction contracts feature a collection delegation term whereby the AMC delegates the obligation to collect the NPLs back to the banks. In addition, over 90% of transactions were funded by the banks either through direct loans to the AMC or through indirect financing through other affiliated financial institutions, such as trusts or security companies. Banks with lower capital ratio or in violation of NPL regulations were more likely to finance the NPL transactions through direct loans to the

[5]Other means include securitization then selling to other market participations who are presumably not relevant for systemic risk considerations, or a combination of all these methods.

[6]In contrast, the average haircuts observed in NPL auctions on the publicly-available platform Taobao are between 20 to 60% (McMahon, 2019).

AMC, consistent with such banks being more desperate to conceal NPLs as the direct lending is more easily traceable.

Third, within two years, the AMC re-sells over 70% of the NPL packages that it previously bought to third parties at a re-sale premium between 0.15% and 3%, with a median of 0.9%. Further, all third parties are non-SOE private firms located in the same city as the bank, over 85% of the third parties belong to either manufacturing, accommodation and food, or wholesale and retail industries, and over 98% of all third parties are borrowers of the bank. Looking at the transaction dates, we find that the AMC holds NPL packages for either exactly 6, 12, 18, 24, or 36 months before the re-sales. The exact clustering of the AMC's holding periods is inconsistent with natural transactions. In addition, we find that the longer an NPL package stays with the AMC, the higher the resale premium.

Fourth, we test the effect of NPL transactions on banks' debt and equity prices in an event study. We focus on a subset of banks with publicly traded stocks or debt instruments and look at a one-trading-month window around initial transaction dates. If NPL transactions represent orderly resolution which are 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 find neither equity nor credit market prices respond to NPL sales. We interpret the null reaction as public financial markets either being unaware of the sale or believing that NPL sales are not actual disposals – both indicative of the transactions not being true, transparent resolutions of NPLs.

Overall, our empirical results are more consistent with NPL transactions to AMCs being a method to conceal rather than actually resolve non-performing debt. Three parties 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 NPL regulation, (2) AMCs that are compensated for acting as a pass-through entity, and (3) third-party bank affiliates that are the ultimate owners of the NPLs and borrowers of the banks. These hidden NPLs are relevant for policymakers concerned about systemic risk as the NPL transactions between banks and AMCs are opaque (Thomson, 2011). Although bank supervisors may be aware of some concealment activity, consistent with the July 2019 rule banning direct lending of banks to AMCs to finance NPL transactions, they may not know the quantitative extent to which banks engage in these transactions.

Recognizing these hidden NPLs imply that the total NPLs in the Chinese banking sector is two to four times of the reported amount: aggregate NPLs amount to 4 to 9 trillion RMB (approx.

US$0.6-1.2 trillion) depending on the aggregation method and assumptions on NPL resolutions. Although concealing the NPLs does not necessarily mean risk is not transferred or mitigated to some extent, banks are still be liable for the NPL losses to the extent that those losses propagate from the third-party borrowers in the form of another layer of default. Should the NPLs take substantial losses, equity holders of third-party affiliates would be wiped out and start passing losses to their creditors: 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. A stress scenario with a modest loss given default of 60% and a pass-through rate from third-parties to banks of 50% would erode 1.14–1.54 trillion or 5.1–6.9% of aggregate regulatory capital in the banking sector.

Our findings have implications for the policy design of non-performing debt resolution and for determining supervisory and regulatory focus for promoting financial stability more generally. The AMC model is generally viewed as a viable choice of problem loan resolution mechanism in the current policy and research discussions (Geithner, 2009; Avgouleas and Goodhart, 2017). But 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 simply 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". Finally, 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.

After discussing the relevant literature, the remainder of the paper is 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, and 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 test. Section 5 concludes.

Related Literature

Our study contributes to the literature on measurement and resolution of problem loans. 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.[7] 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, a practice commonly referred to as "regulatory arbitrage". 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. To this end, our paper contributes to policy discussions by documenting a novel mechanism of regulatory arbitrage—the concealment of NPLs through AMCs in China.

[7] 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),[8] regulate bank NPLs. 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", "sub-standard", "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,[9] 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.[10]

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). For each of the Big 4 state-owned banks, a dedicated AMC was set up to acquire and then resolve its NPLs. Similar to AMCs or "bad banks" in other countries such as the Resolution Trust Corporation in 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

[8]The CBIRC was formed in April 2018 with the merger of the CBRC and the 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.

[9]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.

[10]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.

(Luo, 2016). Following the AMC model used in in the past, these national AMCs were initially established in 1999 with a tenure of 10 years. However, their tenure was extended to an indefinite period in 2009. 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 institutions.

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 any 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 other entities (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. Appendix Figure A.2 shows 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. Banks transfer NPLs to local AMCs in the form of NPL packages consisting of at least 10 NPLs (also called a "batch" or "bulk" transfer). In such a transaction, a bank removes the transferred NPLs from its balance sheet and transfers them to the AMC. Under the current regulatory framework, only designated institutions such as national and local AMCs can receive NPL transfers from banks. In other words, transferring to AMCs is the only viable option for banks to dispose NPLs without writing them down or fully recovering them.

2.2 Data Sources

We combine proprietary and publicly available data from several different data sources for our analyses. First, we obtain information of all NPL transactions from a leading local AMC in a relatively developed province of China. For security reasons, we mask the company. It was founded in 2013 and is one of the first local AMCs approved. The AMC is owned by a mix of provincial

government and private ownership, which is representative of local AMCs.

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 a combination of the National Bureau of Statistics of China, OECD, the World Bank, and other publicly available sources through the Wind and CEIC data aggregators. Where the same variables are available in multiple databases, we cross-check the data to ensure consistency and accuracy.

[Table 1 here]

Our final sample ranges from the third quarter of 2014 through the end of 2019. Overall, as an NPL transaction dataset, our sample covers 257 NPL transactions with the 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 of the Big 4 national banks, 8 joint stock banks, and 70 additional smaller city or county banks. 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 loans is 51 billion RMB (approx. US$7.3 billion) and median profits is 1.36 billion RMB (approx. US$194 million). The median bank-year observation satisfies the bank capital regulation with 13% capital ratio, and the minimum capital ratio is 10.8%, slightly above the minimum 10.5% regulation threshold. Appendix Section A.2 studies the sample selection based on observables and find that the most important predictor for sample entry is distance from a bank to the AMC's headquarter. Appendix Section A.5 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 start by describing the quantity-based NPL 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 therefore stipulate how banks set aside allowance for loan losses. More NPLs force banks to set aside higher allowance which reduces their profits. This quantity-based loan quality regulation approach differs from the mandatory charge-off of delinquent loans in other countries.[11] Under the minimum allowance regulation, Chinese banks are not required to charge off delinquent loans.[12]

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 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 simply violate the required thresholds. We find two pieces of suggestive evidence which are consistent with binding financial regulations driving NPL sales.

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

[12] 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.

[Figure 1 here]

First, Figure 1 plots weekly NPL sales and shows a cluster in the week before each quarter end, the point of time when banks must report financial conditions to the CBIRC. 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 (Paish, 1939; Allen and Saunders, 1992; Hoag, 2016; Du et al., 2018; Cai et al., 2019).

Figure A.3 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. In untabulated analyses, we find that there exhibits 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 and 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.[13] 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 whether a bank i violated the 150% minimum allowance-to-NPLs ratio in year $t-1$, and $X_{i,t-1}$ are controls, including growth rate of deposits, growth rate of the bank's capital ratio, deposit-to-loan ratio, province-level GDP growth, and province-level growth in elec-

[13] Although the indicator of NPL regulation violation is a binary variable, we adopt a linear model as our baseline specification as opposed to a Tobit or probit model in order to use bank fixed effects, which help control for unobserved bank-specific heterogeneity which may confound our variables of interest. Given the short time sample of only five years, using a linear model also avoids the incidental parameters problem. In untabulated analyses, we find the same qualitative and quantitative results as in Table 2 Panel A when using a probit model.

tricity consumption. 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 and the ratio of NPL sales to the bank's lagged total loans. We cluster standard errors by bank to allow for within-bank correlation in the error term.

Table 2 shows that banks in violation of the 150% minimum allowance-to-NPLs ratio conduct more NPL transactions along the extensive margin but do not sell more NPLs along the intensive margin. Column (2) in Panel A shows banks in violation of the minimum of the allowance-to-NPLs ratio are 25-percentage-points more likely to have an NPL sale in a given year. Column (3) in Panel B also shows the relation appears driven by banks in violation of the rule compared to those just above the allowance threshold. However, along the intensive margin, conditional on having a sale, we find violation of the 150% minimum of the allowance-to- NPLs ratio does not predict larger NPL sale packages. We expect this result along the extensive margin and a null result along the intensive margin if the fixed costs associated with selling NPLs are negligible, whereby whenever banks want to sell NPLs, they transact as much or as little as they need to. Column (4) in Panel A shows healthier banks with a larger capital ratio are less likely to have NPL transactions. Interestingly, across both margins of adjustment, Column (1) shows the reported NPL ratio – the statistic reported to the banking regulators – does not predict NPL transactions.

Altogether, the quarter-end clustering of NPL transactions, the bunching of loan quality ratios around regulatory thresholds, and the relation between NPL regulatory tightness and NPL sales jointly suggest financial regulation is a plausible driver of NPL sales. In Appendix Section A.4, we 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 a stricter regulators, and banks with a higher dependence on the interbank market.

3.3 Future Bank Health

By reducing NPLs on a bank's balance sheets, NPLs transactions improve banks' balance sheet health, which may allow them to make new loans after the transaction. To study whether NPL sales predict higher subsequent capital ratios and loan growth, and whether the bank is less likely to violate the minimum of the allowance-to-NPLs ratio in the future, we consider a panel regression

specification of the form:

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

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

Table 3 shows that NPL transactions in the previous year predicts 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 violate 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, banks with NPL sales appear healthier the subsequent year in terms of capital ratio and loan growth, and they are also less likely to violate the 150% minimum allowance-to-NPLs ratio. Therefore, the NPL transactions appear to be a plausibly effective means to reduce the regulatory requirements for NPLs, with consequences on loan expansion and capital ratios.

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. On the one hand, more pressure to comply with financial regulations may incentivize more orderly resolu-

tion of toxic assets. On the other hand, that same pressure may also incentivize banks to conceal NPLs from financial regulators. This distinction 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 that banks are exposed to. 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 true 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 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.[14] 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.

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

[14]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".

(a positive haircut) relative to the face value, as all the NPLs transferred 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 that NPLs transferred by banks which violate the allowance-to-NPLs ratio to have higher haircuts than NPLs transferred by other banks as 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 through the NPL transactions. After the NPL transactions, AMCs engage in a resolution process.One possibility is AMCs to 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 the resolution value may be lower. On the other hand, AMCs are also 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, e.g., WestLB in Germany after the Global Financial Crisis,[15] 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), government-backed resolution is an likely situation. 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 work to resolve the NPLs.

Empirical Predictions. If the NPL transactions from banks to the local AMCs represent government-backed resolution, the transaction prices may not reflect fundamentals: Firstly, we may see NPL

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

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 may 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, similar to in Scenario 1, the NPL transactions correspond to a transfer of risks from banks to AMCs and will be followed by resolution process. As the AMCs act as agents of the governments, other government entities may also participate in the resolution.

Scenario 3: Concealment

Regardless of whether 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 when banks are severely constrained by the NPL regulation. 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 transfers 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. The key difference from Scenario 2, however, is that the coordination between banks and AMCs to conceal NPLs from regulatory scrutiny also implies that the AMCs are not engaged in 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 removal of 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 resale transactions are useful to assess the nature of the resales. 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 resale haircut relative to the AMCs' purchase prices.

4.2 Characteristics of NPL Transactions

Table 4 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 an average delinquency of 55 months. Around 85% of the loans are corporate loans with contractual maturity 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[16] or unsecured.

[Table 4 here]

Panel B shows the characteristics of the transaction contracts. The AMC earns an average annual commission fee for holding the NPL with a mean of 0.542%, and all transactions received funding from the bank. We discuss the breakdown of the exact sources of funding in Section 4.4. In addition, every transaction contract contains an NPL collection delegation term, whereby the AMC appoints the bank as the servicer of 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. We see that despite the NPLs having an average delinquency of almost 4.5 years, NPL transactions prices show low, even negative, haircuts: 8% of all transactions actually had a premium relative to face value. Around 60% of all transactions had exactly zero haircut, 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. Together, the summary statistics in Table 4 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

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

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. 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 5 here]

Table 5 presents the results for four different measures of characteristics of sold NPLs: the average delinquency in Column (1), the share of loans to state-owned enterprises (SOEs) in Column (2), the share of secured loans in Column (3), and the share of loans with maturity greater than 1 year in Column (4). As shown in Column (1), we find NPL packages with a higher average delinquency carry a lower haircut. In other words, 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 that have a higher capital ratio actually have a higher NPL haircut, whereas we would have expected banks with lower capital ratios – more unhealthy banks – to sell at lower prices if they were more desperate to offload NPLs.

Furthermore, there is no statistically significant relation between NPL transaction pricing and whether a bank is in violation of the 150% minimum allowance-to-NPLs ratio. This null result is consistent with our previous result studying the intensive versus extensive margin of NPL sales. If the NPL sale process itself is a concealment which the AMC participates in with little to no fixed costs of initiating, then the intensive margin quantity and pricing of the NPL transactions need not reflect whether banks violate the NPL regulation. Instead, when banks violate the NPL regulation, they conduct more transactions.

The other three measures of NPL quality – the share of loans to SOEs, share of secured loans, and share of loans with maturity greater than one year – in Columns (2) to (4) are all not statistically significantly associated with the haircut. However, the coefficient of the lagged capital ratio

remains statistically significant and changes little in the magnitude across the columns. Similarly, the coefficient of the indicator of whether a bank is in violation of the 150% minimum allowance-to-NPLs ratio remains insignificant across the columns.

The pricing results are inconsistent with a market-based resolution hypotheses 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. The NPL transfer pricing appears to be more consistent with either government-backed resolution or concealment.

4.4 Financing of NPL Transactions

The AMC from which we acquire data keeps a detailed record for every single NPL transaction, which not only include the contract features but also a separate variable for how the NPL transaction was financed. We observe three possible exact sources of funds from the records: a direct loan from the NPL-seller bank, a financing agreement from the NPL-seller bank via a trust company, and financing agreement from the NPL-seller 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."[17] The funds obtained from any of the three methods are intended to be used for purchasing the NPLs from the banks and cannot be used for any other purposes.

[Table 6 here]

Panels A and B of Table 6 tabulate the source of funds for the periods before and after the July 2019 ruling which banned direct loans from banks to AMCs to finance NPL transactions. The composition of source of funds changes significantly after the July 2019 ruling. Panel A shows that prior to 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 which banned the direct loan financing, 80% of transactions were financed via a bridge financing agreement, and 12% through other means.

Direct loans to the AMC as a way to finance the NPL transaction are more detectable compared to financing the transaction through an affiliated vehicle like a securities company or a trust. Therefore, more desperate banks would be more likely to use direct loans compared to banks which

[17] Anecdotally, according to the AMC, the residual category, "other means" of financing, still traces back to the NPL-seller banks, but through more complicated channels.

could afford the time to arrange affiliated vehicles to finance the transaction. We test this conjecture using a regression of the form

$$Direct\ Loan_{i,t} = \alpha_i + \alpha_t + \beta Quality_{i,t} + \phi Capital\ Ratio_{i,t-1} + \gamma Violation_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t}, \tag{4}$$

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 weight. $Direct\ Loan_{i,t}$ 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).

Panel C of Table 6 studies whether banks are more likely to provide a direct loan to the AMC to finance the NPL transaction based on their characteristics. 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 a bank with a lower capital ratio or one that violated the allowance-to-NPL ratio of 150% in the previous year is more likely to finance the NPL transaction directly through a loan. We interpret this result as: banks more desperate to sell their NPLs are more likely to make a direct loan to the AMC to finance the transaction.

4.5 Ultimate Owners and the Re-Sale of NPLs

Why would the AMC ever pay more than the face value for non-performing loans? A possible explanation is that the AMC expects to make a profit through its handling of the loans. In this subsection, 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 explore whether AMCs re-sell the NPLs, the entities which they re-sell the NPLs to, and the prices at which the NPL resale occurs.

[Table 7 here]

Table 7 Panel A presents summary statistics of the AMC's handling of the NPL packages. On average, an NPL package stays with the AMC for 21 months, with a range from 6 months to 48 months. A large fraction of NPL transactions end up being sold to third parties eventually: among

all observed transactions, slightly less than 16% of NPL packages (including those sold to the AMC in more recent periods) stay with the AMC while 10% are re-sold to another AMC and over 70% are sold to a different entity, which we call a third-party. None of the re-sold NPL packages undergoes another round of bundling or re-packaging ("re-syndication"). Furthermore, 5% of the re-sold packages specify the identity of the third-party buyers in the initial transactions.

Resales are prevalent and have straightforward structures. For loans that are already delinquent for an extended period of time and are therefore unlikely to recover, such as those we observed in the NPL transactions, timely resolution is arguably an optimal strategy. At the "Corporate Restructuring: Lessons from Experience" conference organized by the World Bank (Pomerleano and Shaw, 2005), President Yang Kaiseng 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. Therefore, we next study the re-sale premiums.

[Figure 3 here]

Panel B presents summary statistics on resale pricing and characteristics of third-party buyers. 100% of the re-sold NPLs are sold at a premium relative to the AMC's purchase price (see also the empirical cumulative distribution of resale premium in Figure 3). 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 0.6% resale premium. As for the identities of the third-party buyers, we do not have access to their exact identities due to confidentiality reasons; nonetheless we obtain information pertinent to their relationship with the original banks. All of the third-party buyers are located in the same city as the original banks. 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-party entities are other entities.

In addition, none of the third parties are SOEs, inconsistent with a government-sponsored bailout through affiliated entities. The modal third party industry is in manufacturing, followed by accommodation and then wholesale and retail industries. Therefore, the third-parties are likely

not debt resolution specialists either, as none of these industries appear to be plausible specialists in resolving NPLs. To the extent that some NPLs were collateralized by real estate, we would have expected third party bank affiliates to be real estate companies, yet only a little over 2% of the third parties are in that industry.

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

$$\begin{aligned} \textit{Re-sale Premium}_{i,t} = \alpha_i + \alpha_t + \beta \textit{Stay Months}_{i,t} + \phi \textit{Quality}_{i,t} + \gamma \textit{Haircut}_{i,t} + \\ \eta \textit{Capital Ratio}_{i,t-1} + \theta \textit{Violation}_{i,t-1} + X'_{i,t-1}\Gamma + \varepsilon_{i,t}, \end{aligned} \tag{5}$$

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 weight. $\textit{Re-sale Premium}_{i,t}$ is the weighted-average premium of re-sold NPL packages originally from bank i in year t relative to the AMC's purchase price. $\textit{Stay Months}_{i,t}$ 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 8 here]

Table 8 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 with the resale premium. Interestingly, the quality of the NPL packages does not appear to affect the resale premiums on the NPL packages. There is no discernible relation between the haircut in the initial sale and the resale premium. Neither is there a statistically significant relation between bank health and the resale premium.

[Figure 4 here]

Figure 4 shows a scatter plot relating the number of months an NPL package stays with the AMC and the resale premium of that NPL package. For an NPL package which is eventually re-sold, the AMC holds the package for either exactly 6, 12, 18, 24, or 36 months. Also, the re-sale premium appears to be a step function of the length of the AMC's holding period as the black line shows. The longer the holding period, the higher the re-sale premium. The exact clustering of the AMC's holding periods in multiples of 6 months appears inconsistent with resolution. If

NPLs were sold to the AMC with no pre-arranged resales, 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 resale transactions were part of the coordination between banks and AMCs, the AMC's holding period is likely to be agreed upon *ex ante* and common practices in multiples of 6 months may emerge. If this were true, then the positive relation between number of months an NPL stays with the AMC and the resale 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 own balance sheet capacity. Therefore, these results are more consistent with AMCs being compensated proportionally to how long they hold 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 analyzes whether the public financial markets take the NPL transactions into account when they value banks. If NPL sales are orderly resolutions of NPLs which are known to public markets, we would expect a weakly positive price reaction around the sale date. NPL sales would not only be in line with the financial regulator's desired outcomes, but also boost the bank's profit. 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 minimum of the allowance-to-NPLs ratio, which increases the bank's retained earnings.

[Figure 5 here]

In an event study focusing around the dates of NPL sales among banks with publicly-traded credit instruments, Figure 5 shows that neither financial market appears to respond in either direction. Therefore, the results suggest either the financial markets are not aware of NPL sales, or that they are aware of NPL sales but do not price in the NPL sales' effect on bank health and retained earnings for some reason. But although the financial markets do not appear to respond at the time of NPL transactions, equity markets appear to take the NPL sales into account through banks' valuation ratios. Appendix Table A.7 uses a subset of banks in our sample which are publicly traded and shows that banks in our sample with more traded NPLs have lower price-to-earnings and price-to-book ratios, but the relationships are not statistically significant due to the low sample size of 23 banks. Controlling for bank characteristics like capital ratios and local economic conditions, a one percentage point increase in NPLs sold to total loans correlates with a 1.47 decrease

in the price-to-earnings ratio. Although not statistically significant, this relation is consistent with markets discounting banks with more concealed NPLs.

4.7 Tri-party structure of banks, AMCs, and Third Parties to conceal NPLs

Our empirical results on the instances of NPL transactions, amount of NPL transactions, and prices for the sale and resale of the NPLs reject the resolution hypotheses in favor of the concealment hypothesis as Table 9 summarizes. A clear picture emerges from our analysis that three parties are involved in the concealment process:[18] (1) banks that want to remove NPLs from their balance sheets in order to comply with the quantity-based NPL regulation, (2) AMCs that are compensated for acting as a pass-through entity, and (3) third-party bank affiliates that are the ultimate holders of the NPLs. Figure 6 shows the movement of NPLs among the three parties.[19]

Conversely, any additional alternative hypotheses regarding the transfers of NPLs through AMCs to third parties must reconcile the seven pieces of evidence which we document:. (1) the non-market prices 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 non-market prices and timing of re-sale transactions from the AMC to third-party, (6) the characteristics of the third-parties as non-resolution specialists but who end up 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. Collectively, the empirical evidence is more consistent with NPL transactions being concealment rather than full resolution of NPLs (which was the desired policy outcome from the 2012 reform.)

[Table 9 Here]

Participating in the sale and resale process generates a sizable profit for an AMC. For the aver-

[18] Although we only observe NPL transactions conducted by one AMC in the NPL market, we confirm that the coupling of sales and resales is pervasive in this market and that the NPL transactions we observed are indeed broadly representative of the market based on conversations with industry practitioners (not just those at the AMC from which we get data).

[19] 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). 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.

age transaction amount of 438 billion RMB (approx. US$62.6 billion), a median 0.9% resale 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. Across all transactions that we observe from 2014 to 2019, the AMC would have earned around over 1 billion RM (approx. US$150 million) in revenues for participating as an NPL 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 banks pay to the AMC represent a direct financial cost for the banks, but bypassing the AMCs in the concealment process would not be possible as NPL transfers are closely monitored by the CBIRC.[20]

[Figure 6 Here]

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 the calculation of 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 and tossed around among different entities, any eventual resolution at low values could propagate losses through the financial system and potentially pose a threat to financial stability. We perform a stylized stress test to assess the distribution of NPL loss under hypothetical stress scenarios.[21] We first estimate the *true* amount of NPLs in the aggregate as follows:

[20] Our conclusion is also consistent with the empirical evidence in Section A.4: 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.

[21] 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' on-balance-sheet exposures.

1. First, we calculate the total amount of NPL transfers that occur 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.[22] We scale the total flow of transfers received by the AMC by the same share to estimate that the total transfer amount of NPLs stands at 47.7 billion in 2014, 618 billion in 2015, 765 billion in 2016, 1.81 trillion in 2017, and 2.83 trillion in 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. 74% of NPL packages received by the AMC are re-sold to third parties after staying with the AMC for an average of 21 months, corresponding to an average duration for NPLs to get resolved, from the time they are transferred out of the banks, of over 2 years. Therefore, assuming a true resolution horizon of 2 to 3 years seems appropriate.

Panel A of Table 10 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. As a result, the NPL ratio is 5.59–6.85%, 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 exercise, 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.[23] For the 5.13–6.94 trillion total hidden NPLs as of 2019 from the calculation above, the total losses under stress range from 3.08 to 5.56 trillion. We assume

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

[23] 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%.

AMCs and third-parties bear 26% and 74% of the losses, respectively, based on Panel A of Table 7. 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 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.

[Table 10 here]

Panel B of Table 10 presents the stress test calculations. With 5.13–6.94 trillion of hidden NPLs as of the end of 2019, a stress scenario with a loss given default of 60% and a pass-through rate from third-parties to banks of 50% would erode 1.14–1.54 trillion or 5.1–6.9% of aggregate regulatory capital in the banking sector. In a more severe stress scenario with a 80% loss given default, 1.52–2.05 trillion or 6.84–9.25% of aggregate regulatory capital would be wiped out. Such a substantial weakening of capitalization may handicap extension of new credit by banks.

In sum, recognizing the hidden NPLs imply that the total NPLs in China's banking sector is two to four times of the reported amount. While not a project or prediction, should the default risks of the NPLs materialize as in the stress scenarios above, there would 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[24] show 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. 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. As the Chinese economy – the second largest in the world – is predominantly bank-financed, the stability of China's banking

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

sector is a first-order concern globally.[25]

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 as a means to resolve banks' troubled assets. This policy to create designated NPL resolution entities is aligned with the current consensus among policymakers globally. 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 financing to the AMC and through affiliates which 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.

Our findings highlight the importance of recognizing the hidden NPLs for effective financial stability policies. 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 simply hide their troubled assets without truly 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. Good governance practices and timely supervisory monitoring would be crucial for actual resolutions. Finally, 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.

[25] See, e.g., Blagrave et al. 2016; IMF 2017b; 2017a; 2018. In 2019, the total assets in China's banking sector reached 285 trillion yuan, or approximately 40 trillion US Dollars, more than two times as large as the total assets in the US' banking sector.

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6 Tables & Figures

Table 1: Banks and NPL Transactions

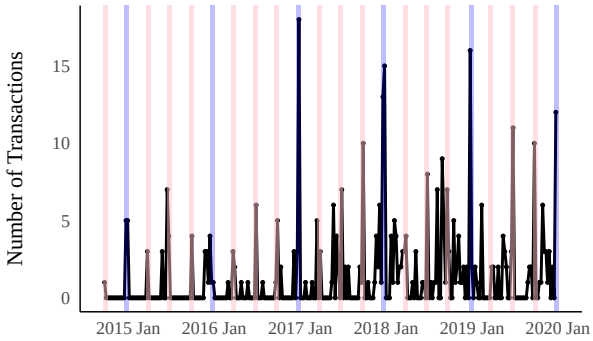
The table below shows summary statistics at the bank-year level showing both bank characteristics in Panel A and local economic conditions in Panel B. The panel contains 82 banks and 409 bank-year observations. Where a bank has more than one NPL transaction in a year, we sum the size of NPL transactions and value-weight by face value to get the average NPL delinquency in months. Local economic conditions refer to province characteristics. "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 (%)	0.306	0.157	-0.339	0.177	0.317	0.381	0.812
ΔDeposits (%)	0.151	0.193	-0.402	0.078	0.124	0.188	2.25
Loans-to-Deposits Ratio (%)	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
Avg Delinquency of Sold 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

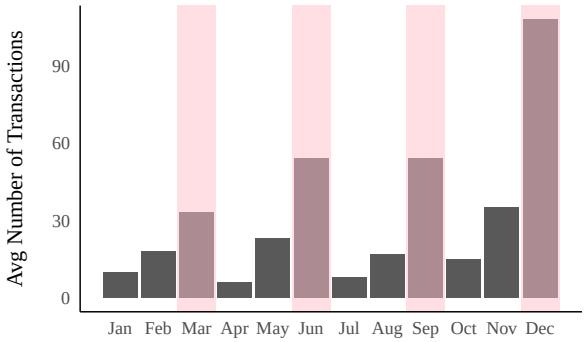
Figure 1: Weekly Non-Performing Loan Sales

The figures below show the number and total amount of transactions by week over our sample period from end of 2014 through 2019 in the top and bottom rows respectively. 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 most 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.

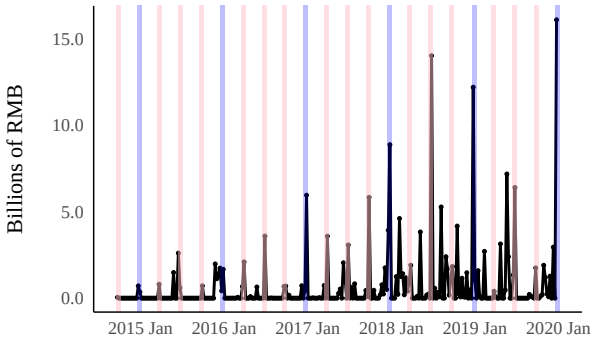
(a) Total Number of NPL Transactions by Week



(b) Number of NPL Transactions by Month



(c) Total Amount of NPL Transactions by Week



(d) Amount of NPL Transactions by Month

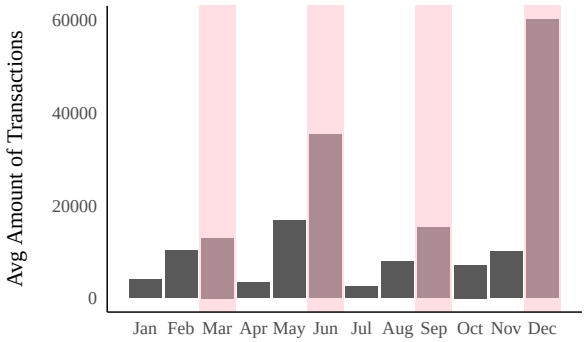


Table 2: What Drives NPL Sales?

The table below shows the relation between traded NPLs. 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.

Panel A: Extensive Margin				
Dependent Variable:	$1\{\text{NPL Transaction}_t\}$			
	(1)	(2)	(3)	(4)
Reported NPL $_{t-1}$	3.214			
	(1.46)			
Allowance/NPLs$_{t-1} < 150\%$		0.250***	0.206**	
		(2.85)	(2.09)	
$150\% \leq$ Allowance/NPLs$_{t-1} < 160\%$			-0.077	
			(-1.16)	
Capital Ratio$_{t-1}$				-0.347***
				(-7.83)
N	409	409	409	374
R^2	0.452	0.457	0.460	0.449
Panel B: Intensive Margin				
Dependent Variable:	NPL Transaction Amount$_t$ / Total Loans$_{t-1}$			
	(1)	(2)	(3)	(4)
Reported NPL$_{t-1}$	-0.321			
	(-1.10)			
Allowance/NPLs$_{t-1} < 150\%$		0.008	0.009	
		(0.55)	(0.62)	
$150\% \leq$ Allowance/NPLs$_{t-1} < 160\%$			0.004	
			(0.30)	
Capital Ratio$_{t-1}$				0.151***
				(5.41)
N	153	153	153	135
R^2	0.689	0.687	0.687	0.706

Table 3: Sold NPLs and Future Bank Performance

The table below shows whether traded NPLs predict future bank performance. 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. Sold NPL_t is a binary variable taking the value of one if the bank had an NPL transaction in year t. Observations are at the bank-year level. All regressions include controls for the growth rate of the deposit, the capital ratio, the deposit-loan ratio, as well as bank and year 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:	Loan Expansion$_{t+1}$			Capital Ratio$_{t+1}$			Violation$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sold NPL_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$_t$ $\times$ Sold NPL Ratio$_t$			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 4: 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
Avg. 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
Avg. 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
Avg. NPL 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
AMC Transaction Funding from Bank (dec)	1	0	1	1	1	1	1
NPL Collection Delegation to Bank (dec)	1	0	1	1	1	1	1

Figure 2: Pricing of NPL Sales

This figure shows the empirical cumulative distribution function of the NPL purchase haircuts on the purchases from banks to the AMC. Positive x-axis values mean an NPL package was purchased at a discount and negative means the package was purchased at a premium.

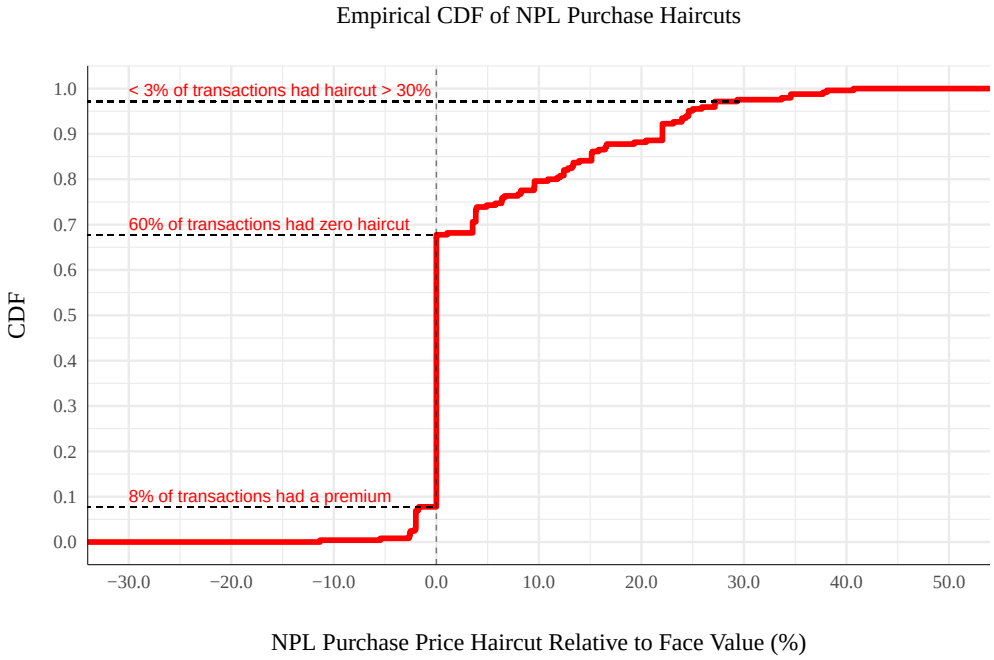


Table 5: The Pricing of NPL Sales

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			
	(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	-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

Table 6: Source of AMC Funds

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. "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. All figures are rounded to either three significant digits or three decimal places, whichever is shorter. Observations are at the NPL transaction 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.

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

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Loan (dec)	0.685	0.465	0	0	1	1	1
Via Trust Company (dec)	0.147	0.354	0	0	0	0	1
Via Security Company (dec)	0.125	0.331	0	0	0	0	1
Others (dec)	0.043	0.204	0	0	0	0	1

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

Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Loan (dec)	0	0	0	0	0	0	0
Via Trust Company (dec)	0.510	0.505	0	0	1	1	1
Via Security Company (dec)	0.367	0.487	0	0	0	1	1
Others (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}			
	(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	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 7: 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: Ultimate Owners							
Variables:	Mean	S.D.	Min	P25	Median	P75	Max
Time of NPL with the AMC (months)	21.0	7.60	6	18	18	24	48
NPL Package Resolution:							
Go to a third party (dec)	0.741	0.439	0	0	1	1	1
Stay with the AMC (dec)	0.159	0.367	0	0	0	0	1
Change to another AMC (dec)	0.099	0.299	0	0	0	0	1
Re-syndication of the NPL (dec)	0.000	0.000	0	0	0	0	0
Pre-arranged Third Party Identity (dec)	0.051	0.220	0	0	0	0	1
Panel B: Re-Sale Transactions and Third-Party Identities							
Variables:	Mean	S.D.	Min	P25	Median	P75	Max
NPL Package Resale Premium (%)	1.000	0.700	0.15	0.50	0.90	1.50	3.00
Third Party in Same City as Bank (dec)	1.000	0.000	1	1	1	1	1
State-owned Enterprise (dec)	0.000	0.000	0	0	0	0	0
Third-Party Industry:							
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

Figure 3: Pricing of NPL Resales

The figure shows the empirical cumulative distribution function of the NPL resale premium of the transactions between the AMC and third parties. Positive x-axis values mean an NPL package was re-sold at a premium and negative means the package was re-sold at a discount.

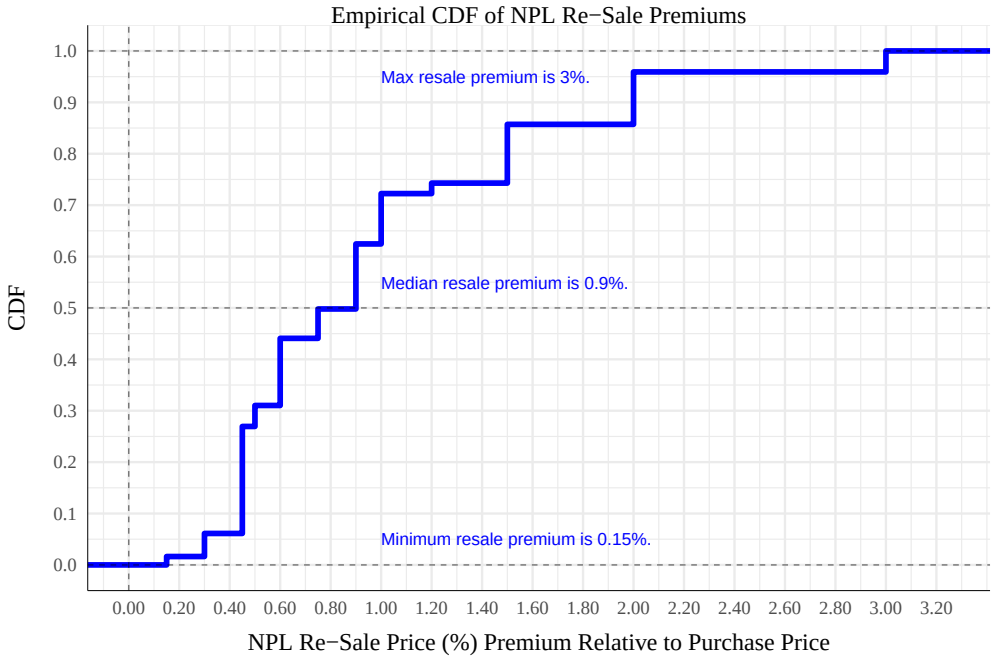


Table 8: The Pricing of NPL Resales

The table shows the relation between NPL package characteristics and resale prices. The haircut in the initial NPL transaction is in percentage points. 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:	Re-Sale Premium (%)			
	(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
Num. of Month NPL Stays with AMC	0.002***	0.002***	0.002***	0.002***
	(5.33)	(6.26)	(5.80)	(6.13)
NPL Quality	-0.0002	0.230	0.236	1.068
	(-0.09)	(0.54)	(-0.94)	(1.18)
Haircut in Initial NPL Transaction	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 4: AMC Intermediation Fee Schedule

This figure shows the scatter plot between the number of months than an NPL package is on the balance sheet of the AMC and the resale premium to third parties.

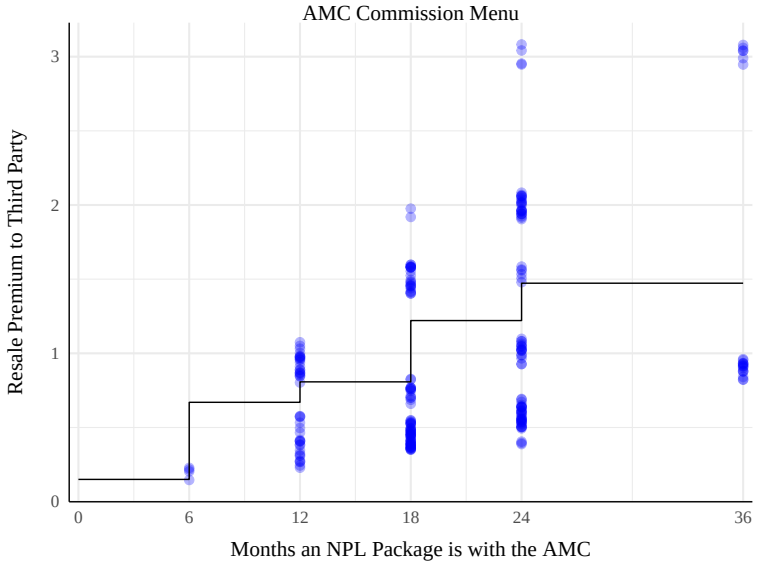
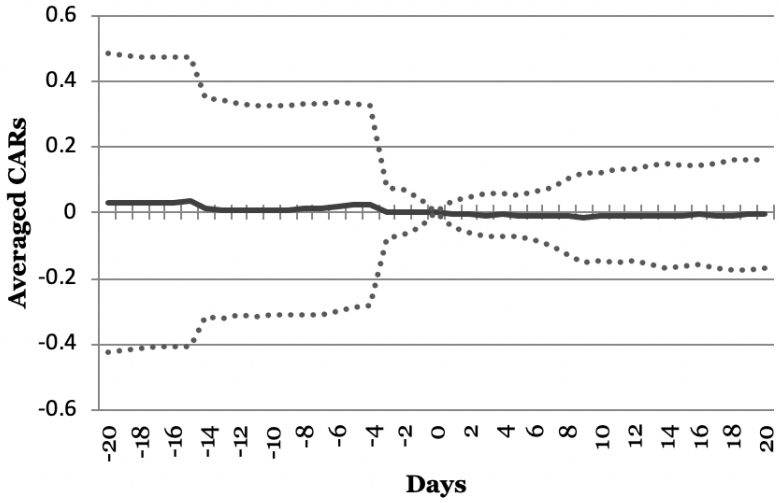


Figure 5: Public Financial Market Reactions to NPL Transactions

This figure shows the cumulative market reaction in a (-20,20) window around the date of transfer of NPLs. Figure 5a shows the average cumulative abnormal returns (CARs) of all banks with publicly-listed equity in the solid line. Figure 5b 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 Around NPL Transaction Dates



(b) Publicly-Traded Debt Premiums Around NPL Transaction Dates

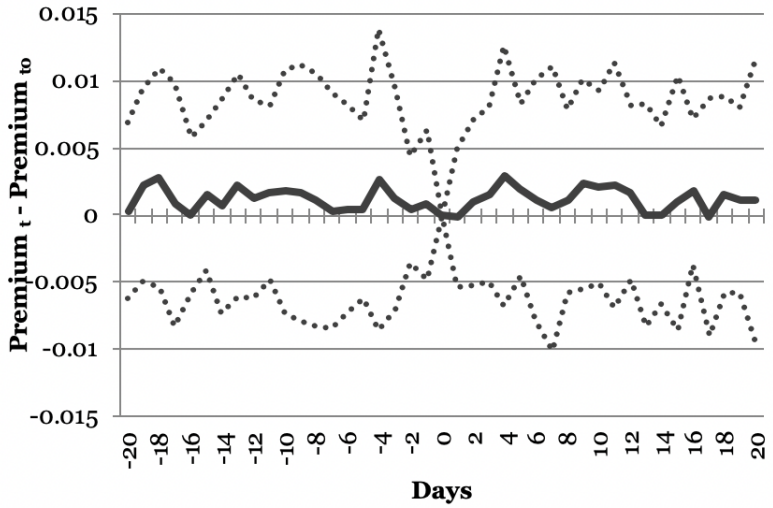


Figure 6: Movement of NPLs in the Financial System

The figure shows the movement of NPLs among banks, AMCs, and third parties who are likely to be banks' affiliates. The capital ratio for banks (AMCs) is calculated as the book value of equity divided by the book value of total assets and based on the median bank (AMC). We do not have the capital structure information for third-party bank affiliates. In our sample, over 90% of the third-parties are existing borrowers of the banks.

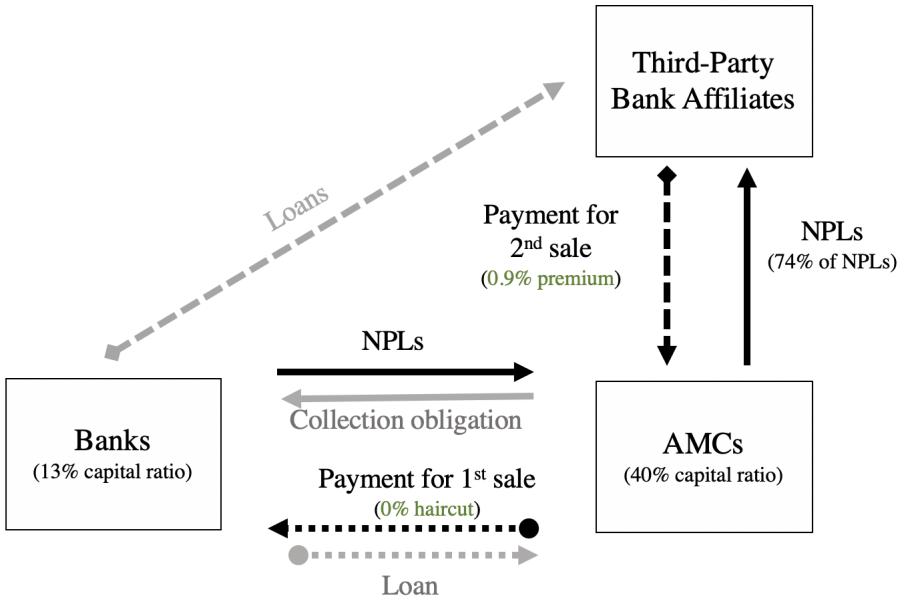


Table 9: Are NPL Transactions Resolution or Concealment? Hypotheses and Results

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 4, Figure 2). Haircut is decreasing in delinquency and increases with bank health (Table 5).
2. Who services NPLs?	AMCs	AMCs	Banks	All transactions have collection delegation terms that delegate the banks to continue collecting the NPLs (Table 4 Panel A).
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 regulation that banned direct lending (Table 6 Panel A and B).
4. Does the AMC sell NPLs to someone else?	Unlikely	Unlikely	Re-sales are prevalent.	More than 80% of NPL packages are re-sold (Table 8 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 7 Panel B, Figure 3); re-sale premium appears to be a step function of the length of the AMC's holding period (Figure 4, Table 8).
6. In re-sales, who buy from the AMC?	Can be anyone	Government entities	Banks' affiliates	More than 90% third-party buyers are borrowers/clients of the banks (Table 7 Panel B).
7. Market reaction to banks' transferring NPLs	Positive price response	Positive price response	Null or negative price response	No response in either the stock market or the public debt market (Figure 5).

Table 10: 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, risk-weighted assets is 152 trillion, and capital-to-risk weighted assets ratio stands at 14.6%. All level figures are reported in Chinese Yuan (RMB). "mn" refers to millions, "bn" refers to billions, and "tn" refers to trillions. "dec" refers to decimal and "N" refers to the count.

Panel A: Total NPLs in 2017–2019

Year	Reported NPLs	Reported NPL ratio	Under 1 year resolution			Under 2 years resolution			Under 3 years resolution		
			Hidden NPLs	Total NPLs	Revised NPL ratio	Hidden NPLs	Total NPLs	Revised NPL ratio	Hidden NPLs	Total NPLs	Revised NPL ratio
2017	1.71 trillion	1.74%	1.81 trillion	3.52 trillion	3.52%	2.58 trillion	4.28 trillion	4.26%	3.20 trillion	4.90 trillion	4.84%
2018	2.03 trillion	1.83%	2.83 trillion	4.86 trillion	4.28%	4.64 trillion	6.67 trillion	5.78%	5.41 trillion	7.43 trillion	6.40%
2019	2.41 trillion	1.86%	2.30 trillion	4.71 trillion	3.57%	5.13 trillion	7.54 trillion	5.59%	6.94 trillion	9.35 trillion	6.85%

Panel B: Back-of-the-Envelope Stress Testing the Hidden NPLs in 2019

Total Hidden NPLs	Loss Given Default (%)	Losses born by AMCs	Losses born by third-parties	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	
				Losses born by banks	relative to total regulatory capital	Losses born by banks	relative to total regulatory capital	Losses born by banks	relative to total regulatory capital
5.13 trillion	60%	800 billion	2,278 billion	228 billion	1.03%	1,139 billion	5.13%	2,278 billion	10.3%
	70%	934 billion	2,657 billion	266 billion	1.20%	1,329 billion	5.99%	2,657 billion	12.0%
	80%	1,067 billion	3,037 billion	304 billion	1.37%	1,518 billion	6.84%	3,037 billion	13.7%
6.94 trillion	60%	1,083 billion	3,081 billion	308 billion	1.39%	1,541 billion	6.94%	3,081 billion	13.9%
	70%	1,263 billion	3,595 billion	359 billion	1.62%	1797 billion	8.10%	3,595 billion	16.2%
	80%	1,444 billion	4,108 billion	411 billion	1.85%	2,054 billion	9.25%	4,108 billion	18.5%

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

This appendix contains supplementary material, tables, and figures.

A.1 Establishment of Local AMCs

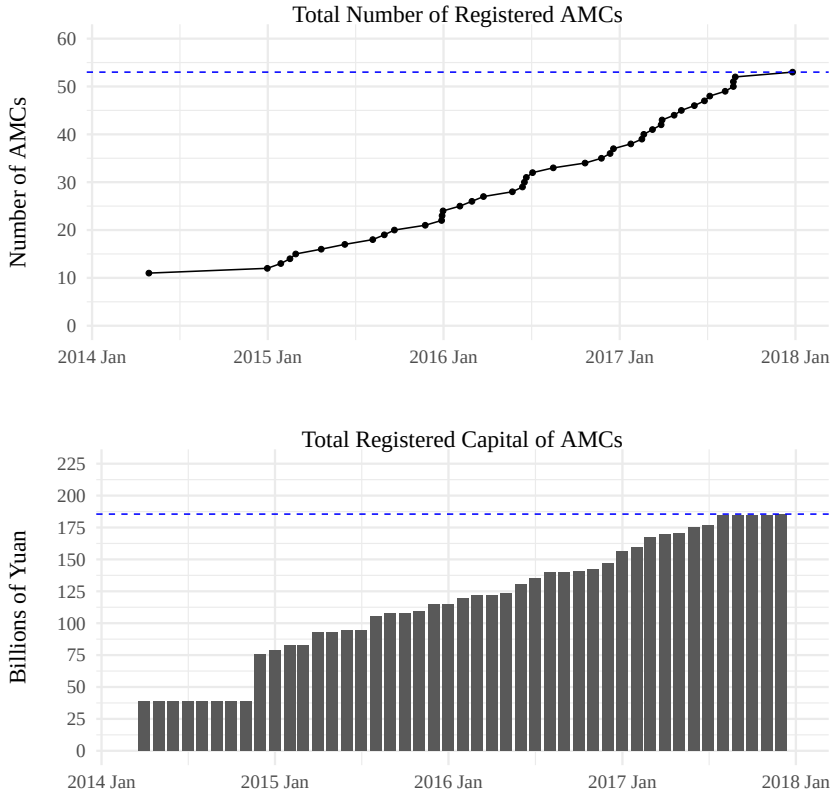
The 2012 reform, which allowed local AMCs to be set up, was followed by a burgeoning wave of local AMCs (Figure A.1). Figure A.2 shows the dynamic pattern of local economic variables its residualized with respect to time and province fixed effects, shown from year from $t-5$ to $t-1$, relative to the 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.

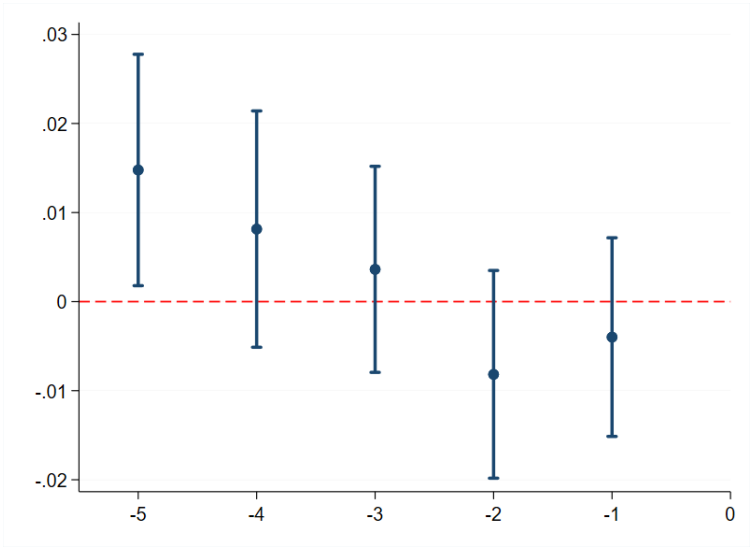


Registration Year	1999	2003	2005	2006	2008	2013	2014	2015	2016	2017	Total
Num. New AMCs	1	1	1	2	1	4	2	7	8	2	29
%	3.45	3.45	3.45	6.9	3.45	13.79	6.9	24.14	27.59	6.9	100
Cumulative %	3.45	6.90	10.34	17.24	20.69	34.48	41.38	65.52	93.10	100	

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)

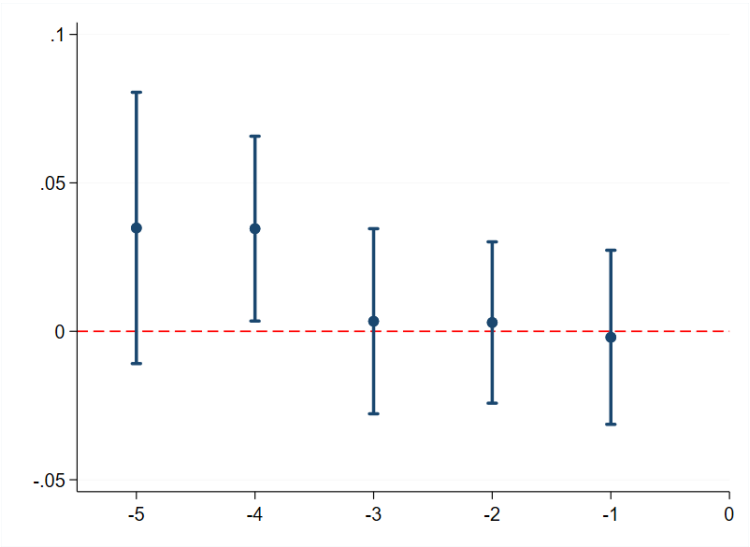


Table A.1: Predicting AMC Opening

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

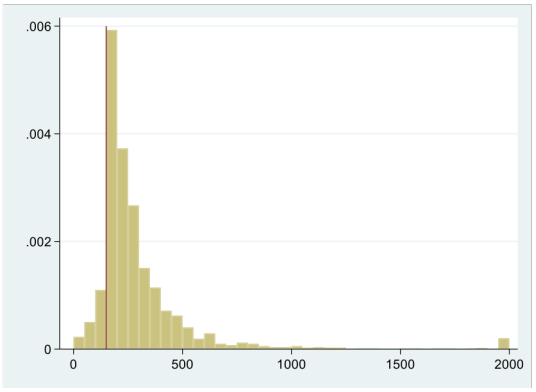
A.3 How Binding is the NPL Regulation?

Figure A.3 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.

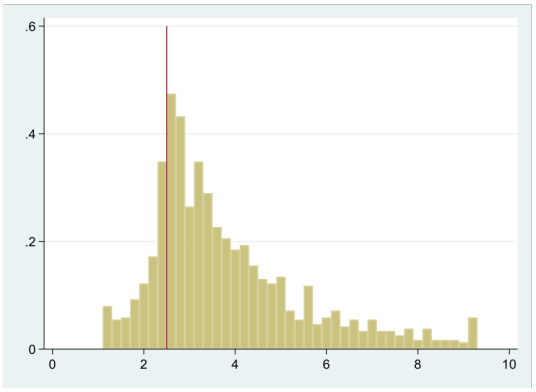
Figure A.3: Regulatory ratios of loan quality

This figure shows the histograms of two measures of non-performing loan (NPL) allowances which are subject to regulatory minimums. In Figure A.3a, the vertical bar denotes 150%, the regulatory minimum for the allowance-to-NPLs ratio. In Figure A.3b, 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.4 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).

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. We will revisit this relation between distance to regulator and NPL transactions later in Section 4.7.

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 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 loosened.

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 debt financing of the bank from the interbank market is more than 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.5 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[26]. 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.

[26] 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 SystemThe 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)					
		Median Book			Median Book
Rank	Province	Lev. Ratio	Rank	Province	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.6 Bank Valuation Ratios and Traded NPLs

Table A.7: Bank PE Ratio and NPL Transactions

The table below studies the subset of publicly listed banks in our sample using a cross sectional test, summing up total NPL transactions from 2014 through 2019. Observations are at the bank level as of December 2019. 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:	PE Ratio	PB Ratio
	(1)	(2)
Total NPLs Sold$_{t-1}$	-1.471	-0.131
	(0.169)	(0.106)
N	23	23
R^2	0.072	0.068

Table A.5: Mechanisms Affecting NPL Sales

The table below shows traded NPLs with regulator characteristics, competition and financial market conditions, and corporate governance characteristics. Panel A studies variables related to corporate governance, Panel B studies variables related to regulators. Bank characteristics level variables are absorbed by bank fixed effects, and banks are defined as those below median in total loans outstanding and rural banks are those not in tier 1 and 2 cities. 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. 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)
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)
Violation$_{t-1}$ $\times X_{t-1}$	0.287**	0.198*	-0.129	-0.382**
	(2.00)	(1.71)	(-1.19)	(-2.06)
X_{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 and Financial Market Conditions				
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)
Violation$_{t-1}$ $\times Z_{i,t-1}$	0.225**	-0.164	0.107	0.298
	(2.09)	(-0.67)	(0.85)	(1.42)
X_{t-1}	0.113	-0.064		
	(1.09)	(-0.30)		
R^2	0.459	0.459	0.458	0.460
N	409	409	409	409