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Permissible collateral and access to finance: Evidence from a quasi-natural experiment

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Abstract

By allowing large classes of movable assets to be used as collateral, the Property Law reform transformed the secured transactions in China. Difference-in-differences tests show firms operating with ex-ante more movable assets expand access to bank credit and prolong debt maturity. However, the reform does not seem to improve the efficiency of credit allocation, as debt capacity of ex-ante low quality firms expands the most following the reform. Credit expansion also does not lead to better firm performance. These findings are not driven by confounding factors such as improvements in creditor and property rights protection. Our results also cannot be explained by other important reforms which were introduced around the same time as the introduction of the Property Law. These include anti-tunneling and split-share reforms and amendments to the corporate tax structure in China. We conduct explicit robustness tests for these other reforms and hence contribute to the empirical literature on the reform process in China with new findings.

JEL classification: G21; G28; G32; K22.

Keywords: collateral; movable assets; leverage; property law.

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1 Introduction

Collateral is central in the law and finance literature. Various theories and empirical studies highlight the links between enforceability of secured contracts and access to external finance (e.g. Calomiris, Larrain, Liberti and Sturgess, 2017; Haselmann, Pistor and Vig, 2010; Lilienfeld-Toal, Mookherjee and Visaria, 2012; Vig, 2013), and the availability of collateral and debt capacity in the presence of contract incompleteness (e.g. Stiglitz and Weiss, 1981; Hart and Moore, 1994). Studies find that the lack of sufficient collateral is a key obstacle to access to external finance across countries. The problem is aggravated in countries with weak collateral laws, because inadequate legal infrastructure excludes important asset types, for instance, movable assets, from permissible collateral classes. On the other hand, legal reforms on collateral law also have a dark side: banks may rely excessively on collateral and reduce incentives for adequate screening, consequently allowing riskier borrowers to obtain loans and worsening credit allocation efficiency (Manove, Padilla and Pagano, 2001; Zazzaro, 2005; Jappelli, Pagano and Bianco, 2005).

In this paper, we provide new evidence from China on how legal reform on permissible collateral affects firms' access to bank credit, credit allocation and firm performance. An investigation in the Chinese context is fruitful given the distinct features of the Chinese banking sector: firstly banks are not fully commercialized yet and bank lending is often compromised by state intervention, and secondly, legal institutions are generally perceived as weak and inefficient, hence credit allocation is affected by both informal and formal institutions. Under these circumstances, it is a priori unclear whether legal reforms could effectively promote firms' access to finance and improve credit allocation efficiency. The answers to these questions may also provide new perspectives for understanding the accumulation of non-performance loans and the on-going debate on deleveraging in China.

To address these issues, we take advantage of the introduction of the Chinese Property Law in the end of 2006, which expanded the contracting space in secured transactions by allowing large classes of movable assets as permissible collateral. Before the Property Law, secured transactions were governed by the 1995 Security Law, which restricted the scope of permissible collateral to immovable assets (e.g. land and buildings) and a small class of movable assets (e.g. equipment and motor vehicles). Other important asset classes such as accounts receivable and inventory were either excluded from the pool of permissible collateral or allowed only by way of possessory security interests. The Property Law removed these restrictions by allowing a broad class of movable assets

as permissible collateral (see section 2). Moreover, accompanying the new law, a centralized electronic registration system was also established to facilitate a more easy creation of secured interests.

As the Property Law reform only pertains to movable assets, it should affect more the firms with intensive use of these assets. This policy wrinkle allows for an investigation in a difference-in-differences framework, which is ideal for such a quasi-experimental setting, because it eliminates observed and unobserved factors that affect treated and untreated firms alike (see e.g. Roberts and Whited, 2013). Specifically in this context, the effect of the Property Law is identified by comparing the responses of firms that *ex-ante* rely more on movable assets (high movable firms) with those of firms that rely less on movable assets (low movable firms).

Using a sample of listed firms from China during 2001–2011, we establish several main findings. Firstly, allowing movable assets as collateral expanded borrowers' access to formal finance, and prolonged debt maturity. Compared to low movable firms (control group), high movable firms (treated group) experienced a relative increase in both total leverage and long-term leverage after the reform. These changes are economically significant: for instance, long-term leverage increased by 4.8% more for high movable firms, amounting to 40% of the sample mean. In contrast, short-term leverage did not show differential changes for high movable and low movable firms. However, we also find such credit expansion was mainly driven by *ex-ante* low quality firms, indicating inefficiency in credit allocation. This evidence is consistent with the theoretical models of Manove, Padilla and Pagano (2001), Zazzaro (2005), and Jappelli, Pagano and Bianco (2005), that legal reforms which improve the value of collateral ease firms' credit constraints, but at the same time, these reforms create incentives for banks to screen inadequately and rely excessively on collateral, consequently worsen the efficiency of credit allocation.

Changes in capital structure due to the legal reform is also accompanied by changes in asset structure. We find high movable firms increased more in size relative to low movable firms, and such change was mainly driven by more fixed asset investments. Specifically, Fixed assets of high movable firms increased by 7.6% more than those of low movable firms, a highly economically significant result, as it amounts to 24% of sample average. These findings together with previous evidence that firms extended their debt maturity is consistent with the view that firms may have employed the extra credit to match asset and debt maturity (e.g. Myers, 1977; Milbradt and Oehmke, 2014). Finally, we do not find evidence that firm performance experienced differential changes across high and low movable firms after the Property Law.

These results are obtained controlling for firm and year fixed effects, which capture systematic differences across firms and general time trends. These effects are also independent from

industry (provincial) time-varying shocks, because we control explicitly for fixed effects interaction terms between industry (provincial) and year. In addition, we validate the parallel trend assumption by investigating whether our findings persist for placebo reforms, which is a crucial assumption for the difference-in-differences framework. Nevertheless, other confounding factors could provide alternative explanations to the previous findings. We proceed by investigating these possible explanations.

We first validate other changes brought about by the Property Law, such as improvements in creditor rights or property rights protection, are unlikely to drive our findings.[1] Secondly, we test if other contemporary reforms could confound our results, including: China Securities Regulatory Commission's (CSRC) new regulations on related-party transactions and illegal loan guarantees (2005–2006); the split-share reform (2005–2007); and the unification of corporate tax rates in 2008. None of the reforms offers an alternative explanation of our results. Thirdly, we verify the findings are not caused by differential responses to macroeconomic shocks, such as variations in credit conditions, fiscal policy, the global financial crisis and changes in collateral values. Finally, a battery of additional tests are conducted to ensure the robustness of our findings. Our results are not driven by differences in firm characteristics other than movable assets, and are robust to alternative definitions of treatment, alternative classifications of moveable assets, and are not sensitive to various alternative samples.

This article is closely related to the literature that investigates how legal reforms on collateral affect corporate financial policies. Campello and Larrain (2016) investigate the reforms in Eastern Europe that permitted the use of movable assets (e.g. machinery and equipments) as collateral, and find that such reforms promoted access to external finance, and reallocated assets and employments towards firms with more movable assets. Aretz, Campello and Marchica (2015) analyze the reform of the Napolenoic Code in France, and find that increased access to collateral – by expanding it to hard assets – increased firms' debt capacity and prolonged debt maturity. Cerqueiro, Ongena and Roszbach (2015) examine legal reform in Sweden that reduced the value of collateral (e.g. floating liens). They show that such reform reduced debt capacity and shortened debt maturity, and eventually contributed to distortions in corporate investment and asset allocation. Love, Martinez Peria and Sandeep (2016) investigate the effects of the existence of collateral registries on access to finance across a large number of countries.

[1] Berkowitz, Lin and Ma (2015) provide the first analysis on how changes in creditor and property rights protection by the Property Law affect firm value.

We contribute to this literature by providing new evidence from the largest emerging market economy that expanding the space of permissible collateral improves access to external finance and prolongs debt maturity. Most previous studies investigate economies characterized by a private banking sector, while our study focuses on China, characterized by a semi-efficient state-dominant banking sector. The results reported here suggest that even in such an environment, legal reforms that target directly the pledgeability of collateral could effectively expand firms' access to formal finance. This finding bears particular importance as China is often viewed as a counterexample to established results obtained in the law and finance literature, mostly for advanced economies (Allen, Qian and Qian, 2005). Our results also reinforce the claim of Haselmann, Pistor and Vig (2010) that effective collateral laws are crucial, particularly in emerging markets where information asymmetries are more severe than in advanced economies. Additionally, we provide some evidence supporting the notion that laws which increase collateral value could hurt the efficiency of credit allocation, possibly because banks rely excessively on collateral instead of screening in reducing ex-post credit risk (Manove, Padilla and Pagano, 2001; Zazzaro, 2005; Jappelli, Pagano and Bianco, 2005; Assuncao, Benmelech and Silva, 2014).

This paper is also related to studies examining how enforceability of secured contracts affects lending (e.g. Calomiris, Larrain, Liberti and Sturgess, 2017; Haselmann, Pistor and Vig, 2010; Lilienfeld-Toal, Mookherjee and Visaria, 2012; Vig, 2013), and how the collateral channel affects capital structure and investment (e.g. Chaney, Sraer and Thesmar, 2012; Campello and Giambona, 2013; Cvijanovic, 2014; Gan, 2007; Benmelech, 2009; Kim and Kung, 2017). These analyses focus on the value, availability or re-use of assets which have been permitted as collateral, while we focus on the permissibility of assets to be used as collateral in the first place.

The remainder of the paper is organized as follows. Section 2 provides a brief description of the institutional background governing secured transactions in China. Section 3 describes identification strategy, data and key variables. Section 4 presents the main results. Section 5 discusses various alternative explanations and robustness tests. Finally, Section 6 concludes.

2 The institutional background

2.1 The Security Law

Before the enactment of the Property Law in the end of 2006, secured financing was governed by the 1995 Security Law. This law specifies certain types of *existing* movable assets which can be pledged as collateral. Non-possessory security interests were allowed only for the use of equipment and motor vehicles as collateral (under Article 34 of the Security Law). Other movable assets such as accounts receivables, future acquired properties, properties that cannot be fixed in type, quantity or location, could not serve as permissible collateral. The Security Law did not exclude inventory as permissible collateral; however, it could be used only as collateral by way of possessory security interests. In practice, the amount of inventory had to be fixed at the time of financing and was required to be relocated (or the ownership certificate had to be transferred) to creditors.

Furthermore, a secured interest had to be registered to be enforceable, while no centralized registration system existed. In China, numerous registries dealt with different types of collateral, and had ultimate discretion in rejecting or accepting the registration of secured interests. Moreover, these registries required collateral to be appraised and the legality of security agreements to be certified. As a result, creating and registering secured interests was costly, time consuming and subject to uncertainty. Another problem was that the Security Law did not provide clear rules on the determination of priority among competing claims on the same collateral. Secured lenders might have to compete with other claimants for underlying collateral, which in turn increased the cost of credit.

The limited permissible asset types and prohibitive process in creating and registering secured interest impeded secured transactions using movable assets as collateral. As a result, secured transactions strongly favored real property as security when lending to enterprises. World Bank Group (2007) shows that less than 7% of loans in China were secured purely by movables assets, which were mostly inventories and equipment.[2]

2.2 The Property Law

On December 29, 2006, the 5th Session of the 10th Standing Committee of the National People's Congress (NPC) accepted a draft of the Property Law of the People's Republic of China. The Law was eventually passed on March 16th, 2007 and put into effect on October 1th of that year. The

[2] Source: People's Bank of China (PBOC)-FIAS-CPDF survey of financial institutions (The "Lender Survey"), p.56.

Property Law was supplemented by two additional implementation measures: the Measures for Chattel Mortgage Registration, issued by the State Administration of Industry and Commerce (SAIC); and the Measures for the Registration of Pledged Receivables, issued by the People's Bank of China. The former governs general movable properties while the latter governs receivables. These measures together with the Property Law provide detailed guidance on the scope of permissible collateral and registration systems for security interests.

Under the new law, the range of permissible security was greatly expanded, which now includes accounts receivables, existing and future production equipment, raw materials, semi-finished goods and inventories. The registration of security interests is also simplified: for general movable assets (except receivables), the registration can be done at the local office of the SAIC for the county in which the debtor is domiciled, and it requires only basic information about the parties, the debt and the underlying security.

In addition, specific rules and registration systems are created to guide secured transactions in receivables, which are arguably one of the most important movable asset classes. Accounts receivables are broadly defined in Chapter 17 of the Property Law as "… the right to require payment from debtors arising out of sales of goods, services or facilities, including existing and future monetary claims and proceeds, but not including those arising from negotiable instruments or other negotiable securities". The Measure for the Registration of Pledged Receivables provides further clarification by listing five types of accounts receivables as permissible collateral, including, but not limited, the following: 1) claims from sales; 2) claims from leases; 3) claims from rendering services; 4) rights to charge fees from immovable property such as toll roads, bridges, tunnels, ferries, etc.; and 5) claims from granting loans or other credit. To facilitate the creation of secured interests in accounts receivables, the Credit Reference Centre of the People's Bank of China (Centre) is created as a centralized registration authority for the pledging of accounts receivables. The Centre also sets up a search system to publicize registration information of the pledge of accounts receivables, which allows lenders to obtain information about borrowers or other registered security interests. Apart from allowing more permissible collateral and establishing centralized registration systems, the Property Law also provides clearer references to the determination of priorities among competing claims on the same collateral. Specifically, priority is determined by the date of registration of security interests.

As the result of these legal changes, secured transactions against movable assets have expanded greatly. During 2008–2010, the number of loans backed by movable assets increased by 21% per year, while the value of loans increased by 24% per year. Since the creation of the Credit

Reference Centre in 2007, more than 1.7 million receivable-backed loans have been recorded by the end of July 2015, or a remarkable annual growth rate of 51%. These loans amounted to 57 trillion RMB, among which 30 trillion was given to 220,000 small and medium-sized enterprises.[3]

3 Identification strategy and data

3.1 Identification strategy

We investigate the causal relationship between the collateral framework and access to finance in China using difference-in-differences (DID) method, where we compare corporate leverage before and after the enactment of the Property Law as a function of firms' pre-reform level of movable assets. The identification hinges on the fact that the Property Law pertains to movable assets only, and therefore firms with *ex-ante* higher reliance on movable assets in their operations are more affected by this legal change. The difference-in-differences approach allows us to control observed and unobserved factors that could affect treatment and control firms alike.

Like any method, the difference-in-differences framework relies on some crucial assumptions. Firstly, the pre-reform trends for the treated and control group must be similar, that is, the so called parallel trend assumption. We address this issue by investigating placebo (non-exist) reforms that took place *before* the actual passage of the Property Law. If the parallel trend assumption holds, we expect to find *insignificant* differential effects across treated and control firms for these placebo reforms. Secondly, our shock, that is the passage of the Property Law, needs to be an exogenous event, so that firms could not anticipate the legal reform and adjust their asset composition beforehand. Regarding this assumption, we argue it is very unlikely that firms could have anticipated the passage of the Property Law, as well as predicting precisely the content of the Property Law. According to Zhang (2008), various versions of the Property Law were discussed and blocked due to the pressure from the conservatives. The Property Law therefore had to be redrafted several times, making it impossible for firms to plan their response accordingly since the actual content of the Property Law was unknown beforehand. In addition, the several rounds of redrafting and discussion in the People's Congress made the timing of the final passage unpredictable. Specifically, in March 2006, the law was withdrawn from the People's Congress due to strong opposition from conserva-

[3] Source: Independent Evaluation of the IFC Secured Transactions Advisory Project in China (2011) and Credit Reference Center of People's Bank of China

tives. On December 24, 2006, the standing committee of People's Congress conducted an unprecedented seventh reading of the law to discuss its suitability, suggesting that even 5 days before its approval, it was still uncertain whether or not the law would pass. And finally, when the Property Law was approved on December 29, 2006, it shocked the stock market. Berkowitz, Lin, and Ma (2015) found the announcement of the Property Law on December 29, 2006 was unexpected by comparing the stock market reaction on the announcement date and the rest of the trading days of 2006. These facts provide compelling evidence that the passage of the Property Law was unexpected and therefore exogenous to firms. Nevertheless, it is possible that some politically connected firms may have inside information about the potential passage of the law, and could have changed their asset mix in advance. To further mitigate any potential anticipation effect, we remove observations from 2006 when the Property Law was debated and approved by the National People's Congress.

As stated above, our identification strategy relies on firms' *ex-ante* reliance on movable assets, in the sense that firms relied more on movable assets before the reform should be more affected by the Property Law. In our main analysis, we define movable assets as the sum of *Inventory* and *Accounts Receivable*. This classification captures the main groups of the assets that were allowed to be pledged as collateral after the reform. Robustness analysis in latter section validates our main results are not sensitive to this particular definition of movable assets. We scale the level of movable assets by total assets and calculate the movable assets ratio *Movratio* as $(Inventory_t+Accounts\ Receivable_t)/Asset_t$. To measure the *ex-ante* dependence on movable assets, we calculate for each firm its pre-reform median movable assets ratio (over 2001–2005)[4]. Based on this measure, we then divide firms into three equal sized bins, and denote the firms in the highest 33% of movable assets ratio as treated firms, and the firms with the lowest 33% as control firms. We expect that firms in the treated group to be affected more by the passage of the Property Law. Specifically, our generalized difference-in-differences specification is as follows:[5]

$$\mathrm{Y_{it}} = \alpha_\mathrm{i} + \gamma_\mathrm{t} + \beta \mathrm{Highmov_i} * \mathrm{After_t} + \delta \mathrm{X} + \varepsilon_\mathrm{it} \qquad (1)$$

where *i* indexes for firm and *t* for accounting year. Y_{it} represents outcomes of interest, including for instance various leverage measures defined later. Firm fixed effects α_i control for time-invariant

[4] Our main results hold if pre-reform movable ratio is defined based on 2005 value instead of median calculated over 2001-2005. Using median value over pre-reform era avoids the possibility that movable assets could be cyclical in nature.

[5] $After_t$ and $Highmov_i$ do not enter the regression as stand-along variables because they are absorbed by year fixed effects and firm fixed effects.

differences between treatment and control groups, while the time fixed effects γ_t control for aggregate time-varying shocks. $Highmov_i$ is an indicator variable that equals one if the firm belongs to the treatment group (i.e. firm located in the top 33% of pre-reform median movable ratio) and zero if it belongs to the control group (i.e. firms located in the bottom 33% of pre-reform median movable ratio). $After_t$ is a binary variable that takes the value one for the years after the Property Law reform (2007–2011), and zero otherwise (2001–2005). We exclude observations from 2006 to mitigate concerns on any anticipation effect. X denotes a set of control variables including: $Size_{it-1}$,[6] $Tangibility_{it-1}$, $Liquidity_{it-1}$, $Profitability_{it-1}$, $Sale_{it-1}$, Age_{it-1}, $List_{it}$, $Split_{it}$ and $State_{it}$. To mitigate endogeneity concerns, most of these controls enter the model with lagged values. ε_{it} is the error term. Following Bertrand, Duflo and Mullainathan (2004), standard errors are clustered at the firm level. The difference-in-differences estimator is β, which measures the pre-post difference in the outcome of interest of firms with a high movable ratio, relative to the pre-post difference of firms with a low movable ratio.

One concern with this specification is that some industry specific shocks occurred around the enactment of the law, and these industries have higher movable asset ratio. To address this issue, the baseline specification is augmented with *Industry-Year* fixed effects to control for time-varying industry specific shocks. Similarly, *Province-Year* fixed effects are included to control for time-varying regional economic shocks. Section 5 discusses further the robustness of the main specification.

3.2 Data and key variables

Our sample is composed of firms listed in Shanghai Stock Exchange or Shenzhen Stock Exchange covering 2001–2011. As required by China Stock Regulatory Committee, listed firms report regularly detailed balance sheet and income statement information. We obtain these data from a database called *WIND Information*. This database also provides information of listed firms such as industry classification, location, established year, listed year and ownership type, etc. Crucially it also contains a detailed breakdown of firms' liabilities, including information on total debt, long-term debt, short-term debt, and detailed breakdowns of asset categories.[7] We exclude firms from financial in-

[6] Our results remain unchanged if we control firm size by size dummies, which allows for possible non-linear effects of firm size on debt maturity, as in Gopalan, Mukherjee and Singh (2016).
[7] Unfortunately, both *WIND Information*, and another popular financial database *CSMAR*, lack detailed information on secured and unsecured debt.

dustries and firms with missing values in total assets. As discussed before, we also exclude observations from 2006 in order to mitigate concerns of any anticipation effect. In addition, in order to be qualified for inclusion in the sample, firms are required to have annual reports both before and after 2006. In total, our whole sample contains more than 12,000 firm-year observations from around 1200 firms, and covers 58 industries. The sample is also well-represented geographically, as it includes firms located from all 31 provinces of mainland China.

Table 1 provides summary statistics for the key variables. All continuous variables are winsorized at 1% and 99%, and all real variables are inflation adjusted. Table 1 (Panel A) shows that the average *Movratio* is 26%. A decomposition of movable assets shows that inventory represents 17% of total assets, while accounts receivable accounts for 9% of total assets. In section 5, we shall use an alternative definition of the movable ratio as a robustness check, which defines this ratio as $(CurrentAsset_t\text{-}Cash_t)/Asset_t$. This broader definition captures the fact that all movable assets that are not explicitly prohibited by the Property Law are allowed to be pledged as collateral, such as raw material and future equipment. The average $(CurrentAsset_t\text{-}Cash_t)/Asset_t$ is 37%. All in all, these figures suggest that movable assets are an important asset category. Hence, should these assets be allowed as collateral (as has been permitted by the Property Law), potentially it could change the landscape of secured borrowing in China.

Panel B provides the summary statistics on the liabilities side. Total firm leverage is defined as the ratio of debt over lagged assets ($Debt_t/Asset_{t-1}$), where $Debt_t$ is the sum of long- term debt ($LongDebt_t$) and short-term debt ($ShortDebt_t$).[8] The average $Debt_t/Asset_{t-1}$ is 0.33, with a standard deviation of 0.22. Total leverage is further decomposed into long-term leverage ($LongDebt_t/Asset_{t-1}$) and short-term leverage ($ShortDebt_t/Asset_{t-1}$). Average long-term leverage is 0.12, while that of short-term leverage is 0.19. These figures suggest that the majority of corporate debt of these listed firms is short-term.

Panel C reports the summary statistics on the assets side and profitability. The mean value of $Log(1+Asset_t)$ is 21.25, which translates to an average firm book value around RMB 1,600 million. Average firm net profitability ($Netprofit_t/Asset_{t-1}$) is 3.5%. Finally, Panel D describes briefly the control variables employed in the analysis. *Tangibility* is defined as the ratio of fixed assets to total assets ($FixedAsset_t/Asset_t$). Average tangibility is 0.29. *Liquidity* is defined as cash divided by total assets ($Cash_t/Asset_t$). Average liquidity is 0.16. *Profitability* is defined as the ratio of net profits over total assets ($Netprofit_t/Asset_t$). *Sale* is the logarithm of one plus total sales. *Age* is defined as

[8] Short-term debt is debt that matures within one year, while long-term debt is debt with a maturity longer than one year.

the logarithm of one plus the number of years since the incorporation of the firm. The average age is 11 years. *List* is a dummy variable that equals one for firm-year observations after the firm's IPO, and zero otherwise. *Split* is a dummy variable that equals one for firm-year observations after a firm's completion of the split-share reform (discussed later), and zero otherwise. *State* is a dummy variable that equals one if the controlling shareholder is the government and zero if the controlling shareholder is a private entity.

4 Results

This section presents the main results. In section 4.1, we report the effects of the Property Law reform on corporate leverage and debt maturity. Next, we discuss whether the reform improved the efficiency of credit allocation in section 4.2. Section 4.3 investigates the real effects of the Property Law reform, such as its impact on asset structure and firm performance.

4.1 Debt and debt maturity

This section examines the effect of the Property Law on corporate leverage and debt maturity by estimating specification (1). Table 2 presents the results. The coefficient of interest is on $Highmov_i*After_t$, which measures the differential effects of the Property Law across firms with high and low pre-reform movable assets. Column (1) examines the effect of the law on total leverage, using $Debt_t/Asset_{t-1}$ as outcome variable. The coefficient of interest is 0.069 and statistically significant at 1%. Given that the average leverage ratio is 0.33 in our sample, this result suggests that in relative terms high movable firms increase leverage ratio by 21% more than for low movable firms. Columns (2) to (3) investigate if the Property Law changed the debt maturity structure. In column (2), long-term leverage ($LongDebt_t/Asset_{t-1}$) for high movable firms increased in relative terms by 4.8% more than for low movable firms, and this effect is also statistically significant at 1%. The economic implication is also significant: a 4.8% increase represents 40% of the sample mean. In contrast, short-term leverage ($ShortDebt_t/Asset_{t-1}$) in column (3) does not show differential changes between the two types of firms. The DID estimator is 0.009 and statistically insignificant. In unreported tests we obtain similar findings when using level of debt instead of leverage as dependent variables, which rules out the possibility that our results are driven by the variations in the denominator (i.e. total assets).

These findings are consistent with our hypothesis that better collateral law that permits movable assets as collateral improves firms' access to bank credit. However, somewhat surprising is that short-term leverage does not experience relative changes after the enactment of the Property Law. Indeed, as suggested by columns (1) and (2), the observed relative increases in total leverage is driven entirely by the increases in the long-term leverage. These findings are counterintuitive because short-term debt, if secured, is more likely to be secured by movable assets, and consequently, a legal act that allows more short-term assets to be pledgable should improve mostly firms' access to short-term bank credit. One possible explanation is that for listed firms in China, short-term debt is less likely to be secured when compared to long-term debt, and therefore, the effects of the Property Law on short term borrowing are less pronounced.[9] As will be discussed in latter section, the expansion in long-term leverage is accompanied by the increases in firms' fixed assets investment, indicating that firms have the tendency to match their debt and asset maturity.

One might suspect that movable assets could be positively related to corporate leverage for reasons other than the pledgability of collateral. For instance, it is possible that firm with more outstanding accounts receivable or more inventory in the past needed to borrow more to keep the company afloat. This argument would imply a positive correlation between the movable assets ratio and leverage at any given point of time. To explore this possibility, we repeat our analysis in columns (4)–(9) for several placebo reforms that happened in years *before* the actual reform. Since we use lagged control variables and we need at least one year of observation before and after the placebo reforms, we could design two placebo reforms occurring in 2003 and 2004, respectively. In all these tests, $After_t$ is an indicator variable takes value one for years after the placebo reform, and $Highmov_i$ is calculated based on median movable assets ratio measured before each placebo reform. In all the placebo reforms, the coefficients on $Highmov_i*After_t$ are statistically insignificant and economically small compared to the baseline model, indicating no differential effects across firms with high and low level of movable assets before the actual reform. These results rule out the alternative explanation stated above. In addition, these placebo reforms provide validation for the parallel trend assumption, which is crucial for the DID framework.

[9] Diamond (1991) provides theoretical arguments that short-term debt is less likely to be collateralized than long-term debt. Xu, Van Rixel and Wang (2015) provide loan-level evidence that the likelihood of pledging collateral increases with loan maturity in China.

4.2 The efficiency of credit allocation

Having established that the Property Law reform promoted access to bank finance, this section investigates if the reform improved the efficiency of credit allocation in China. The answer to this question is very important as credit misallocation in China caused significant losses to aggregate output (e.g. Hsieh and Klenow, 2009). Under the assumption that collateral is usually associated with low quality borrowers (e.g. Berger and Udell, 1990, 1995; Jimenez, Salas and Saurina, 2006), a reform that expands permissible collateral should improve the most the debt capacity of these borrowers. This is because high quality borrowers may access unsecured loans, while low quality borrowers cannot borrow unless the loan is secured. Furthermore, because providing collateral may reduce banks' incentives to screen borrowers adequately (Manove, Padilla and Pagano, 2001), this could allow more low quality firms with movable assets to apply for loans. These arguments suggest that the impact of the Property Law on debt capacity should be more pronounced among low quality firms, and consequently worsen the efficiency of credit allocation.

To investigate this hypothesis, we expand the baseline specification with a triple interaction term to test whether low quality firms with more movable assets expanded more access to bank credit. We apply a set of *ex-ante* firm quality proxies *Q*, including: return on sales (*ROS*), indebtedness (*Liability Ratio*), and Altman's Z-score. Each proxy is measured at the pre-reform median. The baseline specification (1) is then re-estimated after incorporating the triple interaction terms, with $Debt_t/Asset_{t-1}$ as the dependent variable.

Table 3 reports results. Consistent with the previous conjecture, the differential increase in $Debt_t/Asset_{t-1}$ is mainly driven by low quality firms. For instance, in column (1) the coefficient on the triple interaction term $Highmov_i*After_t*PreRos_i$ is statistically negative, indicating that relative credit expansion for high movable firms is less pronounced for firms with higher pre-reform return on sales. In column (2), the positive coefficient on $Highmov_i*After_t*PreLiability_i$ implies that the relative credit expansion for high movable firms is driven by firms that had been highly indebted before the introduction of the law. Column (3) examines whether firms that are prone to bankruptcy, measured by Altman's Z-scores, experienced larger increase in their debt capacity. The negative coefficient on the triple interaction term $Highmov_i*After_t*PreZscore_i$ suggests that firms with higher pre-reform Z-scores, that is firms less prone to bankruptcy, expanded less in their debt capacity.

Overall, these findings indicate that after the introduction of the Property Law, firms that were less profitable, highly indebted, or prone to bankruptcy expanded the most their debt capacity. This implies that although the Property Law reform relaxed credit constraints, it did not improve

the efficiency of credit allocation in China, as the extra credit was mostly allocated to *ex-ante* low quality firms. Similar findings are reported by Assuncao, Benmelech and Silva (2014), which finds that a legal reform in Brazil eased the resale of repossessed cars, eventually allowing for riskier borrowers to obtain loans. One possibility for this finding could be related to banks' reduced incentives to screen borrower adequately once more collateral becomes available, or if the repossession of collateral becomes easier (Manove, Padilla and Pagano, 2001; Zazzaro, 2005; Jappelli, Pagano and Bianco, 2005). However, we do not have data on banks' screening activities before and after the Property Law to test this conjecture. We leave it for future research.

4.3 Asset structure and profitability

This section investigates if firms change their asset structure following the Property Law reform, and if the reform improves the profitability of firms. Results are obtained by estimating specification (1) using $Log(1+Asset_t)$, $FixedAsset_t/Asset_{t-1}$, and $Netprofits_t/Asset_{t-1}$ as dependent variables, respectively. All specifications include *Industry*Year*, and *Province*Year* fixed effects to exclude possible confounding factors driven by industrial or provincial specific time varying shocks.

Table 4 reports results. Looking at the estimates in column (1), we find that high moveable firms experienced relative increase in total assets, as suggested by the statistically significant coefficient on the interaction term. Column (2) indicates that $Fixed\ Asset_t/Total\ Asset_{t-1}$ of high movable firms increased by 7.6% more than for low movable firms, which is highly economically significant as it amounts to amounts to 24% of sample average. In unreported tests, we find this pattern persists using $Log(1+FixedAsset_t)$ as dependent variable, validating that the results in the other columns are not caused by changes in the scaling variable. Finally, column (3) investigates whether high movable firms experienced relative improvements in their profitability after the reform. The interaction term is statistically insignificant and economically small, suggesting no differential changes in the profitability of firms across high and low movable firms after the reform. As before, for each dependent variable we check the parallel trend assumption by investigating placebo reforms that took place in 2003 and 2004. Results are reported in columns (4)–(9). In all these columns, the coefficients on the interaction term are small and statistically insignificant, validating that the parallel trend assumption holds.

Taken together, these results suggest that firms adjusted their asset composition towards longer maturity in terms of more fixed asset investments, but the shifts in asset and debt composi-

tions did not seem to affect profitability. Since high movable firms usually have low levels of tangible assets, our findings imply that firms achieved more balanced asset structures following the reform. This result is in line with the notion that firms match the maturity of assets and liabilities (e.g. Myers, 1977; Milbradt and Oehmke, 2014): the evidence shows that firms with relatively large amounts of short-term assets (or the high movable firms in this paper) experienced disproportional increases in both long-term debt (section 4.1) and long-term assets (fixed assets).[10] Our findings also lend some support to "credit multiplier" effects (e.g. Bernanke, Gertler and Gilchrist, 2000; Campello and Hackbarth, 2012): higher external finance promotes more investments in fixed assets, which in turn could be used as collateral to further increase the debt capacity of these firms.

5 Validity and robustness

This section investigates if confounding factors could refute the previous findings, including: the creditor rights and property rights protection aspects of the Property Law (5.1); other contemporary reforms (5.2); and macroeconomic shocks (5.3). Additional robustness tests are discussed in section (5.4). For the sake of brevity, from this section onwards, only results for total leverage ($Debt_t/Asset_{t-1}$), long-term leverage ($LongDebt_t/Asset_{t-1}$), and short-term leverage ($ShortDebt_t/Asset_{t-1}$) are presented.

5.1 Creditor rights and property rights protection

The Property Law not only broadened the scope of assets that could be pledged as collateral, it also improved the protection of creditor rights and property rights, at least in theory. It is therefore crucial to check if these "side effects" are the main drivers of the previous findings.

5.1.1 Creditor rights protection

The Property Law has improved creditor rights protection substantially. Various articles of the Property Law give creditors more power to protect the value of underlying collateral; prevent misusage of secured assets and entitle creditors to order debtors to restore the value of secured assets due to depreciation; and allow creditors to seize secured assets in times of default.[11] These changes could

[10] See Gopalan, Mukherjee and Singh (2016) for similar findings. They find that better contract enforcement allows firms to better match debt and asset maturity.
[11] Berkowitz, Lin and Ma (2015) provide an excellent summary of various Articles of the Property Law that strengthen creditor rights protection.

have profound consequences for corporate debt structure. On the one hand, creditors might supply more credit if secured contracts are enforceable (e.g. Haselmann, Pistor and Vig, 2010; Visaria, 2009). On the other hand, excessive creditor rights protection may also introduce pre-mature liquidation bias, resulting in less demand for secured debt, total debt and shorter debt maturity (e.g. Vig, 2013).

If creditor rights protection drives the previous results, it should post differential impacts on high movable and low movable firms. One possibility is that fixed assets are easier to be evaluated and monitored relative to movable assets, and hence, should default occur, are easier to be ceased by creditors (Vig, 2013; Gopalan, Mukherjee and Singh, 2016). Consequently, stronger creditor rights protection could affect more firms that *ex-ante* operate with more fixed assets, which are also potentially low movable firms.

To test for the effect of creditor rights protection, we expand specification (1) with an interaction term $Ftan_i*After_t$, where $Ftan_i$ is a continuous variable that equals firm *i*'s pre-reform median tangibility. Higher value of $Ftan_i$ implies that firm operates *ex-ante* with high levels of fixed assets, and potentially is more sensitive to the strengthening of creditor rights protection. Consequently, if better creditor rights protection is driving the results, the coefficient on $Ftan_i*After_t$ should be positive and the coefficient on $Highmov_i*After_t$ should become insignificant. Table 5 columns (1)–(3) report the results. The coefficient on $Ftan_i*After_t$ is –0.056 in column (1) and statistically insignificant, suggesting no differential impacts of creditor rights protection on total leverage. $LongDebt_t/Asset_{t-1}$ decreases relatively more for firms with more tangible assets (column (2), $Ftan_i*After_t$=–0.128***), while the pattern reverses for $ShortDebt_t/Asset_{t-1}$ (column (3), $Ftan_i*After_t$ =0.119***). This result implies that firms operating *ex-ante* with high levels of fixed assets substitute long-term debt for short-term debt after the reform, which is consistent with the notion that stronger creditor rights reduce debt maturity (see e.g. Vig, 2013). But more importantly, controlling for the differential effects of creditor rights protection does not lead to significant changes in the coefficients on $Highmov_i*After_t$, rejecting the alternative explanation that better creditor rights protection is the main cause for our previous findings.[12]

[12] It's extremely hard to fully differentiate the effects of creditor rights protection from that of the expansion of permissible collateral types, because secured lending relies on creditor rights protection.

5.1.2 Property rights protection

A second "side effect" is the improvement in property rights protection. The Property Law recognized explicitly the equal protection of private and public properties for the first time, and provided provisions to limit the expropriation of private assets.[13] At least on paper, the new law may have improved property rights protection. Better property rights protection affects accessibility to external finance and real outcomes in at least two ways. Firstly, lenders extend more credit and firms invest more if the underlying collateral is unlikely to be expropriated by government (e.g. De Soto, 2001; Chaney, Sraer and Thesmar, 2012). Secondly, lower expropriation risks reduce uncertainty, which improves firm value and profitability, promotes investment and increases debt capacity (e.g. Alchian and Demsetz, 1973; Besley, 1995).

Ideally, if the improvements in property rights protection are similar for high movable and low movable firms, such effects will be differenced out in the DID framework. Nevertheless, a valid concern is that firms with a high share of movable assets benefit disproportionally more from better property rights protection, because movable assets are easier to be expropriated.

This issue is addressed in three ways. The first method explores the heterogeneous improvements in property rights protection for different types of firms. In general, private firms should benefit the most from the improvements in property rights protection (Berkowitz, Lin, and Ma, 2015), while state-owned firms should benefit less because they are well protected (or without well-defined property rights), both before and after the Property Law enactment. Therefore, we augment specification (1) with $Private_{it}$ and an interaction term $Private_{it}*After_t$ to capture the differential impacts of property rights protection, where $Private_{it}$ is a dummy that equals one if firm *i*'s controlling shareholder is a private entity at time *t*, and zero otherwise.[14] If better property rights protection improves access to finance, the coefficient on $Private_{it}*After_t$ is expected to be *positive*. Columns (4)–(6) of Table 5 report the results. In column (4) and (5), the coefficients on $Private_{it}*After_t$ are statistically insignificant, suggesting that private firms, i.e. firms with worse property rights protection, do not experience relative changes in total leverage and long-term leverage. With respect to

[13] See for instance Berkowitz, Lin and Ma (2015) and Zhang (2008) for description of the pre-reform property rights protection and various Articles of the Property Law on improving property rights protection.
[14] To control for the possible confounding factor of privatization, the baseline model is re-estimated on a sample of firms that never changed their ownership type throughout the entire sample period. Results remain similar. As another robustness check, firm ownership is re-defined based on the ownership type in 2005 instead of using a time-varying definition. This definition avoids the possibility that firm ownership is endogenous to the Property Law reform. Results remain similar.

short-term leverage, column (6) indicates that private firms experienced a relative *decrease* compared to state-owned firms after the reform, contradicting the property rights protection hypothesis. Importantly, after controlling for the differential impacts of property rights protection, the coefficients on $Highmov_i*After_t$ for all debt measures are almost identical to that of the baseline model in Table 2.[15]

The second method explores the *ex-ante* cross-sectional variation on property rights protection at the provincial level.[16] If lower expropriation risks promote access to finance, one would expect the effect to be stronger for firms located in provinces with high pre-reform expropriation risks. Following Berkowitz, Lin and Ma (2015), we employ the *Producer Protection Index* of Fan, Wang and Wu (2010) to measure expropriation risks at the provincial level.[17] Higher values of this index imply better property rights protection, hence less expropriation risks. Specification (1) is augmented with an interaction term $Protect_i*After_t$ to capture the differential effects of property rights protection, where $Protect_i$ is a continuous variable that equals the pre-reform median producer protection index of the province where the firm locates. For this test, standard errors are clustered at the provincial level.[18] As reported in Table 5, columns (7) to (9), the coefficients on $Protect_i*After_t$ are negative and statistically insignificant for all debt measures. Adding $Protect_i*After_t$ also does not affect neither the economic magnitudes nor the statistical significance of the coefficients on $Highmov_i*After_t$ for all regressions.

Lastly, we re-estimated specification (1) on a sample of state-owned firms. This sample offers a relatively clean identification of the causal relationship between permissible collateral and access to finance. This is because state-owned firms are less likely to suffer from pre-mature liquidation risks (due to soft budget constraints and implicit guarantees from government), and their level of property rights protection will not change substantially after the Property Law. To avoid potential confounding factors resulting from changes in ownership, only firms that remained state-owned throughout the entire sample period are included in this sample. Results in columns (10) to (12) of Table 5 show that the coefficients on $Highmov_i*After_t$ are largely consistent with the results

[15] Test including both $Ftan_i*After_t$ and $Private_{it}*After_t$ in specification (1) are conducted but not reported. The assumption of this test is that firms with more fixed assets benefit disproportionally more from better property rights protection, i.e. through the collateral channel (see e.g. Berkowitz, Lin and Ma, 2015). This test does not change the coefficients on $Highmov_i*After_t$, nor does it affect the coefficients on either $Ftan_i*After_t$ or $Private_{it}*After_t$. Results are available upon request.

[16] For this test, we exclude *Province*Time* fixed effects because including it would absorb the provincial property rights protection measure.

[17] Another property rights protection index- *Reduce Government Expropriation Index*- is also employed as a robustness check. Similar results are obtained using this index. Results are available upon request.

[18] Clustering standard errors at the firm level does not change the results.

for the full sample. Taken together, these results suggest that better property rights protection is unlikely to be the key driver of our previous findings.

5.2 Other contemporary reforms

This section tests whether other contemporary reforms (policies) can confound the previous results, including: "tunneling reforms"[19] (i.e. new regulations enacted by the China Securities Regulatory Commission (CSRC) on related-party transactions and illegal loan guarantees (2005–2006)); the split-share reform (2005–2007); and unification of corporate tax rates (2008).

5.2.1 Tunneling reforms

Chinese listed firms have been plagued with tunneling activities (Jiang, Lee and Yue, 2010). During 2005 and 2006, the State Council and CSRC issued several statements to tackle tunneling activities, including joint statements by eight ministries threatening to take personal actions against top managers of controlling entities if the tunneling problem would not be resolved by the end of 2006.[20] According to many observers, these strict rules have successfully reduced tunneling activities (e.g. Jiang, Lee and Yue, 2010; Li et al., 2015). As demonstrated in Jiang, Lee and Yue (2010), one of the most common ways to tunnel corporate assets is through inter-corporate lending to controlling shareholders and their affiliates. These transactions are registered under the entry *"Other Receivables"* (*OREC*), which represent on average 4% of total assets in our sample (see Table 1). Given the possibility that firms with more movable assets also have more other receivables, it is very likely that high movable firms are prone to tunneling activities. Hence, even if the Property Law would not have been introduced, changes in the debt structure resulting from the anti-tunneling regulations enacted in 2005 and 2006 would be different for high and low movable firms.

Following Jiang, Lee and Yue (2010), we employ other receivables ratio ($Other\ Receivables_t/Asset_t$) is as proxy of tunneling risk. We augment the baseline model (1) with the interaction term $Forec_i*Tunnel_t$ to capture the differential effects of the "tunneling reforms", where $Forec_i$ is a continuous measure that equals firm's pre-reform median other receivables ratio, with higher value

[19] Tunneling is an activity involving the extraction of firm value by controlling shareholders or managers (see e.g. Johnson, La Porta, Lopez-de-Silanes and Shleifer, 2000; La Porta, Lopez-de-Silanes and Zamarripa, 2003).
[20] Several failed attempts in regulating tunneling activities took effect in early 2000. Eventually, in November 2005, the State Council issued a Directive on behalf of the CSRC, titled " On improving the Quality of Listed Companies", which states that the top management of controlling shareholders or colluding firms will be personally punished for tunneling activities. In November 2006, eight government ministries issued a joint announcement, making it clear that the top management of controlling entities will be fired and face disciplinary punishment if tunneling activities remain in place by December 31, 2006. See Jiang, Lee and Yue (2010) and Li et al. (2015) for more details.

indicating higher possibility to tunnel activates. $Tunnel_t$ is a dummy that equals one for 2005–2011 and zero otherwise. If the reduction in tunneling activities is the sole explanation for our results, the coefficient on $Highmov_i*After_t$ would lose its significance once controlled for the interaction term $Forec_i*Tunnel_t$.

Table 6 (columns (1) to (3)) reports the results. Firm leverage decreases relatively more for firms that are prone to tunneling risks after the tunneling reform (column (1), $Forec_i*Tunnel_t$= –0.311*), and such relative decrease in total leverage is mainly driven by the relative reduction in short-term leverage (column (3), $Forec_i*Tunnel_t$ =–0.428***). This result suggests that before the "tunneling reforms", listed firms over-borrowed at short maturities to provide inter-corporate loans to their controlling shareholders, allowing them to expropriate funds from the company. After the "tunneling reforms", firms prone to tunneling reduced disproportionally more their short-term leverage. On the other hand, long-term leverage increased relatively more for firms prone to tunneling risks, as suggested by the positive interaction term in column (2) ($Forec_i*Tunnel_t$ =0.164***). Taken together, these results suggest that firms which were more prone to tunneling activities before the reforms changed their debt structure after these reforms, reducing their short-term leverage while increasing their long-term leverage. Hence, our findings suggest the reforms starting in 2005 seem to have effectively reduced tunneling activities in China, echoing the results reported in Li et al. (2015). More importantly for our analysis, controlling for the differential effects of the "tunneling reforms" does not affect the coefficients on $Highmov_i*After_t$ for all debt measures, rejecting the alternative explanation that our baseline results are driven by these reforms.

5.2.2 Split-share reform

The split-share reform initiated in April 2005 mandated the conversion of previously non-tradable shares into tradable shares, which according to many observers improved corporate governance of listed firms (e.g. Chen et al. 2012), promoted further privatization (e.g. Liao, Liu and Wang, 2014), and changed the role of secondary equity markets (Campello, Ribas and Wang, 2014). These studies also find that the split-share reform promoted access to finance and investment, and generated marked improvements in firms' productivity, profitability and employment. Therefore, it is important to check if our results are driven by the split-share reform instead of the introduction of the Property Law.

To this end, the baseline model is augmented with $Split_{it}$ and $Highmov_i*Split_{it}$, where $Split_{it}$ is a dummy variable that equals one for firm-year observations after a firm's completion of the split-

share reform, and zero otherwise. Results are reported in Table 6, columns (4)–(6). The coefficients on $Highmov_i*Split_{it}$ are statistically insignificant for all dependent variables, implying that there was no differential impact of the split-share reform on corporate leverage. More importantly, the coefficients on $Highmov_i*After_t$ are very similar to the baseline results, suggesting that the effects driven by the introduction of the Property Law were independent from those generated by the split-share reform.

5.2.3 Corporate tax reform

On March 16, 2007, the Enterprise Income Tax Law was enacted and took effect from January 1th, 2008. Earlier, corporate tax rates varied with firm ownership, with foreign firms enjoying a preferential tax rate of 25%, while domestic firms were charged at 33%. The new law equalized the tax rates of domestic and foreign firms at 25%. Assuming that lower taxes improve firm profitability and consequently their repayment capacity, creditors may extend more credit to firms that enjoy larger tax reductions, i.e. domestic firms. Hypothetically, if firms with more movable assets were over-represented by domestic firms and if firms with less movable assets were mostly foreign firms, our results could be explained by the corporate tax reform. To remove this concern, the baseline model is re-estimated for a sample of domestic firms, which benefitted equally from the tax reduction, and consequently, the direct effect of the tax reform on the outcome variables should be cancelled out in a difference-in-differences framework. A firm is classified as domestic if the controlling shareholder is a domestic entity. The results reported in columns (7)–(9) of Table 6 are similar to the baseline model results, hence our results still hold.

5.3 Credit conditions, financial crisis and collateral value

Macroeconomic shocks which occurred in the post-reform period could have triggered the contrasting behaviors of treated and control firms. This section investigates the following possible shocks: a variation in credit conditions; the RMB 4 trillion stimulus package implemented during 2008–2010; the 2008 financial crisis; and changes in collateral values such as land prices.

5.3.1 Credit conditions

A concern is that the differential effects on high and low movable firms may reflect the asymmetric responses of firms in the treatment and control groups to changing macroeconomic credit conditions

rather than to the introduction of the Property Law. It has been long established that financially constrained firms react to changes in credit conditions more strongly than unconstrained firms (Campello, Graham and Harvey, 2010). Under the assumption that high moveable firms are more likely to be financially constrained, these differential changes could be caused by variations in credit conditions instead of the introduction of the Property Law.

To investigate this possibility, we expand specification (1) with an interaction term between $Highmov_i$ and a proxy of credit conditions, which controls for the possibility that high movable firms respond to changes in credit conditions differently from low movable firms. We employ lagged loan to GDP ratio ($LoantoGDP_{t-1}$) as a proxy of aggregate credit conditions. [21] Data are obtained from the Chinese National Bureau of Statistics. Columns (1) to (3) of Table 7 find insignificant coefficients on $Highmov_i*LoantoGDP_{t-1}$ for all leverage measures, which implies that high movable firms do not respond to changes in credit conditions differently from low movable firms. The interaction term $Highmov_i*After_t$, if anything is now statistically and economically even more significant than our earlier results from the baseline model. We therefore conclude that the differential effects of the Property Law on high movable versus low movable firms are independent from changes in credit conditions.

5.3.2 Stimulus package

From November 2008 to the last quarter of 2010, China implemented a RMB 4 trillion stimulus package to mitigate the effects from the global financial crisis, which could affect our results if high movable firms received disproportionally more credit thanks to government initiated programs under this package. Table 7, columns (4)–(6), include an interaction term $Highmov_i*Stimu_t$ to capture the differential effects of the stimulus package on high versus low movable firms, where $Stimu_t$ is a dummy variable that equals one for the period 2008–2010, and zero otherwise. The coefficients on $Highmov_i*After_t$ become even more significant, both statistically and economically compared to the baseline results in Table 2.

5.3.3 Financial crisis

The 2008 financial crisis could post also another challenge. Lenders may prefer relatively liquid firms during crisis periods and hence may extend disproportionally more credit to firms with more

[21] Alternative proxy such as lagged *M2/GDP* produces similar results, which are available upon request.

movable assets. To address this issue, we check if our results still hold for a sample that ends in 2007, one year before the outbreak of the global financial crisis.[22] Results are reported in columns (7)–(9). The main findings for this sample are largely similar to the results for the whole sample, validating that our previous findings are not driven by financial crisis.

5.3.4 Impact of macroeconomic shocks on fixed assets value

Falling asset prices reduce collateral values and debt capacity (Kiyotaki and Moore, 1997). Therefore, the relative increase in leverage for high movable firms, which likely to have low levels of fixed assets, could be explained by macroeconomic shocks that reduce the value of fixed assets. This hypothesis is unlikely to explain our findings for several reasons. Firstly, any time-varying industry or provincial shocks are controlled for because all specifications include both the interaction terms *Industry*Year* and *Province*Year*. As a result, only shocks that have differential impacts on the fixed assets' value of treated and control firms within the same industry and within the same province are of concern. It is very hard to identify such shocks. Secondly, the value of the most common type of fixed assets, which is land, has been increasing steadily during the sample period (see e.g. Wu, Gyourko and Deng, 2015). If anything, the collateral value channel would suggest that firms with more fixed assets should have had better access to external finance, which we find not to be the case.[23] Lastly, the differential effects of the Property Law are strong for a sample of state-owned firms only (Table 5, columns (10)–(12)), which are less financially constrained (Allen, Qian and Qian, 2005; Ayyagari, Demirguc-Kunt and Maksimovic, 2010) and hence changes in collateral values should not affect their access to external finance (Wu, Gyourko and Deng, 2015). Taken together, it seems highly unlikely that changes in the values of fixed assets are able to explain our findings.

[22] Another way to address this is to estimate the model for another crisis period before the enactment of the Property Law. Finding results consistent with previously reported would attribute the observed differential effects to financial crisis instead of the Property Law. The 1998 East Asian Financial Crisis could have fitted for such a placebo test. Unfortunately, the key variable movable assets ratio cannot be computed for years before 2000 when most of the firms do not report their level of movable assets.

[23] Wu, Gyourko and Deng (2015) construct a land price panel across 35 Chinese cities over 2003 to 2011, and report that the real value of land doubled for 27 cities, while even quadrupling for nine cities by the end of 2011. They further report that the changing values of land do not affect firms' external finance or investments.

5.4 Further robustness tests

5.4.1 Observables

This section investigates if our findings are driven by differences in observables other than the movable ratio. Specifically, we control explicitly for the differential reactions to the introduction of the Property Law as a function of pre-reform firm characteristics *Z*, which includes *Tangibility*, *Liquidity*, *Age*, *Profitability*, *Sale* and *Leverage*. The baseline model is augmented with an interaction term FZ_i*$After_t$ to capture the differential reactions of other innate firm features to the legal change, where FZ_i is a continuous measure equals the firm's pre-reform median firm characteristic *Z*. For the sake of brevity, only the results controlling for *Liquidity*, *Leverage* and *Profitability* are reported in Table 8.[24] The coefficients on $Highmov_i$*$After_t$ when $Debt_t/Asset_{t-1}$ is the dependent variable range from 0.049 to 0.08, and all are significant at 1%. For $LongDebt_t/Asset_{t-1}$, the coefficients on $Highmov_i$*$After_t$ center around 0.048, and all are significant at 1%. In line with our previous results, we do not find differential effects on high versus low movable firms for $ShortDebt_t/Asset_{t-1}$ across all specifications. Importantly, these results still hold when controlling for pre-reform leverage (columns (4)–(6)), suggesting that our findings cannot be explained by mean reversal of debt usage. Taken together, these results validate our finding that the movability of assets drives the differential effects between high and low movable firms, instead of other innate firm features.

5.4.2 Other robustness tests

Finally, some additional robustness tests are available upon request, including 1) Re-estimation based on continuous measures of treatment, defined as the pre-reform median movable assets ratio, or movable assets ratio measured in 2005 (i.e. one year before the reform); 2) Reclassification of movable assets: although accounts receivable and inventory are the main categories of movable assets, there are other asset types that became pledgable after the reform, including for instance, future equipment and raw materials. We therefore broaden the definition of movable assets class by defining the movable ratio as $(CurrentAsset_t-Cash_t)/Asset_t$. 3) Re-estimation over alternative samples: a) sample of firms that have been listed throughout the entire sample period, to alleviate the concern that differential reputational improvements due to listing or accessibility to capital markets

[24] Including all pre-reform characteristics altogether in one regression also does not exert meaningful changes to the coefficients on $Highmov_i$*$After_t$. All these results are available from the author upon request.

might drive the results;[25] b) a sample of firms that never changed their ownership type throughout the sample period, which removes possible confounding effects due to privatization. In all these tests, the DID coefficients for all dependent variables are remarkably stable and are consistent with our main results.

6 Conclusions

The Property Law was a milestone in reforming the protection of property and creditor rights in China. It also transformed the landscape of secured transactions in China, although this aspect of the Property Law has received little academic attention. This study provides the first evidence for China that the expansion of permissible collateral improved the access to external finance and prolonged the maturity of debt. However, the reform did not improve the efficiency of credit allocation among Chinese firms. We find that the extra credit that became available due to the legal reform was mostly taken by firms that were less profitable, highly indebted, and prone to bankruptcy. This finding is in line with the literature on the allocation efficiency of credit expansion (e.g. Mian and Sufi, 2009; Assuncao, Benmelech and Silva, 2014). The Property Law reform also allowed firms to invest more in fixed assets. However, we do not find evidence that firms improved their performances after the Property Law.

Taken together, this paper shows that legal reform that expands permissible collateral improves the access of firms to external financing. Our results provide important implications for policy. Firstly, collateral reform may decrease banks' screening incentives and allow riskier borrowers to obtain extra credit, and consequently risks to financial stability may develop (e.g. Manove, Padilla and Pagano 2001; Zazzaro, 2005; Jappelli, Pagano and Bianco, 2005). In recent years, non-performing loans in China have increased significantly, which may be associated to some extent with an inefficient allocation of credit. Secondly, the availability of more credit driven by an expansion of permissible collateral also may have caused higher leverage or overinvestment, with potential detrimental effects on firm profitability and overall economic performance. These concerns highlight the importance of accompanying collateral law reform with other structural reforms to improve the overall efficiency of credit allocation. For instance bank competition and privatization of bank ownership should be promoted in order to ensure that lending decisions will be made on commercial grounds.

[25] All firms in the sample are eventually listed at stock exchanges, but their annual reports started to be published several years before the actual listings.

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Tables

Table 1 Summary statistics

Variables	Observations	Mean	Std.dev.	Min	Max
Panel A: Movable ratio					
$Movratio_t$	12445	0.26	0.17	0.01	0.76
$Inventory_t/Asset_t$	12570	0.17	0.15	0.00	0.75
$AccountReceivable_t/Asset_t$	12518	0.09	0.08	0.00	0.37
$OtherReceivable_t/Asset_t$	12692	0.04	0.07	0.00	0.38
$(CurrentAsset_t-Cash_t)/Asset_t$	12707	0.37	0.19	0.02	0.86
Panel B: Debt					
$Debt_t/Asset_{t-1}$	6884	0.33	0.22	0.02	1.44
$LongDebt_t/ Asset_{t-1}$	7239	0.12	0.14	0.00	0.79
$ShortDebt_t/Asset_{t-1}$	10218	0.19	0.15	0.00	0.83
Panel C: Assets and profitability					
$Log(1+Asset_t)$	12720	21.25	1.17	18.42	24.70
$FixedAsset_t/Asset_{t-1}$	11415	0.32	0.22	0.00	1.07
$Netprofit_t/Asset_{t-1}$	11446	0.04	0.08	–0.28	0.34
Panel D: Controls					
$Tangibility_t$	12680	0.29	0.19	0.00	0.79
$Liquidity_t$	12707	0.16	0.12	0.00	0.56
$Profitability_t$	12717	0.03	0.08	–0.41	0.22
$Sale_t$	12701	20.57	1.50	15.94	24.50
Age_t	12720	2.43	0.49	0.00	4.13
$List_t$	12720	0.96	0.20	0	1
$Split_t$	12720	0.50	0.50	0	1
$State_t$	12710	0.69	0.46	0	1

This table reports summary statistics for main variables. Sample covers 2001 to 2011 and excludes observations from 2006. The sample contains firms listed in either Shanghai Stock Exchange or Shenzhen Stock Exchange. Data is obtained from Wind Information. $Movratio_t$ is defined as $(Inventory_t+Accounts\ receivables_t)/Asset_t$. $Tangibility_t$ is the ratio of fixed assets to total assets ($FixedAsset_t/Asset_t$). $Liquidity_t$ is cash divided by total assets ($Cash_t/Asset_t$). $Profitability_t$ is the ratio of net profits over total assets ($Netprofit_t/Asset_t$). $Sale_t$ is the logarithm of one plus total sale. Age_t is defined as the logarithm of one plus the number of years since incorporation. $List_t$ is a dummy variable equals one for firm-year observation after firm's IPO, and zero otherwise. $Split_t$ is a dummy variable equals one for firm-year observation after firm's completion of the split-share reform, and zero otherwise. $State_t$ is a dummy variable equals one if the controlling shareholder is government and zero if the controlling shareholder is private entity.

Table 2 Debt structure

	Actual reform			Placebo 2003			Placebo 2004		
Dep.Var.	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Highmov_i*after_t$	0.069***	0.048***	0.009	–0.027	–0.006	–0.014	0.023	0.024	–0.010
	(0.024)	(0.014)	(0.012)	(0.021)	(0.013)	(0.011)	(0.020)	(0.018)	(0.010)
$Log(TA_{t-1})$	–0.106***	–0.033***	–0.040***	–0.222***	–0.070***	–0.092***	–0.220***	–0.070***	–0.095***
	(0.016)	(0.009)	(0.007)	(0.030)	(0.018)	(0.015)	(0.031)	(0.018)	(0.015)
$Tangibility_{t-1}$	–0.128***	–0.073***	–0.035	–0.190***	–0.088*	–0.045	–0.155**	–0.099**	–0.019
	(0.046)	(0.028)	(0.023)	(0.073)	(0.045)	(0.037)	(0.075)	(0.046)	(0.038)
$Liquidity_{t-1}$	–0.098	–0.068*	–0.042	–0.041	–0.068*	–0.025	–0.044	–0.071*	–0.019
	(0.060)	(0.036)	(0.028)	(0.076)	(0.041)	(0.038)	(0.078)	(0.041)	(0.038)
$Profitability_{t-1}$	–0.131	0.066	–0.156***	–0.126	0.060	–0.101**	–0.114	0.064	–0.098**
	(0.085)	(0.046)	(0.044)	(0.096)	(0.052)	(0.048)	(0.099)	(0.051)	(0.048)
$Sale_{t-1}$	–0.002	–0.017**	0.009*	0.004	–0.010	0.011	0.003	–0.001	0.007
	(0.012)	(0.007)	(0.005)	(0.021)	(0.011)	(0.007)	(0.020)	(0.010)	(0.007)
Age_{t-1}	0.124***	0.038	0.039*	0.144**	0.017	0.078***	0.120**	–0.003	0.060**
	(0.043)	(0.023)	(0.024)	(0.057)	(0.039)	(0.029)	(0.055)	(0.040)	(0.029)
$List_t$	–0.013	–0.036*	0.005	0.035	–0.016	0.007	0.026	–0.017	0.009
	(0.032)	(0.019)	(0.014)	(0.040)	(0.026)	(0.015)	(0.038)	(0.025)	(0.014)
$Split_t$	0.034*	0.031**	0.006	0.042	0.012	0.004	0.037	0.008	0.001
	(0.020)	(0.012)	(0.010)	(0.028)	(0.017)	(0.013)	(0.029)	(0.017)	(0.013)
$State_t$	–0.025	–0.007	–0.010	–0.029	0.006	–0.004	–0.015	0.001	0.007
	(0.024)	(0.015)	(0.012)	(0.038)	(0.019)	(0.017)	(0.039)	(0.022)	(0.017)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,559	4,835	6,658	2,018	2,098	3,070	2,013	2,089	3,063
R-squared	0.268	0.231	0.237	0.280	0.208	0.190	0.286	0.209	0.214
Number of firms	750	761	835	657	671	818	658	671	818

This table estimates the following specification: $Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \delta X + \varepsilon_{it}$, where *i* indexes for firm and *t* for year. The dependent variables are $Debt_t/Asset_{t-1}$ (*DT/TA*), $LongDebt_t/Asset_{t-1}$ (*LD/TA*), and $ShortDebt_t/Asset_{t-1}$ (*SD/TA*), respectively. α_i and γ_t are firm and year fixed effects, respectively. $After_t$ is a dummy variable equals one for the years 2007–2011, and zero otherwise. $Highmov_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. *X* is a set of firm specific control variables and ε_{it} is error term. Columns (4)–(9) report results for placebo reforms takes place in 2003 and 2004, respectively. For these placebo reforms, the sample ends by year-end of 2005. In these placebo regressions, $After_t$ is an indicator variable that takes value one for years after the placebo reform, and $Highmov_i$ is measured over years before the each placebo reform. Standard errors clustered at firm level are reported in parentheses. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

Table 3 The efficiency of credit allocation

Dep.Var.	DT/TA		
$PreQ_i$=	ROS	Liability	Z-score
	(1)	(2)	(3)
$Highmov_i$*$After_t$ *$PreQ_i$	–0.191* (0.113)	0.348*** (0.112)	–0.011* (0.006)
$Highmov_i$*$After_t$	0.074*** (0.024)	–0.105 (0.065)	0.102*** (0.031)
$After_t$ *$PreQ_i$	0.147*** (0.056)	–0.499*** (0.078)	0.015*** (0.005)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes
Observations	4,559	4,559	4,559
R-squared	0.270	0.288	0.276
Number of firms	750	750	750

This table presents subsample estimations using the following specification: $Y_{it} = \alpha_i + \gamma_t + \beta_1 Highmov_i * After_t * PreQ_i + \beta_2 Highmov_i * After_t + \beta_3 PreQ_i * After_t + \delta X + \varepsilon_{it}$, where *i* indexes for firms and *t* for year. *PreQ*$_i$ is a set of continuous proxies of pre-reform firm quality, including: return on sales (*ROS*), indebtedness (*Liability Ratio*), and Altman's Z-score. Each proxy is measured at the pre-reform median. The dependent variable is $Debt_t/Asset_{t-1}$ (*DT/TA*). α_i and γ_t are firm and year fixed effects, respectively. *After*$_t$ is a dummy variable equals one for the years 2007–2011, and zero otherwise. *Highmov*$_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. *X* is a set of firm specific control variables and ε_{it} is error term. All specifications include firm specific control variables, firm fixed effects, year fixed effects, *Industry*Year* fixed effects, and *Province*Year* fixed effects. ε_{it} is error term. Standard errors clustered at firm level are reported in parentheses. ***, **, and * implies significance at 1%, 5%, and 10%, respectively.

Table 4 Asset structure and profitability

	Actual Reform			Placebo 2003			Placebo 2004		
Dep. Var.	LogTA	FA/TA	Profit/TA	LogTA	FA/TA	Profit/TA	LogTA	FA/TA	Profit/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Highmov_i*After_t$	0.123**	0.076***	0.001	0.002	0.001	–0.002	0.021	0.005	0.004
	(0.049)	(0.013)	(0.006)	(0.023)	(0.012)	(0.006)	(0.024)	(0.016)	(0.006)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,585	7,574	7,579	3,363	3,362	3,362	3,366	3,365	3,367
R-squared	0.604	0.218	0.263	0.551	0.157	0.272	0.545	0.156	0.272
Number of firms	844	844	844	842	842	842	843	843	843

This table estimates the following specification: $Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \delta X + \varepsilon_{it}$, where *i* indexes for firms and *t* for year. The dependent variables are $Log(1+Asset_{it})$ (*LogTA*), $FixedAsset_{it}/Asset_{it-1}$ (*FA/TA*), and $Profit_{it}/Asset_{it-1}$ (Profit/TA), respectively. α_i and γ_t are firm and year fixed effects, respectively. In column (1)–(3), $After_t$ is a dummy variable equals one for the years 2007–2011, and zero otherwise; and $Highmov_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. *X* is a set of firm specific control variables and ε_{ijt} is error term. Columns (4)–(9) report results for placebo reforms took place in 2003 and 2004, respectively. In these placebo regressions, $After_t$ is an indicator variable that takes value one for years after the placebo reform, and $Highmov_i$ is measured over years before the each placebo reform. The sample ends by year-end of 2005 for these placebo reforms. Standard errors clustered at firm level are reported in parentheses. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

Table 5 Creditor rights and property rights protection

	Creditor rights			Firm property rights			Regional property rights			State-owned firms		
Dep.Var.	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$Highmov_i$*$After_t$	0.060**	0.026*	0.019	0.071***	0.047***	0.008	0.066***	0.053***	0.008	0.083***	0.052***	0.008
	(0.026)	(0.016)	(0.017)	(0.024)	(0.014)	(0.012)	(0.025)	(0.014)	(0.012)	(0.029)	(0.017)	(0.014)
$Ftan_i$*$After_t$	–0.056	–0.128***	0.119***									
	(0.078)	(0.046)	(0.038)									
$Private_{it}$*$After_t$				–0.039	0.022	–0.042***						
				(0.026)	(0.015)	(0.013)						
$Protect_i$*$After_t$							–0.001	–0.002	–0.001			
							(0.003)	(0.002)	(0.002)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,559	4,835	6,658	4,559	4,835	6,658	4,278	4,547	6,261	3,464	3,643	4,800
R-squared	0.268	0.235	0.241	0.270	0.232	0.242	0.209	0.181	0.190	0.289	0.262	0.261
Number of firms	750	761	835	750	761	835	707	718	787	596	603	674

Columns (1)–(9) estimate the following:$Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \beta_1 Protection * After_t + \delta X + \varepsilon_{it}$, where *i* indexes for firms, *j* for industries, and *t* for year. The dependent variables are $Debt_t/Asset_{t-1}$ (*DT/TA*), $LongDebt_t/Asset_{t-1}$ (*LD/TA*), and $ShortDebt_t/Asset_{t-1}$ (*SD/TA*), respectively. α_i and γ_t are firm and year fixed effects, respectively. ε_{it} is error term. *After*$_t$ is a dummy variable equals one for the years 2007–2011, and zero otherwise. *Highmov*$_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. *Protection* is represented by *Ftan*$_i$, *Private*$_{it}$, or *Protect*$_i$, respectively. *Ftan*$_i$ is a continuous variable equals to firm's pre-reform median *FixedAsset/Asset* ratio. *Private*$_{it}$ is a dummy equals one if firm *i*'s controlling shareholder at time *t* is a private entity, and zero otherwise. *Protect*$_i$ is a continuous variable that equals the pre-reform median producer protection index of the province where the firm *i* locates. Columns (10)–(12) estimate specification (1) for a sample of state-owned firms. All specifications include firm specific control variables, firm fixed effects, year fixed effects, *Industry*Year* fixed effects, and *Province*Year* fixed effects. Standard errors are clustered at firm level, except in columns (7)–(9) are clustered at province level. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

Table 6 Other contemporary reforms

	Tunnel reform			Split-share reform			Tax reform		
Dep.Var.	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Highmov_i$*$After_t$	0.069***	0.048***	0.006	0.067*	0.057***	0.011	0.070***	0.052***	0.005
	(0.024)	(0.014)	(0.012)	(0.042)	(0.022)	(0.019)	(0.024)	(0.015)	(0.012)
$Forec_i$*$Tunnel_t$	–0.311*	0.164*	–0.428***						
	(0.175)	(0.098)	(0.085)						
$Highmov_i$*$Split_{it}$				0.002	–0.010	–0.002			
				(0.041)	(0.022)	(0.019)			
$Split_{it}$				0.033	0.035*	0.007			
				(0.028)	(0.019)	(0.013)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,559	4,835	6,658	4,559	4,835	6,658	4,400	4,662	6,411
R-squared	0.269	0.232	0.248	0.268	0.231	0.237	0.274	0.231	0.237
Number of firms	750	761	835	750	761	835	741	753	832

This table estimates the differential effects of other reforms. The dependent variables are $Debt_t/Asset_{t-1}$ (*DT/TA*), $LongDebt_t/Asset_{t-1}$ (*LD/TA*), and $ShortDebt_t/Asset_{t-1}$ (*SD/TA*), respectively. *Tunnel Reform* columns (columns (1) to (3)) estimate the following: $Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \beta_1 Forec_i * Tunnel_t + \delta X + \varepsilon_{it}$ In this specification, $Highmov_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. $Forec_i$ is a continuous measure equals to firm *i*´s median level of other receivables to assets ratio (*Other Receivables/Asset*), measured for the pre-tunneling reform (2001-2004) period. $Tunnel_t$ is a dummy equals one for years from 2005 to 2011, and zero otherwise. *Split-Share Reform* (columns (4) to (6)) estimate:$Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \beta_1 Highmov_i * Split_{it} + \beta_2 Split_{it} + \delta X + \varepsilon_{it}$. In this specification, $Split_{it}$ equals one for firm-year observations after firm's completion of split-share reform, and zero otherwise. *Tax Reform* columns (columns (7) to (9)) estimate specification (1) for a sample of domestic firms. In all specifications, *i* indexes firms and *t* indexes year. α_i and γ_t are firm and year fixed effects, respectively. $After_t$ is a dummy variable that equals one for the years 2007-2011, and zero otherwise. All specifications include firm specific control variables, firm fixed effects, year fixed effects, *Industry*Year* fixed effects, and *Province*Year* fixed effects. Standard errors are clustered at firm level. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

Table 7 Macroeconomic shocks

	Credit condition			Stimulus package			Pre-crisis		
Dep.Var.	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Highmov_i*After_t$	0.073***	0.053***	0.011	0.089***	0.059***	0.021	0.072**	0.039*	0.013
	(0.026)	(0.015)	(0.013)	(0.028)	(0.016)	(0.014)	(0.036)	(0.022)	(0.016)
$Highmov_i*LoantoGDP_{t-1}$	0.038	0.044	0.022						
	(0.063)	(0.039)	(0.030)						
$Highmov_i*Stimu_t$				–0.036*	–0.020	–0.020**			
				(0.020)	(0.013)	(0.009)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,559	4,835	6,658	4,559	4,835	6,658	2,535	2,642	3,826
R-squared	0.268	0.231	0.237	0.269	0.231	0.238	0.243	0.195	0.177
Number of firms	750	761	835	750	761	835	694	708	826

Columns (1)–(6) estimate the following specification: $Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \beta_1 Highmov_i * Shock + \delta X + \varepsilon_{it}$, where *i* indexes for firms and *t* for year. The dependent variables are $Debt_t/Asset_{t-1}$ (*DT/TA*), $LongDebt_t/Asset_{t-1}$ (*LD/TA*), and $ShortDebt_t/Asset_{t-1}$ (*SD/TA*), respectively. α_i and γ_t are firm and year fixed effects, respectively. ε_{it} is error term. $After_t$ is a dummy variable that equals one for the years 2007–2011, and zero otherwise. $Highmov_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. *Shock* is represented by $LoantoGDP_{t-1}$ (columns (1) to (3)) or $Stimu_t$ (columns (4) to (6)), where $LoantoGDP_{t-1}$ is lagged loan to GDP ratio and $Stimu_t$ is a dummy variable that takes on value one for years 2008 to 2010 and zero otherwise. Columns (7) to (9) estimate specification (1) for a pre-crisis sample (2001–2007). All specifications include firm specific control variables, firm fixed effects, year fixed effects, *Industry*Year* fixed effects, and *Province*Year* fixed effects. Standard errors are clustered at firm level. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

Table 8 Observables

	Pre-liquidity			Pre-leverage			Pre-profitability		
Dep. Var.	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA	DT/TA	LD/TA	SD/TA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Highmov_i*After_t$	0.068***	0.048***	0.010	0.049**	0.041***	–0.001	0.080***	0.049***	0.011
	(0.024)	(0.014)	(0.012)	(0.022)	(0.014)	(0.012)	(0.024)	(0.015)	(0.013)
$Fcash_i*After_t$	0.413***	0.220***	0.096						
	(0.148)	(0.080)	(0.062)						
$Flev_i*After_t$				–0.758***	–0.279***	–0.431***			
				(0.081)	(0.052)	(0.048)			
$Fpft_i*After_t$							1.192***	0.106	0.550***
							(0.265)	(0.154)	(0.174)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,559	4,835	6,658	4,342	4,563	5,703	4,559	4,835	6,658
R-squared	0.272	0.234	0.238	0.309	0.247	0.294	0.275	0.231	0.246
Number of firms	750	761	835	677	677	692	750	761	835

This table estimates the following specification:$Y_{it} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \beta_1 FZ_i * After_t + \delta X + \varepsilon_{it}$, where *i* indexes for firms and *t* for year. The dependent variables are $Debt_t/Asset_{t-1}$ (*DT/TA*), $LongDebt_t/Asset_{t-1}$ (*LD/TA*), and $ShortDebt_t/Asset_{t-1}$ (*SD/TA*), respectively. α_i and γ_t are firm and year fixed effects, respectively. ε_{it} is error term. $After_t$ is a dummy variable that equals one for the years 2007–2011, and zero otherwise. $Highmov_i$ equals one if *i*'s pre-reform median movable ratio belongs to the top tertile, and zero if in the bottom tertile. FZ_i is pre-reform median value of firm characteristic *Z*, including pre-liquidity ($Fcash_i$), pre-leverage ($Flev_i$), and pre-profitability ($Fpft_i$), respectively. All specifications include firm specific control variables, firm fixed effects, year fixed effects, *Industry*Year* fixed effects, and *Province*Year* fixed effects. Standard errors are clustered at firm level. ***, **, and * implies significance at 1%, 5%, and 10% level, respectively.

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