The Journal of FINANCE
The Journal of THE AMERICAN FINANCE ASSOCIATION

THE JOURNAL OF FINANCE • VOL. LXVIII, NO. 3 • JUNE 2013

Access to Collateral and Corporate Debt Structure: Evidence from a Natural Experiment

VIKRANT VIG*

ABSTRACT

We investigate how firms respond to strengthening of creditor rights by examining their financial decisions following a securitization reform in India. We find that the reform led to a reduction in secured debt, total debt, debt maturity, and asset growth, and an increase in liquidity hoarding by firms. Moreover, the effects are more pronounced for firms that have a higher proportion of tangible assets because these firms are more affected by the secured transactions law. These results suggest that strengthening of creditor rights introduces a liquidation bias and documents how firms alter their debt structures to contract around it.

THE SEMINAL PAPER BY La Porta et al. (1998; henceforth LLSV) titled "Law and Finance" and subsequent literature link creditor rights with financial development by documenting a positive correlation between an index of creditor rights and the size of credit markets in cross-country regressions.[1] These findings support the view that ownership protection, particularly in credit markets, fosters financial development by lowering the cost of credit. According to this view, the major function attributed to law is that it empowers creditors to enforce their contracts. The bankruptcy literature on the merits of Chapter 11 and bankruptcy reorganization suggests that creditor rights could be excessive and lead to ex post inefficiencies in the form of a liquidation bias (see Aghion,

*Vikrant Vig is with the London Business School. I would like to thank Patrick Bolton, Charlie Calomiris, Ray Fisman, Denis Gromb, Oliver Hart, Daniel Paravisini, and Bernard Salanie for many invaluable discussions and comments. In addition, I would like to thank Viral Acharya, Ken Ahern, Andres Almazan, Ken Ayotte, Tim Baldenius, Mike Barclay, Tomer Berkowitz, Alex Butler, Pierre Chiappori, Francesca Cornelli, Sid Dastidar, Doug Diamond, James Dow, Sapnoti Eswar, Maria Guadalupe, Charlie Hadlock, George Hall, Rainer Haselmann, Christopher Hennessy, Laurie Hodrick, Hagit Levy, Bentley Macleod, Ulf Nielsson, Francisco Perez-Gonzalez, Manju Puri, Raghu Rajan, Adriano Rampini, Tano Santos, Florian Schulz, Amit Seru, Cliff Smith, Suresh Sundaresan, Elu von Thadden, Jean Tirole, Paolo Volpin, and seminar participants at various departments. I would also like to thank the officials at the Bank of Baroda, Reserve Bank of India, ICICI, State Bank of India, and Dena Bank for helping me understand the Indian banking industry. In particular, I would like to thank Y.V. Reddy, Rakesh Mohan, R.B. Barman, Anil Khandelwal, Saibal Ghosh, and Sundando Roy for their generous support, feedback, and valuable comments. The usual disclaimer on errors applies here as well.

[1] See La Porta et al. (1997), Levine (1998, 1999), Djankov, McLiesh, and Shleifer (2007), Beck, Demirgüc-Kunt, and Levine (2004), Haselmann, Pistor, and Vig (2010), and Visaria (2009).

DOI: 10.1111/jofi.12020

Hart, and Moore (1992), Hart et al. (1997))[2]. In light of these seemingly opposing views, the question of how far the law should go in protecting creditors naturally arises.

This paper revisits the positive link between creditor protection and the expansion of credit and asks whether there are situations in which strengthening creditor rights could lead to a decline in credit use by firms. Specifically, the paper exploits a quasi-natural experiment in India, namely, the passage of the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interests Act of 2002 (SARFAESI Act henceforth), to investigate the effect of law on corporate debt structure. Before the SARFAESI Act, the slow and rigid judicial process created severe bottlenecks in the recovery of security interests. To liquidate a firm, secured lenders had to go through a prolonged judicial process, during which the value of collateral depreciated considerably. The reform significantly increased the rights of secured creditors by allowing them to bypass the lengthy and judicial process to seize and liquidate the assets of the defaulting firm, thus improving the ability of lenders to access the collateral of the firm.

Using the above securitization reform, which strengthens the rights of secured creditors, and employing a difference-in-differences (DID henceforth) methodology, the paper attempts to identify the effects of the regulatory change on the quantity of secured credit used by firms. Remarkably, in contrast to the law and finance literature, which predicts an increase in secured debt, this paper finds that an increase in the rights of secured creditors actually led to a 5.2% decrease in the use of secured debt by firms. This paper attempts to identify the cause of this response and finds that creditor protection imposes an extra cost on borrowers, as is evident from borrowers' reduced reliance on secured debt.

The law and finance literature presents a strong case for strengthening creditor rights, arguing that strong creditor rights reduce borrowing costs and thus relax financial constraints.[3] The economic justification for stronger creditor rights is that they expand the space of debt contracts that can be written between the borrower and the lender. An expansion in contract space should constitute a Pareto improvement as it makes no borrower worse off because borrowers can revert back to the old regime, but makes certain borrowers better off, as it enhances their borrowing capacity.

The above argument relies on the important assumption that borrowers have enough contractual flexibility (freedom of contracting) to revert back to the old regime. Although the mandatory nature of the SARFAESI Act does not allow firms to explicitly opt out of the law,[4] as such a contract would not be enforced in court, firms can undo the effect of the law through other means (if they are

[2] See also Strömberg (2000), Pulvino (1998), and Povel (1999).

[3] The reduction in the cost of borrowing may come through several channels. For instance, stronger creditor rights mitigate moral hazard by borrowers. Stronger creditor rights also lower the deadweight cost of liquidation.

[4] The bankruptcy law in the United States is also mandatory as it does not allow parties to opt out.

concerned about some inefficiencies), for example, by reducing the amount of collateral for the same amount of secured loan.

To see this, consider a loan contract between an entrepreneur (debtor) and a lender (creditor). The entrepreneur wishes to purchase some assets and offer these assets as collateral for the loan. Consider the simple Hart and Moore (1994) setup. In this setup, the entrepreneur needs financing at date 0 to invest in an asset that generates cash flows at $t = 1$ and $t = 2$. Cash flows are observable but not contractible, and assume that the entrepreneur has all the bargaining power. Assume that, at $t = 1$, the creditor can liquidate the firm (in the event of default) for \$50,000. Because by assumption the entrepreneur has all the bargaining power, the maximum amount that the entrepreneur can borrow in such a scenario is limited by the liquidation value of the asset. Next, consider a reform that strengthens secured creditor rights by improving their access to the pledged collateral. Essentially, such a reform allows secured creditors to liquidate the collateral for a higher amount, say \$75,000. Clearly, this reform expands the space of feasible contracts: it allows borrowers to borrow more if they desire to do so. If for some reason borrowers are worried about the strong secured creditor rights (creditor hold-up, liquidation bias) that accompany an increase in the liquidation value of the collateral, they can reduce the amount of pledged collateral (in this example, pledge two-thirds of what they had pledged before) and thus revert back to the old regime (bringing the liquidation value back to \$50,000). This essentially is the crux of the law and finance argument.

In summary, a reform that strengthens secured creditor rights would cause secured debt use to either increase or remain the same—secured debt would increase for those borrowers who were financially constrained and could not borrow before, and would stay the same for those borrowers who feel threatened by the reform as they have the status quo option, which is exercized by using less collateral for the same amount of secured debt.[5] It is important to note that such an expansion in contract space thus constitutes a Pareto improvement as it makes no borrower worse off but some borrowers clearly better off (by relaxing their financial constraints).

In an important paper, Lipsey and Lancaster (1956) formalize the general theory of second best. According to this theory, in a world with a large number of constraints or frictions, a piecemeal policy response that fixes or relaxes one of the constraints can actually reduce welfare rather than increase it. Put differently, in an economy with several sources of market imperfections, an attempt by regulators to fix a market failure may have an unintended effect of reducing welfare rather than increasing it. Although we do not take a stand on the welfare implication of the law, the main result of our paper, that firms

[5] A similar argument can also be made using the notion of signaling through collateral (Bester (1985)). In Bester's model, collateral is used as a signaling device, which helps sort borrowers into their respective types. According to that model, a reduction in the deadweight costs of collateral implies that firms need to post more collateral to achieve separation. Thus, an increase in the liquidation value caused by the strengthening of secured creditors rights would result in the use of more secured debt.

reduced secured debt relative to other forms of financing, suggests that the firms may have been worse off. Thus, policy recommendations require a careful evaluation of the situation.[6]

We illustrate the above intuition in a simple stylized model motivated by the features of the empirical setting analyzed. In this framework, we show that, whereas strengthening secured creditor rights increases secured debt capacity and lowers the cost of borrowing, it also exposes firms to the threat of being prematurely liquidated. Specifically, we argue that strengthening creditor rights generates two simultaneous effects, an *income* effect and a *substitution* effect. The income effect follows from the increase in liquidation value of the asset brought about by an improvement in creditor rights. The increase in liquidation value of collateral increases borrowing capacity and reduces the costs of borrowing. The substitution effect comes from the threat of premature liquidation. We show that, in situations in which firms value continuation, a standard secured debt contract may lead to inefficient liquidations. Moreover, firms cannot simply scale down the collateral to undo the effect or revert back to the old regime. Thus, firms contract out of secured debt to undo some of those inefficiencies. An important insight of this analysis is that strengthening of creditor rights does not necessarily expand the contract space, as is evident from a reduction in the level of secured debt.

Alternatively, the main arguments regarding how creditor rights affect the equilibrium level of financing can be broadly broken down into supply side arguments and demand side arguments. From creditors' perspective (supply side), protecting creditor rights increases creditors' willingness to supply capital.[7] This can alternately be viewed as an increase in the debt capacity of firms. From the borrowers' perspective (demand side), there are two forces at work. On the one hand, strong creditor rights (improved access to collateral) lower the deadweight cost of secured debt. This should increase the demand for secured debt. On the other hand, if there are limits to contracting, strong creditor rights may create a threat of premature liquidation. If borrowers value continuation then this may reduce their demand for secured debt.

The empirical strategy employed in this paper is essentially a DID methodology. We exploit cross-sectional variation in firms' ability to collateralize assets to generate variation in the treatment effect. It is natural to expect that firms with more collateralizable assets are also more affected by the secured transactions reforms than firms with less collateral. Because only tangible assets can be effectively collateralized in India,[8] we use the Rajan and Zingales (1995)

[6] In a paper that is in a similar vein to this paper, Aghion and Hermalin (1990) theoretically argue that legal restrictions on private contracts can in certain situations improve welfare.

[7] Another possibility is that strengthening of creditor rights may introduce the threat of a creditor run on the assets of the firm and this may reduce creditors willingness to supply credit. We explore this possibility in the empirical section.

[8] In the SARFAESI regime, security interests can only be created in identifiable assets. This means that security interests created in nonidentifiable assets, such as nonfixed assets or future inventory/receivables, would merely be executory contracts, and in bankruptcy these are treated no better than an unsecured claim. Because firms with large fixed assets (such as manufacturing

measure of asset tangibility to classify firms into treatment and control groups, with firms in the high asset tangibility group forming our treatment group whereas those in the low asset tangibility group constitute our control group.[9] We find that secured debt use declined significantly more for the highest tangibility group compared to the lowest tangibility group. We interpret this as a Coasian response by firms to undo some of the inefficiency caused by the strengthening of secured creditor rights. In addition, we document some heterogeneity in treatment effects. Examining our high tangibility and low tangibility groups, we find that the most aggressive reduction in secured debt comes from firms that have a higher cost of financial distress. We discuss these results in more detail in Section IV.A.1.

In addition to the use of secured debt, we also examine the effect of the secured transactions reform on other aspects of the balance sheet. We also document a reduction in total leverage. We interpret this result as suggesting that firms are not able to seamlessly switch from secured to unsecured debt. In addition, we find that firms respond to stronger secured creditor rights by hoarding more liquidity. We interpret this as a Coasian response by firms—cash helps to reduce the threat of premature liquidation caused by a strengthening of secured creditor rights as it helps firms avoid default. Because default is now more costly for firms, they tend to hoard more liquid reserves to undo some of the inefficiency that is created by stronger secured creditor rights. Furthermore, we document a shortening of corporate debt maturity, a reduction in total firm investments, and an increase in profitability. Finally, we examine the effect of SARFAESI on the leasing of assets and creditor concentration, and document a negative impact, although the statistical significance of these results is weak. A reduction in leasing is consistent with the view that both leasing and creditor concentration are substitutes for creditor rights. Once creditor rights are strengthened, there is less of a need for these activities.

This paper connects several strands of the literature. The law and finance literature pioneered by La Porta et al. (1998) is an obvious starting point. A fairly large literature establishes creditor rights as an important determinant of credit market development (La Porta et al. (1997, 1998), Levine (1998, 1999), Djankov, McLiesh, and Shleifer (2007), Beck, Demirgüç-Kunt, and Levine (2004), Haselmann, Pistor, and Vig (2010), Gropp, Scholz, and White (1997), Scott and Smith (1986)). Further, a general consensus is emerging that creditor rights promote financial development by relaxing financial constraints. This paper adds to this literature by arguing that strong creditor rights also impose costs on the borrower and that mandatory regulatory changes do not

firms) have a larger proportion of fixed assets, they are likely to have a larger pool of identifiable assets to use as collateral for secured loans. Consistent with this, we find that firms with a large pool of fixed assets have larger amounts of secured loans. An alternate economic justification for this measure can also be motivated by Myers and Rajan (1998), who argue that liquid assets are also easy to expropriate, and thus generate relatively lower values in liquidations.

[9] We have conducted our analysis by classifying firms into treatment and control groups based on their pretreatment level of secured debt. The results are very similar and can be obtained from the author upon request.

necessarily expand the contract space as suggested by the law and finance literature.[10]

This paper also adds to the recent literature that examines the effect of legal institutions on financial contracts in cross-country settings. Gianetti (2003) finds that stronger creditor rights are associated not only with higher leverage but also with greater availability of long-term debt. In another paper, Qian and Strahan (2007) explore the relationship between private contracts and creditor rights across different countries. They report that, on average, firms in countries with stronger secured creditor rights have longer-maturity loans and more secured debt. Acharya, John, and Sundaram (2011) analyze the effect of bankruptcy codes on the capital structures of U.S. and U.K. firms. They find that the difference in leverage ratios between equity-friendly and debt-friendly regimes is a decreasing function of the liquidation value of the asset. Davydenko and Franks (2008) analyze recovery rates across the United Kingdom, France, and Germany and conclude that contracts adapt to changes in bankruptcy codes and laws. Private contracts are further reported to reflect variations in legal origin and creditor rights, among other things. These papers, however, exploit cross-sectional variation in creditor rights, so whereas these papers are extremely informative about the relationship being investigated, omitted variables are a valid concern.

This paper further addresses the growing empirical literature that examines the effects of collateral and liquidation value on financial contracts, as the passage of the secured transactions reform can be construed as a perturbation to the liquidation value of the assets.[11] Benmelech, Garmaise, and Moskowitz (2005) analyze debt maturity as a function of "asset redeployability." They find that higher asset redeployability is associated with longer maturity and larger loans, but they find no effect on leverage. In important empirical work on financially distressed firms, Alderson and Betker (1995) report that firms facing high liquidation costs choose capital structures in such a way that financial distress becomes less likely. Asquith, Gertner, and Scharfstein (1994) document that debt structure affects the restructuring of financially distressed firms. Our paper also speaks to a small but growing empirical literature on debt structure of firms (see, for example, Rauh and Sufi (2010) and Erel et al. (2009)).

Finally, this paper contributes to two widely contested debates in the bankruptcy literature. The first debate concerns the merits of Chapter 11 and Chapter 7. Chapter 11 is criticized on the grounds that it leads to excessive continuation, whereas Chapter 7 is thought to lead to inefficient liquidations

[10] Fan and White (2003), Acharya, Amihud, and Litov (2011), Acharya and Subramanian (2009), and Lilienfeld-Toal, Mookherjee, and Visaria (2010) are examples of recent papers that suggest there might be a cost associated with strong creditor rights.

[11] Most of the literature is built on the foundations of incomplete contracts. For example, Aghion and Bolton (1992), Dewatripont and Tirole (1994), Hart and Moore (1999), Hart (2001), Bolton and Scharfstein (1990), Rajan and Winton (1995), Bolton and Scharfstein (1996), Shleifer and Vishny (1992), Williamson (1988), Diamond (1991, 1993), and Berglof and von Thadden (1994) are the important papers in this area. See Hart (2001) for a complete review on the financial contracting literature.

of healthy firms. Because the SARFAESI Act can be construed as a move from a pro-debtor (Chapter 11) to a pro-creditor (Chapter 7) regime, the paper contributes to this literature by documenting some of the costs of stronger creditor rights. The second debate focuses on the justifications for the current mandatory rules in the U.S. bankruptcy code (see Rasmussen (1992), Schwartz (1997), and Schwarcz (1999) for more details). Some scholars criticize mandatory rules (i.e., rules that parties cannot contract around) on the grounds that these rules are not likely to be optimal for all parties and that the freedom to contract to suit individual requirements is likely to benefit more parties. However, mandatory rules are justified by arguing that, whereas theoretically appealing, freedom to contract is difficult to implement in practice, especially as debtors are likely to have many creditors, which creates ex post inefficiencies.

The rest of the paper is organized as follows. Section I provides a brief overview of the legal infrastructure in India. Section II describes the model. Section III details the data and describes the empirical methodology. Section IV discusses empirical results. Finally, Section V concludes.

I. Legal Reforms in India

Although India ranks quite high in terms of the LLSV creditor rights index and attains the maximum score of 4, the enforcement of creditor rights has been seen as a major impediment to lending in India. Historically, the judicial process was extremely rigid, marked by bureaucratic delays, and it took a long time before creditors could access collateral. In the event of default, a civil suit had to be filed with the civil courts, which in turn had to follow a lengthy Civil Procedure Code. Detailed guidelines specified how the trial had to be conducted. Furthermore, provisions for appeals on any interim as well as final orders rendered the entire process extremely vulnerable to delays.[12] Consequently, a large amount of bank funds was tied up in nonperforming assets (NPAs), the value of which depreciated with the passage of time.

In an attempt to remove the bottlenecks in the legal process, the Indian government enacted two important reforms that aimed at strengthening creditor rights: (1) The Debt Recovery Tribunals Act of 1993 (DRT Act), and (2) the SARFAESI Act.

Under the DRT Act, specialized tribunals were established by the government for the recovery of loans by banks and financial institutions. These tribunals were not required to follow the Civil Procedure Code and were granted considerable flexibility to set up their own procedures for speedy recovery on defaulted loans. Visaria (2009) provides a detailed discussion of this Act. She finds that the establishment of these tribunals led to a significant reduction in both delinquency rates and the cost of loans.

The SARFAESI Act ushered in a new era of creditor rights by allowing secured creditors to bypass the lengthy court process and seize the assets of the

[12] Liquidation proceedings against companies registered under the Companies Act of 1956 were made even more tedious owing to the bureaucracy associated with the sale of assets.

defaulting firm. The SARFEASI Act was retroactive, that is, it applied to both old as well as new contracts. Further, the Act applied to secured loans and not unsecured loans. With the passage of the SARFAESI Act, banks and financial institutions could liquidate secured assets of a firm that defaulted on payments for more than 6 months by giving a notice of 60 days.[13] The Act allowed for recovery through securitization, asset reconstruction, and enforcement of security interests without court intervention.

A. Pre-SARFAESI Creditor Rights

Before the passage of the SARFAESI Act, secured creditors had no power to claim an asset outside of court/tribunal proceedings. According to Kang and Nayar (2003), the length of liquidation or rehabilitation proceedings under prior laws was typically 10 to 15 years. Further, workers often misused their veto power to block reorganization plans that could threaten jobs, further delaying the proceedings. As a result, assets would often be misappropriated, transferred, or just devalued over the course of lengthy proceedings, leading to significantly lower secured credit recovery values than would likely have been achieved through a swifter asset recovery process.

In comparison to developed countries like the United States, United Kingdom, France, and Germany, secured creditors in India had relatively weaker protections. The United Kingdom and most other common law countries, as well as Germany, generally have no automatic stay (La Porta et al. (1998)), thus allowing secured creditors to seize and liquidate assets in which they have security interests without much delay. In contrast, France and some civil law countries are often likely to include automatic stays in bankruptcy proceedings. The United States similarly includes automatic stays in bankruptcy proceedings. Even so, strong remedial rights typically mitigate weaker creditor protections in these countries (La Porta et al. (1998)). Secured creditors in the United States are permitted to foreclose or seize title to security when debtors default. A stay on assets is implemented once bankruptcy proceedings have been initiated.[14] Before the SARFAESI Act, however, Indian law actually prevented creditors from seizing security at any time—whether before or after insolvency proceedings—without a tribunal order. Recovery of security interests was thus effectively stayed, pending the resolution of these tribunal proceedings, by the lack of extra-proceeding mechanisms.

The objective of creditor rights varies from country to country. For instance, in the United Kingdom, the primary objective is the repayment of creditor claims (pro-creditor regime), whereas in the United States the objective is to maintain the business as a going concern (pro-debtor regime). In France, the

[13] It is important to note that the SARFAESI Act only applies to banks and defined financial institutions, but because most lending in India is provided by banks, in practice, this distinction is minimal.

[14] In the United States, state property law governs security interests, whereas bankruptcy law is federal in nature.

objective is to safeguard workers' jobs and maintain business operations (White (1996)). Before the passage of the SARFAESI Act, the legal regime in India had the flavor of a very pro-debtor regime, closer to France than the United States, driven primarily by the objectives of keeping the firm as an ongoing concern and protecting the interests of workers. These objectives were motivated largely by political economy concerns, as massive layoffs could have an adverse effect on electoral outcomes.

B. Post-SARFAESI Creditor Rights

The SARFAESI Act brought an important change to the legal system in India—a transition from a pro-debtor regime to a pro-creditor regime—by increasing the rights of secured creditors. More specifically, SARFAESI did little to change property rights in security, but instead changed the manner in which security interests were enforced. After providing 60 days' notice to debtors demanding that they meet their obligation, secured creditors were now entitled to seize the security if the debtor failed to meet the demand. Although SARFAESI does afford an appellate venue, generally such appeals cannot occur until after the property is seized, after which a debtor can file an application against such measures. An inquiry would then proceed before the Debt Recovery Tribunal with a secondary appellate level, the Appellate Tribunal, also available. This process is, therefore, rather punitive on debtors who generally must wait until after seizure to appeal such an action. Moreover, if the borrowers were to seek an injunction, they could only do so after depositing 75% of the defaulted amount with a debt recovery tribunal.

Under the SARFAESI regime, secured creditors have the right to take over management of the secured assets or even the business itself and the secured creditor can sell off the secured assets to recover the obligation. In effect, therefore, the appointed manager in these types of situations serves as a custodian over the assets with the primary obligation of managing the assets, unless a transfer of the assets is used to recover the value of the secured assets.[15] In form, the provision is somewhere between debtor-friendly regimes that allow management to stay in control of the firm such as the United States, and more punitive regimes in which management is nearly always removed as is common in the United Kingdom because the Indian regime does not automatically remove management in insolvency. In practice, however, the Indian regime is strongly creditor friendly in that it permits creditors to decide whether to leave management in place or whether to take over management of the assets.

Priority rights in insolvency were also mostly unaffected by SARFAESI. Just as was the case before SARFAESI, under Indian insolvency laws, secured creditors share top priority pari passu with workmen's dues. Government dues and other preferential claims then follow (Umarji (2004)). The difference, however, is that secured creditors can seize the security and sell such assets, provided

[15] See Batra (2003) and Umarji (2004) for more details on the SARFAESI Act.

that the creditor distributes proceeds for workmen's dues pursuant to the requirements of the Companies Act.

Although numerous countries give some form of priority to government and workers' claims, secured creditors in India generally have weaker priority than secured creditors in most developed countries. Although there is some deviation in the United States, secured creditors are still technically superior in rights there. France is probably the closest parallel, where the bankruptcy judge appoints an official to represent the state's interest and secured creditors have little to say about how the assets are used, either in reorganization or liquidation (White (1996)). In such situations, it is conceivable, if not likely, that workers are de facto elevated to similar priority as secured creditors, even if workers' dues do not technically share top priority.

Another pre-SARFAESI rule preserved after implementation of the law is the exclusion of cram-down provisions that would make compromise binding without approval of the requisite block of creditors (Kang and Nayar (2003)). Instead, any restructuring plans remain limited to mergers and acquisitions or voluntary compromise approved by three-quarters of all creditors by value. Similarly, when assets are used for joint financing or if assets secure the debt of multiple secured creditors, no single secured creditor is permitted to enforce the security without the agreement of secured creditors representing three-fourths of the security by value.[16] In such a situation, the agreement by three-fourths of the creditors by value is binding on all of the secured creditors.[17]

To summarize, SARFAESI provides additional measures to enforce security interests. Pre-SARFAESI, the burdensome enforcement process sometimes permitted the erosion of secured creditors rights. Post-SARFAESI, secured creditors can conceivably better enforce their property rights by promptly seizing assets before such rights are eroded through insolvency proceedings. The SARFAESI Act has shifted the burden of proof to the debtor. Before SARFAESI, the lender would have to go through an elaborate legal process trying to recover the dues. In the interim the firm continued to operate. With the passage of the SARFAESI Act, all that a lender had to do was prove that there was a default on the loan. After that they could begin the liquidation process. With the changes implemented by SARFAESI, Indian creditor protections have significantly improved from what were among the weakest on a comparative basis to the stronger end of the spectrum.

Some of the major benefits of the SARFAESI Act as intended by the legislators are as follows. First, the law was intended to reduce the NPAs of banks and financial institutions. Second, a sound secured transactions law was considered important for attracting funds from foreign creditors, thus promoting trade and growth. Third, a creditor-friendly system was considered essential for the promotion of secured credit in India, which in turn would lead to economic

[16] See Batra (2003).

[17] Section 13(9) of the Act stipulated that, for secured loans with multiple creditors, an agreement among 75% of the creditors (by value) is required for SARFAESI to be invoked. This clause aimed to avoid inefficient liquidations generated by potential creditor runs.

growth (Umarji (2004)). According to M.R. Umarji, Chief Architect of the SARFAESI Act,

> Establishment of a legal regime that promotes secured credit not only aids in the cultivation and growth of individual business, but also can have a positive effect on the economic prosperity of the State.

As for most laws, it is difficult to pin down the exact event date for our analysis. The official date of the Act is June 21, 2002. However, discussion in the press started as early as 1999. Due to rising concerns about the NPAs, a high-powered committee (Andhyarjuna Committee), consisting of officials from the Reserve Bank of India, Ministry of Finance, Ministry of Law, and ICICI Bank, was set up in February 1999 to formulate recommendations for the legal framework of the banking system. In March 2000, the panel submitted reports on the legal reforms, specifically stating the need for a law that strengthens the rights of banks and financial institutions by allowing them to seize assets of defaulting firms without court intervention. Definitive signs along this direction emerged between November 2000, after the panel met to finalize the draft for the new bill, and June 2001, when legislators met to discuss the panel's recommendations and finalize details of the foreclosure law. The Act was first promulgated as an ordinance and later converted into an act. The effective date of the Act was the date of the First Ordinance, that is, June 21, 2002.

There is plenty of anecdotal evidence on the importance of this law. A flood of litigation suits immediately followed the passage of the Act. Borrowers challenged the constitutional validity of the SARFAESI Act and termed it "draconian." Further, corporate lobby groups expressed concerns about strong creditor rights. They argued that such a law would give banks and financial institutions excessive powers that they would abuse. For example, it was alleged that banks would falsely classify accounts as NPAs and then invoke SARFAESI. It was also argued that the law was unfair because it gave borrowers practically no right to appeal. The contention was that, if borrowers had resources to deposit the stipulated amount (75% of the total amount), they would not have defaulted in the first place.[18]

Recent empirical evidence also suggests that this Act had an effect. Visaria (2009) documents a positive stock price reaction for banks as a result of the Act.[19] Data on recovery and NPAs suggests that the law had a positive impact. As can be seen from Figure 1, the law led to a reduction in net nonperforming assets of banks (as a fraction of total outstanding loans), where net NPA

[18] In its landmark judgement on the Mardia Chemicals v. Union of India case on April 8, 2004, the Supreme Court upheld the constitutional validity of the law with the exception of one provision that required borrowers to deposit 75% of the claim amount to file an appeal against the action of the bank.

[19] In several interviews conducted with different banks, it was mentioned that, after the SARFAESI Act was enacted, banks started to receive a lot of requests from entrepreneurs to unsecure their personal assets. A sample of hand-collected data shows that there is a reduction in the use of personal assets as security for loans.

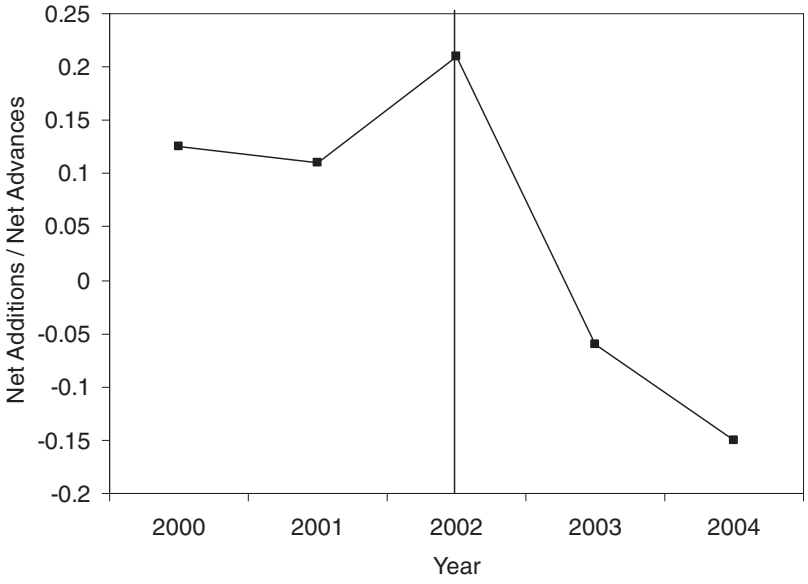

Figure 1. Net nonperforming assets additions to net advances. We plot net additions in nonperforming assets (NPAs) to total value of outstanding loans (advances), where net NPA additions is defined as NPA additions less NPA recovery. On the y-axis net advances refers to total loans minus provisioning done on nonperforming assets. Source: Trends and Progress Report, Reserve Bank of India.

is defined as the difference between NPA additions and NPA recovery.[20] In the 2002–2003 report of the Reserve Bank of India on Trend and Progress of Banking India, it is noted that:

> NPAs declined sharply in 2002-03, reflecting, inter alia, the salutary impact of earlier measures toward NPA reduction and the enactment of the SARFAESI Act ensuring prompter recovery without intervention of court or tribunal. The progress under this Act has been significant, as evidenced by the fact that during 2002-03, reductions outpaced additions, especially for PSBs and reflected in an overall reduction of nonperforming loans to 9.4 per cent of gross advances from 14.0 per cent in 1999-2000.

Summing up, the evidence, both anecdotal as well as statistical, indicates that the SARFAESI Act dramatically increased the power of secured creditors. At the same time, commentators were puzzled about the slow credit growth in the economy (Chakravarty (2003)). Although the Act was intended to promote secured lending in India, it led to a movement away from secured debt.

[20] According to Djankov and McLiesh (2006), the time to recover collateral in India decreased from 10 years to 6 months in some cases due to the enactment of a reform that made enforcing security rights significantly easier.

Borrowers clearly understood the law and felt threatened by it. It is this tension between secured creditors and borrowers that we investigate in this paper.

II. Theoretical Framework

We present a simple stylized model of secured debt that is motivated by India's institutional environment. The objectives of this exercise are to (1) organize the main theoretical arguments, and (2) use the model to guide our empirical analysis. The model borrows features from the Hart and Moore (1999) and Bolton and Scharfstein (1990) setup and is reminiscent of the theory of second best put forth by Lipsey and Lancaster (1956), who state that, in an economy with several frictions, an attempt to fix one friction can reduce welfare rather than increase it.

A. Model Setup

Consider a manager-owned firm with no wealth but a project opportunity. The project requires an initial investment of F at date 0, which has to be raised in a competitive financial market, and generates cash flows $\tilde{C}_1$ and $\tilde{C}_2$ at dates 1 and 2, respectively. More precisely, the cash flows $\tilde{C}_1$ and $\tilde{C}_2$ are stochastic and i.i.d.: with probability θ the project generates cash flow equal to C and with probability $1-\theta$ it generates no cash flow. Let C_2 denote the expected value of the second-period cash flow. Although the investment is contractible, cash flows are nonverifiable. Let l_1 and l_2 denote the date 1 and date 2 liquidation values of the firm (in excess of cash flows), where $l_1 > l_2$ captures depreciation of assets over time. For simplicity, we do not allow for partial liquidation of the firm. The manager earns a noncontractible and nontransferable private benefit b if the firm continues to period 2, that is, if the firm is not liquidated in period 1. We further assume that investors are risk neutral and we normalize the risk neutral interest rate to zero. The time line is shown in Figure 2.

We focus this discussion on the trade-off between secured and unsecured debt and we assume that debt cannot be renegotiated. The debt contract is specified by a contractual repayment obligation R at date t=1. If the payment R is made, then the firm is allowed to continue to period 2, in which case the manager also earns some noncontractible private benefits ("perquisites") b. A default on the payment R results in a transfer of control rights to the creditors, who can then seek legal consent to liquidate the firm. The actual liquidation proceeds to the financier are a function of the legal regime and the nature of the financial contract that has been written between the firm and financiers.

The main distinguishing feature of the two debt instruments—secured debt and unsecured debt—relates to the liquidation proceeds obtained in the event of default. Secured creditors can access the pledged security outside of the bankruptcy process whereas unsecured creditors do not have such access. Firm liquidation by creditors involves deadweight costs and we assume that liquidation proceeds to creditors—presuming no judicial delay—are given by $\eta \cdot l_1$ and $\eta \cdot l_2$, with $\eta \in \{\eta_s, \eta_{us}\}$, where η_s and η_{us} are the corresponding values of

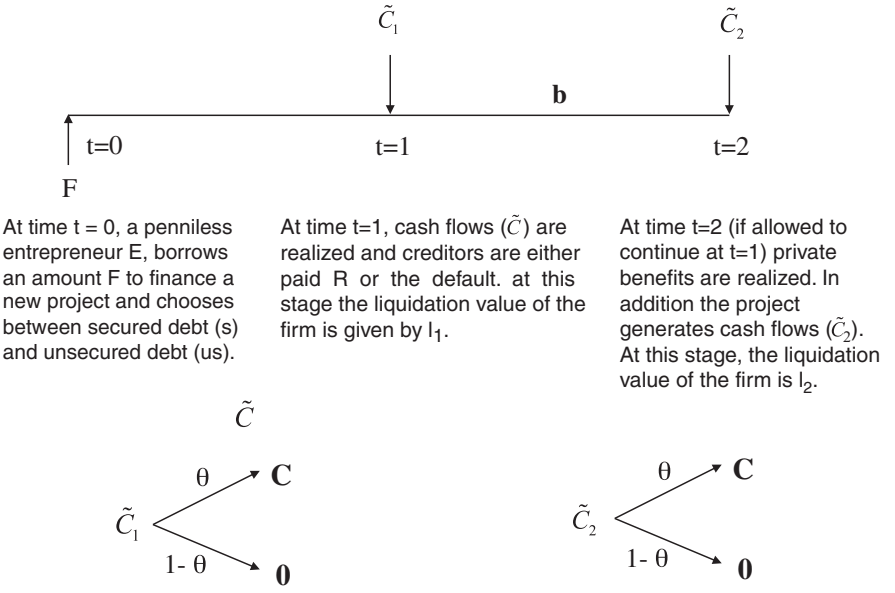

Figure 2. Time line.

η for secured debt and unsecured debt, respectively. We further assume that $1 \geq \eta_s > \eta_{us} \geq 0$, that is, liquidation proceeds (recovery rates) are higher with secured debt. This assumption can be justified by the fact that assets pledged to secured creditors are shielded from the bankruptcy process and thus can be liquidated faster. In addition, secured creditors are senior to other claimants (labor, taxes, etc.), whereas unsecured creditors have the same priority.[21] For simplicity, we normalize $\eta_s = 1$ and $\eta_{us} = \beta$.

As mentioned in Section I, in the pre-SARFAESI regime, access to collateral by creditors was delayed by lengthy court proceedings. We model this as follows. In the prereform regime, there is a one-period delay between the time when creditors initiate the liquidation process and the time they are able to liquidate the firm, during which the assets depreciate in value.[22] So, if the firm defaults at date 1, creditors seek legal consent to liquidate the firm at date 1, and consent is granted at date 2. In the interim, the firm partially continues its operations. We assume that the firm does not produce period 2 cash flows if liquidation is initiated by the creditors at date 1, whereas the manager continues to earn a private benefit b from continuing. The SARFAESI Act allowed secured creditors to seize and liquidate the pledged collateral immediately. The

[21] Empirical evidence supports this assumption (Franks and Sussman (2005), Davydenko and Franks (2008)). This assumption, however, is not critical. It is made merely to break the tie between secured and unsecured debt in the pre-SARFAESI regime (to be seen later).

[22] In the pre-SARFAESI regime, liquidation proceeds for liquidation initiated by creditors—secured and unsecured—at date 2 are zero, that is, after the second period, the asset/technology is assumed to become obsolete.

passage of SARFAESI, however, had no effect on unsecured creditors—there continues to be a one-period lag between the time the liquidation process is initiated and the time creditors are granted the legal right to access the collateral. The liquidation proceeds to different creditors (secured and unsecured) for liquidation under different legal regimes are summarized below:

	Pre-SARFAESI		Post-SARFAESI	
Liquidation Initiation:	$t=1$	$t=2$	$t=1$	$t=2$
Secured Debt ($\eta = \eta_s = 1$)	l_2	0	l_1	l_2
Unsecured Debt ($\eta = \eta_{us} = \beta$)	$\beta \times l_2$	0	$\beta \times l_2$	0

We now make the following additional assumptions:

ASSUMPTION 1: $\theta C_2 + \theta l_2 \geq F > l_1$.

Assumption 1 nests two separate assumptions. First, the condition $F > l_1 > l_2$ implies that one cannot raise F by simply pledging the period 2 liquidation value, thus ruling out long-term contracts.[23] Second, this assumption ensures that firms will not strategically default. To see this, the truth-telling constraint of the entrepreneur requires that $C - R + b + l_2 + C_2 \geq C + b$. This implies $R \leq C_2 + l_2$. Because credit markets are competitive, the IR constraint of the lender implies that $R = \frac{F-(1-\theta)\eta l_2}{\theta}$, which is true for all $\eta \in [0, 1]$. Combining the IC and IR constraints gives us the left hand side inequality of Assumption 1: $\theta C_2 + \theta l_2 \geq F$.

ASSUMPTION 2: $b + \beta l_2 > l_1$.

Assumption 2 states that private benefits are sufficiently large that continuation is efficient.

B. The Choice between Secured and Unsecured Debt

We now analyze the choice between secured and unsecured debt. It is worth highlighting again the mandatory nature of the SARFAESI Act, which implies that firms cannot opt out of SARFAESI. This brings us to our first proposition.

PROPOSITION 1: *In the pre-SARFAESI regime, secured debt is an optimal contract.*

Proof 1: Let Π_s^{pre} and Π_{us}^{pre} denote firm profits with secured and unsecured debt, respectively, in the pre-SARFAESI regime. Clearly Assumption 1 rules out strategic default by firms for both secured and unsecured debt.

Consider first the case of secured debt. Then $\Pi_s^{\text{pre}} = \theta(C - R + C_2 + l_2) + b$. Because credit markets are competitive, the lender IR constraint binds and

[23] Because cash flows are nonverifiable, period 2 cash flows cannot be pledged.

satisfies the following equality: $\theta R + (1-\theta)l_2 = F$. Substituting yields $\Pi_s^{\text{pre}} = \theta C + \theta C_2 + l_2 + b - F$.

Now, consider the case of unsecured debt. Then Π_{us}^{pre} is given by $\Pi_{us}^{\text{pre}} = \theta(C - R + C_2 + l_2) + b$. The lender IR constraint is now $\theta R + (1-\theta)\beta l_2 = F$. This yields $\Pi_{us}^{\text{pre}} = \theta C + \theta C_2 + l_2 + b - F - (1-\theta)(1-\beta)l_2$.

Thus, $\Pi_{us}^{\text{pre}} = \Pi_s^{\text{pre}} - (1-\theta)(1-\beta)l_2$. Because $(1-\theta)(1-\beta)l_2 > 0$, $\Pi_s^{\text{pre}} > \Pi_{us}^{\text{pre}}$. Q.E.D.

The suboptimality of unsecured debt results from the failure to renegotiate the deadweight cost in the liquidation process.

PROPOSITION 2: *Under the assumptions given above, in the post-SARFAESI regime, firms prefer to contract with unsecured debt.*

Proof 2: The passage of the SARFAESI Act does not affect unsecured debt, hence, $\Pi_{us}^{\text{post}} = \Pi_{us}^{\text{pre}}$. The secured lender IR constraint now reflects the removal of the one-period delay in access to collateral by secured creditors and satisfies $\theta R + (1-\theta)l_1 = F$. Firm profits with secured debt are given by $\Pi_s^{\text{post}} = \theta(C - R + C_2 + l_2 + b)$. Substituting the IR constraint yields $\Pi_s^{\text{post}} = \underbrace{\theta C + \theta C_2 + l_2 + b - F - (1-\theta)(1-\beta)l_2}_{\Pi_{us}^{\text{post}}} - \underbrace{(1-\theta)(b - l_1 + \beta l_2)}_{>0\text{: follows from Assumption 2}}$. Hence, $\Pi_s^{\text{post}} < \Pi_{us}^{\text{post}}$. Q.E.D.

In the post-SARFAESI regime, secured creditors can access the collateral immediately. This generates two effects—a benefit and a cost. The benefit comes from increased liquidation value in the case of default. Although ex post this increased liquidation value is enjoyed by the creditors, the firm captures this increased liquidation efficiency ex ante because capital markets are perfectly competitive. The cost is that entrepreneurs now face the threat of being prematurely liquidated at $t = 1$. Because the loss of private benefits outweighs the benefits of increased liquidation proceeds, firms prefer to contract out of secured debt.

We conclude this section with a few final comments. First, the model can easily be extended to incorporate partial liquidations under assumptions that, for example, private benefits are proportional to firm size. Second, as we noted earlier, the SARFAESI Act is mandatory and does not allow firms to opt out. Thus, the inefficiency cannot be contracted around simply by including a "no-liquidation" clause in the event of default. Such a contract would not be enforced—courts would grant liquidation rights to secured creditors who cannot commit not to liquidate. Third, the assumption on debt renegotiation is required to break the tie between secured and unsecured debt in the pre-SARFAESI regime—if debt renegotiation is allowed, firms will be indifferent between contracting with secured debt or unsecured debt at $t = 0$. Still, if there is a positive probability that renegotiation breaks down, firms will prefer secured debt in the pre-SARFAESI regime. Finally, it is important to note that the objective of the model is simply to "highlight a cost of contracting with secured debt." Clearly, secured debt capacity increases after the secured transactions

reform, which may allow certain borrowers who were credit rationed earlier to now obtain new financing.

III. Data and Empirical Methodology

A. Data

This research draws data from a number of sources. The primary database employed in the study is the Prowess database (Release 2.3), compiled and maintained by the Center for Monitoring the Indian Economy (CMIE), a leading private think-tank in India. This database is increasingly employed in the literature for firm-level analysis of the effect of foreign ownership on the performance of Indian firms (Chibber and Majumdar (1999)) and the performance of firms affiliated with diversified business groups (Khanna and Palepu (2000), Bertrand, Mehta, and Mullainathan (2002), and Gopalan, Nanda, and Seru (2007)).

Our sample contains financial information on over 20,000 firm-years, although sample size varies on account of missing information for some of the variables used in the analysis. The database contains detailed information on corporate debt structures, extracted from companies' profit and loss accounts and balance sheets. More specifically, the database contains information on total secured debt, unsecured debt, short-term debt, long-term debt, total debt, cash and bank balance of firms, number of creditors, and leasing, among other variables. Overall, it provides detailed information on large corporations in India, both listed and unlisted. A description of the variables employed in the study is provided in Table I and a breakdown of the sample by industries is shown in Table II. The data span the years 1997–2004.[24]

The data on banking variables are extracted from the Report on Trend and Progress of Banking in India (RBI, various years), a statutory yearly publication of RBI, which provides aggregate information on prudential and financial ratios. Information on macroeconomic variables comes from the *Handbook of Statistics on Indian Economy*, which provides time-series data on monetary and macroeconomic variables.

In addition, we use information on financial contracts that comes from one of the better-performing Indian public sector banks. We extract this information from loan files that the bank maintains for each borrower. With the help of some bank officers, we obtain general information on corporate accounts. We have information on the type of loans, for example, if it is a term loan or a working capital loan, and information on whether the loan is secured or unsecured. Further, in cases in which the loan is secured, we have information on both the type of security and its market value. In addition, we collect information on other accounts of the borrower within the same bank, the length of the relationship, industry affiliation, and credit rating of the borrower as assigned

[24] The Internet Appendix expands this data set to 2006. The Internet Appendix may be found in the online version of this article.

Table I
Data Variables List

In this table, we provide a description of all the variables used in the analysis.

Data Items	Variables	Source
Item 1	Total Assets (Book Value of Assets)	CMIE
Item 2	Plant and Machinery	CMIE
Item 3	Land and Building	CMIE
Item 4	Capital Work in Progress	CMIE
Item 5	Other Fixed Assets	CMIE
Item 6	Gross Fixed Assets	CMIE
Item 7	Net Fixed Assets	CMIE
Item 8	Cash and Bank Balance	CMIE
Item 9	Marketable Securities	CMIE
Item 10	Short-term Debt	CMIE
Item 11	Long-term Debt	CMIE
Item 12	Secured Debt (Secured by tangible assets)	CMIE
Item 13	Unsecured Debt (Not secured by tangible assets)	CMIE
Item 14	Total Debt = Item 10 + Item 11 or Item 12 + Item 13	Derived from CMIE
Item 15	Gross Fixed Assets = Item 2 + Item 3 + Item 4 + Item 5	Derived from CMIE
Item 16	Net Fixed Assets = Item 6 − Accumulated Depreciation	Derived from CMIE
Item 17	Specific Assets (SA) = Item 2 + Item 5	Derived from CMIE
Item 18	Non Specific Assets (NSA)=Item 3 + Item 8 + Item 9	Derived from CMIE
Item 19	$\text{Tangibility} = \frac{\text{Plant and Machinery+Other Fixed Assets}}{\text{Total Assets}}$	Derived from CMIE
Item 20	$\text{Tangibility2} = \frac{\text{Specific Assets}}{\text{Specific Assets + Nonspecific Assets}}$	Derived from CMIE
Item 21	$\text{Tobin's Q} = \frac{\text{Market Value of Assets}}{\text{Book Value of Assets}}$	Derived from CMIE

by the bank. The data span the 1999 to 2005 period and are at the quarterly frequency. From this large database on all corporate accounts of the bank, we query the larger accounts, that is, accounts that have total outstanding balances (across all facilities) of more than 50 million rupees (approximately 1.3 million dollars).

In Table III.A, we present means and standard deviations of the variables used in the analysis. We find significant variation in all the important variables. The average *Secured Debt/Assets* ratio of all firms is 27.9%, with a standard deviation of 17.5%. The average *Debt/Assets* ratio is 34.5%, with a standard deviation of 18.2%. The average size of the firm, as measured by total assets, is 197.6 crore rupees (approximately 45 million dollars) and the median is 36 crore rupees (approximately 8 million dollars). The 99th percentile firm's size is approximately 630 million dollars, that is, 2,843 crore rupees. On average, listed firms are slightly larger than unlisted firms. Around three-fourths of the total debt is secured and about two-fifths of the debt is short term. Finally, profitability, as measured by *EBIT/Assets*, averages around 10%.

B. Identification Strategy

We examine the effect of the law on firms by employing the DID methodology. The DID methodology is ideally suited for establishing causal claims

Table II
Industries

In this table, we provide an industry-by-industry breakdown of our sample.

Industry Code	Industries	Number of Firms	Observations
1	Poultry and Meat	8	40
2	Agricultural Products	161	817
3	Minerals Products	82	389
4	Vegetable Oils	124	570
5	Processed Food and Tobacco	245	1,252
6	Textiles	550	3,000
7	Leather	37	188
8	Wood Products	18	121
9	Paper	138	734
10	Chemicals (includes drugs and pharmaceuticals)	570	3,186
11	Plastics	276	1,544
12	Cement (includes abrasives)	172	958
13	Iron and Steel	423	2,183
14	Engines and Material Handling Equipment	162	913
15	Wires and Cables	168	932
16	Consumer Electronics	280	1,404
17	Automobiles and Ancillaries	189	1,169
18	Misc Items	35	195
19	Construction	130	712
20	Power Generation	21	104
21	Services	591	2,847
22	Diversified	43	275
	Total	4,423	23,533

in a quasi-experimental setting similar to the one employed in this research. This methodology basically compares the effect of an event (legal change in this case) on groups affected by the law (henceforth, treated) with those that are unaffected (henceforth, control). For example, if we want to evaluate the effect of a particular policy change on some variable of interest (say, firms' use of secured debt), then we would calculate the use of secured debt after the law and subtract from it the use before the law. This difference will give us the effect of the law on the use of secured debt. However, other factors, both observable and unobservable, that potentially impact secured debt use may have changed as well. Thus, a control group is desirable to properly control for common economic shocks. We, therefore, compare the difference in the treated group with the difference in the control group. By differencing in this way, the DID strategy eliminates the bias that comes from changes other than the law that could have affected the treated group.

Because the legal reform happens at the country level and applies to all firms, we do not have any natural treatment and control groups for our analysis. However, because the reform does not affect all firms in the same manner, we can use this to construct our treatment and control groups. Essentially, firms that have more collateralizable assets (more tangible assets) are more likely to

Table III.A
Descriptive Statistics

This table reports summary statistics (mean, standard deviation, and number of observations) for variables used in the analysis. Debt is defined as short-term plus long-term debt. Secured debt is defined as any borrowing that is secured by a tangible asset. Short-term debt is any debt with maturity of less than 3 years. Assets refer to the book value of assets and are reported in 10 million rupees (1 US dollar is approximately 45 Indian rupees). EBIT is defined as earnings before interest and taxes. The sample period is 1997 to 2004. Source: CMIE (publishes detailed financial information on large Indian firms).

Variables	All Firms	Listed Firms	Unlisted Firms
Debt/Assets	0.345	0.351	0.336
	(0.182)	(0.178)	(0.189)
	23,533	13,427	10,106
Secured Debt/Assets	0.279	0.293	0.259
	(0.175)	(0.174)	(0.176)
	23,533	13,427	10,106
Long-term Debt/Assets	0.210	0.220	0.197
	(0.166)	(0.162)	(0.17)
	23,533	13,427	10,106
Secured Debt/Debt	0.787	0.808	0.758
	(0.241)	(0.218)	(0.267)
	23,533	13,427	10,106
Short-term Debt/Debt	0.436	0.419	0.459
	(0.295)	(0.281)	(0.312)
	23,533	13,427	10,106
Log(Assets)	3.755	4.089	3.311
	(1.542)	(1.5530)	(1.409)
	23,533	13,427	10,106
Total Assets	197.622	276.381	92.981
	(1,075.03)	(1,391.25)	(316.883)
	23,533	13,427	10,106
Log(EBIT)	1.237	1.577	0.785
	(1.832)	(1.858)	(1.695)
	20,006	11,403	8,603
Log(Sales)	3.525	3.780	3.181
	(1.811)	(1.819)	(1.741)
	23,226	13,331	9,895
EBIT/Assets	0.104	0.101	0.107
	(0.121)	(0.109)	(0.135)
	23,533	13,427	10,106
Number of Banks	2.652	2.923	2.066
	(2.381)	(2.6030)	(1.665)
	9,456	6,467	2,989
Cash and Bank Balance/Assets	0.034	0.030	0.040
	(0.053)	(0.045)	(0.0620)
	23,533	13,427	10,106

be affected by the reform than firms that have less assets to collateralize. We, therefore, exploit the pretreatment cross-sectional variation in the amount of asset tangibility, where asset tangibility is defined as the ratio of fixed assets to total assets (Rajan and Zingales (1995)), to classify firms into treatment

and control groups. Specifically, we divide our sample into terciles (top 33%, middle 33%, and the bottom 33%), based on their pretreatment measure of asset tangibility.[25] We define the highest tercile as the treated group and the lowest tercile as the control group.

The theoretical framework presented earlier provides us an important insight that we exploit for the purpose of identification. Essentially, on the one hand the law raises the liquidation value of the assets and increases the debt capacity of the firms (income effect), whereas on the other hand the law may introduce a liquidation bias (substitution effect). The important insight from the model is that these two effects are negatively correlated. Thus, if one observes a decrease in the equilibrium quantity of secured debt, one can conclude that the demand effect must outweigh the positive supply effect. Furthermore, the OLS estimate is downward biased, which means that our empirical results can be regarded as conservative estimates.

To evaluate the effect of the SARFAESI Act, we estimate the following regression specification using firm-level data:

$$y_{ijt} = \alpha_i + \gamma_t + \delta \times 1_{(E=1)} + \theta \times 1_{(A=H)} + \eta \times 1_{(E=1)} \times 1_{(A=H)} + \omega \times X_{ijt} + \varepsilon_{ijt}, \tag{1}$$

where i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest (*Debt/Assets* etc.); α_i and γ_t are firm and year fixed effects, respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one in years in which the law is in place (2002, 2003, and 2004), and zero otherwise (years before 2002); $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group (high tangibility group) and zero if it belongs to the control group (low tangibility group); X_{ijt} are control variables (e.g., profitability, Tobin's Q, etc.); and ϵ_{ijt} is the error term. The firm fixed effects control for time-invariant differences between the treated and the control group and the year fixed effects control for aggregate fluctuations. The variable of interest is η, which captures the DID effect.

Although the DID specification allows us to control for omitted variables that affect both the treatment and the control group in a similar manner, identification of the causal effect requires controlling for any systematic shocks to the treatment group that are correlated with the legal change, that is, controlling for other shocks that might be correlated with tangibility and the SARFAESI law. For example, it might be the case that investment opportunities of different industries changed around the same time and this is a concern because some industries have higher tangibility than other industries.[26]

We address such concerns in two ways. First, in addition to using the traditional Tobin's Q variable, we control for such shocks by augmenting our regression specification to include the interaction term $\beta_j \times \gamma_t$, where β_j is

[25] We use 3 years of pretreatment data to construct our measure. The results are robust to other classifications.

[26] It is important to note that omitted variables that are orthogonal to asset tangibility get differenced out and we thus only need to worry about omitted variables that are correlated with asset tangibility.

Table III.B
Descriptive Statistics

This table reports the pre-event and postevent results. The event here is the passage of the SARFAESI Act. This law was passed by the Parliament in 2002 and empowered secured creditors to seize and sell the assets of the defaulting firm without court intervention. The data come from CMIE, which publishes financial information of large corporations in India. The data span 1997 to 2004. Standard errors are reported in parentheses. ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively.

	Mean		Median		
Variables	Before	Difference	Before	Difference	Observations
Debt/Assets	0.353***	– 0.023***	0.352***	-0.028***	23,533
	(0.001)	(0.003)	(0.002)	(0.003)	
Secured Debt/Assets	0.289***	– 0.032***	0.276***	– 0.038***	23,533
	(0.001)	(0.002)	(0.002)	(0.003)	
Short-term Debt/Assets	0.133***	0.004**	0.118***	0.000	23,533
	(0.001)	(0.001)	(0.001)	(0.002)	
Long-term Debt/Assets	0.219***	– 0.027***	0.195***	– 0.032***	23,533
	(0.001)	(0.002)	(0.002)	(0.003)	
Secured Debt/Debt	0.799***	– 0.037***	0.878***	– 0.031***	23,533
	(0.002)	(0.003)	(0.002)	(0.004)	
Stort-term Debt/Debt	0.424***	0.037***	0.386***	0.047***	23,533
	(0.002)	(0.004)	(0.003)	(0.005)	
Interest Exp/Op Income	0.450***	– 0.235	0.434***	– 0.155***	23,285
	(0.148)	(0.252)	(0.008)	(0.014)	
Interest Exp/Assets	0.047***	– 0.013***	0.045***	– 0.014***	23,533
	0.000	0.000	0.000	0.000	
Interest Exp/Sales	0.143***	0.034	0.049***	– 0.018***	23,226
	(0.021)	(0.036)	0.000	(0.001)	
Number of Banks	2.649***	0.011	2***	0	9,456
	(0.03)	(0.05)	(0.55)	(0.96)	

the industry fixed effect. This is a nonparametric way of controlling for time-varying industry-specific shocks. As a result, we compare high tangibility firms with low tangibility firms within the same industry. Second, we further exploit cross-sectional heterogeneity in our treatment and control groups in what can be interpreted as a difference-in-difference-in-differences (DIDID) specification. We discuss this approach in more detail in Section IV.D. We double cluster all our standard errors at the firm and year levels (Petersen (2009) and Bertrand, Duflo, and Mullainathan (2004)).[27]

IV. Results

In Table III.B, we report the results from a simple "pre" and "post" analysis by taking simple time-averages before and after the event date. This time-collapsing of the data ensures that the standard errors are robust to

[27] The empirical strategy is similar in spirit to the identification strategy adopted in the Bekaert, Harvey, and Lundblud (2005) paper.

the Bertrand, Duflo, and Mullainathan (2004) critique. It can be seen that, on average, *Secured Debt/Assets* ratios fell by 3.2% (median 3.8%) whereas *Debt/Assets* ratios fell by 2.3% (median 2.8%). Further, *Secured Debt/Debt* ratios fell by about 3.7% (median 3.1%).

In Table III.C, we further divide our sample into tangibility terciles using the Rajan and Zingales (1995) definition. The first-tercile firms have the lowest tangibility, the second-tercile firms have the medium tangibility, and the third-tercile firms have the highest tangibility. It can be seen that third-tercile firms are most affected by the law, whereas firms in the first tercile are least affected (and in many cases unaffected). For example, *Secured Debt/Assets* decreased by 5.7% for the third-tercile group and basically remained unchanged for the first-tercile group. A similar pattern holds for *Debt/Assets* and *Long-term Debt/Assets* ratios. As expected, the second-tercile group has results that lie in between the other two tercile groups. For example, the reduction in *Secured Debt/Assets* ratios of second-tercile group firms is 3.2%, which is between 5.7% (third tercile) and 0.1% (first tercile).

A. Secured Debt

The SARFAESI Act allows for easier access to collateral. More specifically, the Act allows creditors to liquidate the firm in the event of default. Before this law, the existing legal infrastructure caused substantial delays during which the security/collateral depreciated in value. Before we begin a more formal analysis, we provide a graphical snapshot of our results. In Figure 3, we separately plot the de-meaned time series of *Secured Debt/Assets* ratios for both the high tangibility and the low tangibility groups.[28] The high tangibility group is the treated group, whereas the low tangibility group serves as a control group. It can be seen from Figure 3 that the ratios for the high tangibility and low tangibility firms moved roughly together before the legal change. After the legal change, the high tangibility firms reduced their use of secured debt. This is consistent with the predictions from the theoretical model in which an increase in the rights of secured creditors leads to less secured debt as it introduces a liquidation bias. In addition, in Figure 4 we plot the Epanechnikov kernel densities of *Secured Debt/Assets* for both the treatment and control groups before and after the law.[29] It can be seen that there is a leftward shift of the kernel density for the treatment group after the passage of SARFAESI, whereas there is no shift in the density of the control group post-SARFAESI. Further, this shift in the density for the treatment group is statistically significant because the Kolmogorov–Smirnov test for the equality of the distribution functions is rejected at the 1% level. These figures thus depict a reduction in the use of secured debt for the treatment group but no reduction for the control group.

[28] The de-meaning is done relative to each group cell.

[29] The band width reported indicates the half-width of the kernel. This represents the width of the density around each point. In STATA you have the option of specifying the bandwidth. Alternatively, you have the option of not specifying it, in which case STATA calculates the width that minimizes the mean integrated squared error.

Table III.C

Descriptive Statistics

This table reports the before/after results for the terciles. The terciles are formed based on the pretreatment levels of tangibility, where tangibility is defined as net fixed assets to total assets. The event here is the passage of the SARFAESI Act. This law was passed by the Parliament in 2002 and empowered secured creditors to seize and sell the assets of the defaulting firm without court intervention. Thus, "Before" refers to years before 2002 and "Difference" refers to the observed changes in the years 2002 to 2006. Standard errors are reported in parentheses. ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE (publishes detailed information on large Indian firms). Coverage: 1997 to 2006.

	Low Tangibility			Medium Tangibility			High Tangibility		
	Before	Difference	Observations	Before	Difference	Observations	Before	Difference	Observations
Debt/Assets	0.281***	0.003	8,112	0.362***	− 0.022***	7,719	0.416***	− 0.042***	7,702
	(0.002)	(0.004)		(0.002)	(0.004)		(0.002)	(0.004)	
Secured Debt/Assets	0.219***	− 0.001	8,112	0.298***	− 0.032***	7,719	0.351***	− 0.057***	7,702
	(0.002)	(0.004)		(0.002)	(0.004)		(0.002)	(0.004)	
Secured Debt/Debt	0.771***	− 0.019***	8,112	0.809***	− 0.037***	7,719	0.817***	− 0.053***	7,702
	(0.004)	(0.006)		(0.003)	(0.005)		(0.003)	(0.005)	
Long-term Debt/Assets	0.143***	− 0.002	8,112	0.219***	− 0.025***	7,719	0.296***	− 0.045***	7,702
	(0.002)	(0.003)		(0.002)	(0.004)		(0.002)	(0.004)	
Short-term Debt/Assets	0.137***	0.005*	8,112	0.143***	0.002	7,719	0.137***	0.005*	8,112
	(0.002)	(0.003)		(0.001)	(0.002)		(0.002)	(0.003)	
Short-term Debt/Debt	0.523***	0.012	8,112	0.425***	0.040***	7,719	0.323***	0.047***	7,702
	(0.005)	(0.008)		(0.004)	(0.006)		(0.003)	(0.006)	
Log(Assets)	3.487***	0.324***	8,112	3.662***	0.289***	7,719	3.819***	0.274***	7,702
	(0.021)	(0.035)		(0.021)	(0.036)		(0.022)	(0.039)	
EBIT/Assets	0.078***	− 0.014***	8,112	0.077***	− 0.007***	7,719	0.066***	0.010***	7,702
	(0.002)	(0.003)		(0.001)	(0.002)		(0.002)	(0.003)	
Log(EBIT)	0.872***	0.175***	6,993	1.260***	0.169***	6,630	1.379***	0.311***	6,383
	(0.027)	(0.046)		(0.027)	(0.046)		(0.028)	(0.048)	
Log(Sales)	3.207***	0.307***	7,941	3.475***	0.410***	7,650	3.495***	0.484***	7,635
	(0.026)	(0.044)		(0.024)	(0.041)		(0.025)	(0.044)	
Interest Exp/Assets	0.036***	− 0.008***	8,112	0.049***	− 0.012***	7,719	0.057***	− 0.018***	7,702
	0.000	(0.001)		0.000	(0.001)		0.000	(0.001)	
Interest Exp/Op Income	0.408*	− 0.367	7,965	0.537*	− 0.222	7,653	0.405	− 0.091	7,667
	(0.216)	(0.358)		(0.285)	(0.493)		(0.264)	(0.458)	
Number of Banks	2.823***	0.016	2,347	2.515***	− 0.133*	3,357	2.66***	0.136	3,752
	(0.067)	(0.115)		(0.045)	(0.078)		(0.048)	(0.084)	

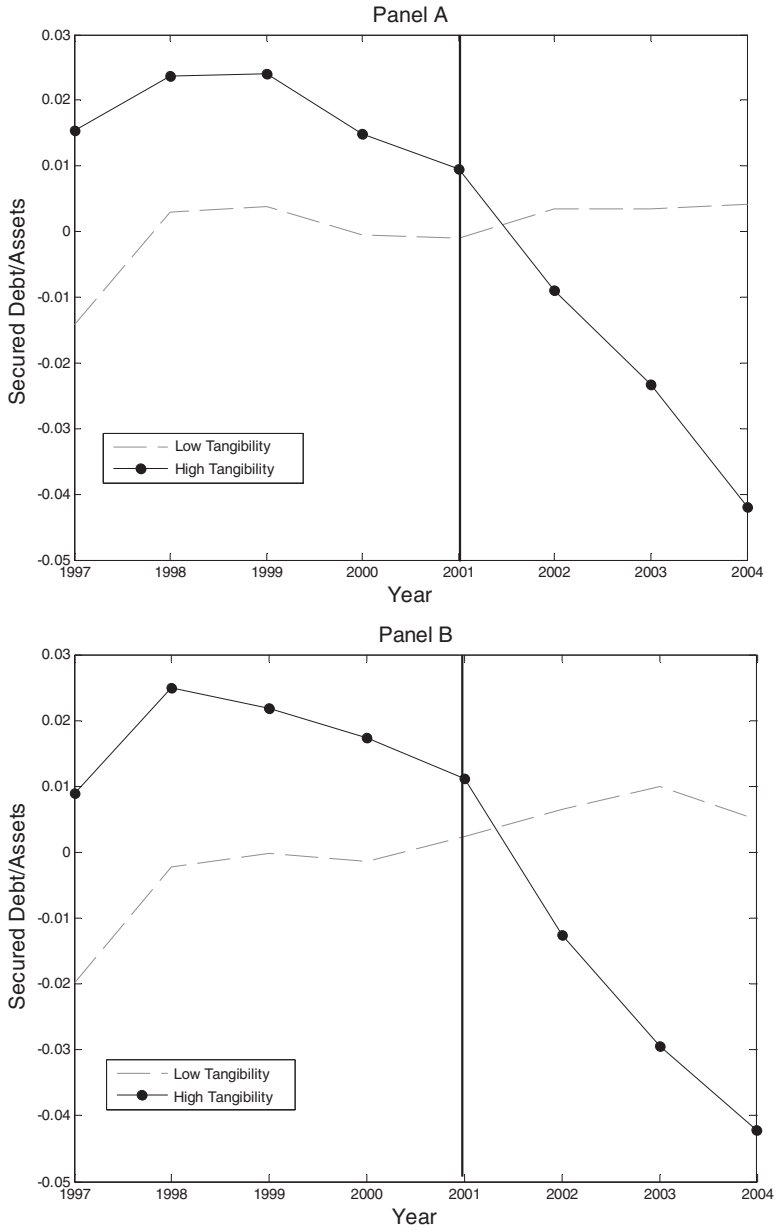

Figure 3. Secured debt to assets. Here, we plot the de-meaned values of the variable secured debt/assets for both the high tangibility and the low tangibility groups. In Panel A, we divide firms into quartiles based on pretreatment values of tangibility and plot the time series for the highest tangibility quartile and the lowest tangibility quartile. In Panel B, we repeat the exercise but group firms according to their pretreatment values of tangibility terciles, that is, we plot firms in the lowest tangibility tercile and firms in the highest tangibility tercile. Tangibility is defined as the ratio of net fixed assets to total assets. Source: CMIE database.

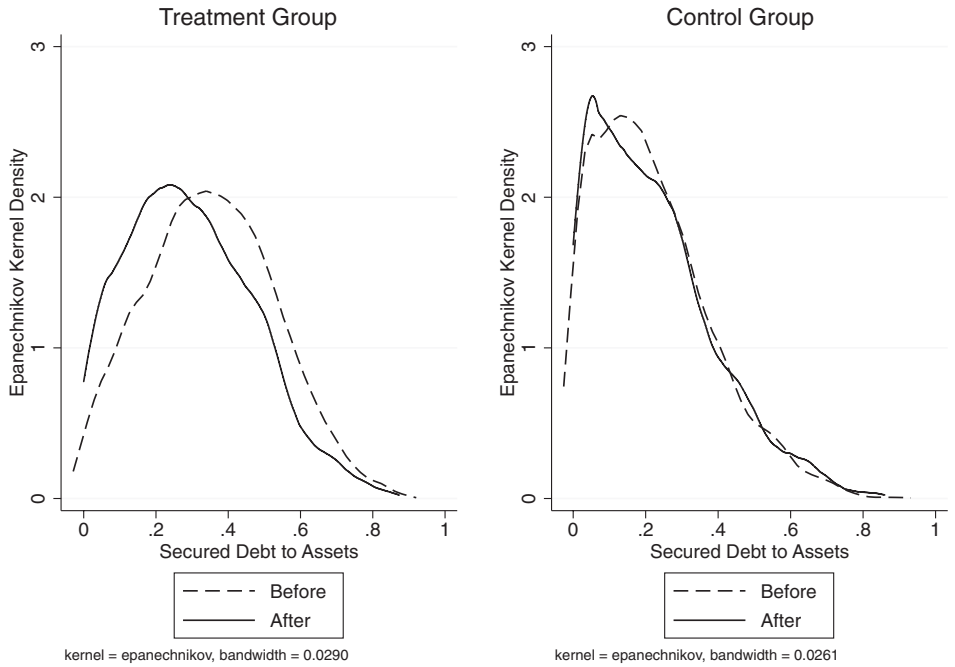

Figure 4. Secured debt to assets. This figure depicts the Epanechnikov kernel density of the ratio of secured debt to assets for both the high tangibility ("treatment") group and low tangibility ("control") group terciles. The bandwidth for the density estimation is selected using the plug-in formula of Sheather and Jones (1991). A Kolmogorov-Smirnov test for the equality of the distribution functions cannot be rejected at the 1% level for the control group and is clearly rejected for the treatment group, which depicts a marked reduction in the secured debt to assets ratio for the treatment group. Tangibility is defined as the ratio of net fixed assets to total assets. Source: CMIE database. Years spanned: 1997 to 2004.

The main identification strategy is best captured by Table IV. We divide firms (by industry) into three bins based on our measure of tangibility. We label the top 33% firms as high tangibility firms and the bottom 33% as low tangibility firms. The *After* variable refers to the 2002 to 2004 period and the *Before* variable refers to years before 2002. We next collapse the data into single data points (based on averages) both before and after. This results in two data points per firm, one for the pre-SARFAESI regime and one for the post-SARFAESI regime. In Panel A, we report the before-after results for the variable *Secured Debt/Assets*. As can be seen, *Secured Debt/Assets* declined 4.4% more for the high tangibility group as compared to the low tangibility group. In Panel B, the numerator is secured debt as before but the denominator is the pre-SARFAESI average asset value. This panel illustrates that the main result is driven by the variation in the numerator, that is, variation in secured debt use.[30] Finally,

[30] It should be noted that the results become stronger when we use the pre-SARFAESI average asset values. This is consistent with the view that SARFAESI had a negative effect on asset growth, something that we discuss in Section IV.E.

Table IV
Empirical Strategy

This table introduces the basic empirical strategy. We divide firms (by industry) into three bins based on a measure of tangibility, where tangibility is defined as the ratio of net fixed assets to total assets. We designate the top 33% firms (based on the measure of pretreatment tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. After refers to the period 2002 to 2004 and Before refers to years before 2002. We next collapse the data into single data points (based on averages) both before and after. This results in two data points per firm, one data point for the pre-SARFAESI regime and one for the post-SARFAESI regime. In Panel A, we report the before-after results for *Secured Debt*/*Assets*. In Panel B, the numerator is secured debt as before but the denominator is the pre-SARFAESI average asset value. In Panel C, the variable of interest *Secured Debt*/*Total Debt*. Standard errors are reported in parentheses. ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. The database is provided by CMIE, which publishes financials of large corporations in India. The data span the years 1997 to 2004.

	Before	After	Difference	No. of Observations
Panel A: Secured Debt to Assets				
High Tangibility	0.331	0.277	– 0.054***	7,661
	(0.002)	(0.004)	(0.004)	
Low Tangibility	0.240	0.230	– 0.010**	8,052
	(0.002)	(0.003)	(0.004)	
Difference			– 0.044***	
			(0.006)	
Panel B: Secured Debt to Assets				
High Tangibility	0.331	0.358	0.027***	7,661
	(0.003)	(0.004)	(0.005)	
Low Tangibility	0.241	0.367	0.126***	8,052
	(0.004)	(0.006)	(0.007)	
Difference			– 0.099***	
			(0.009)	
Panel C: Secured Debt to Debt				
High Tangibility	0.807	0.757	– 0.050***	7,661
	(0.003)	(0.005)	(0.006)	
Low Tangibility	0.785	0.757	– 0.028***	8,052
	(0.004)	(0.005)	(0.006)	
Difference			– 0.021***	
			(0.008)	

in Panel C, the variable of interest is the ratio of secured debt to total debt. It once again shows that the drop in the use of secured debt is larger for the treatment group as compared to our control group.

Next, we show that the patterns in Figure 3 are statistically robust to the application of standard regression analysis. In addition, we control for variables that are understood to affect firm debt structure. In Table V, we investigate

Table V

Effect of SARFAESI Act on Secured Debt

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. The dependent variable is secured debt to assets in columns 1 to 4 and secured debt to debt in columns 5 to 8. Here, i indexes firms, t indexes time, and j indexes industries; α_i and γ_t are firm and year fixed effect respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for the years 2002, 2003, or 2004 and zero otherwise; $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on the measure of pretreatment (average tangibility before 2001) tangibility. We define tangibility as net fixed assets to total assets. We designate the top 33% of firms (based on the measure of pretreatment tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are some firm level control variables, such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Secured Debt/Assets				Secured Debt/Debt			
Variables	1	2	3	4	5	6	7	8
AFTER*HIGH TANG DUM	−0.052***	−0.051***	−0.048***	−0.048***	−0.032***	−0.033***	−0.026***	−0.028***
	(0.010)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.009)
EBIT/Assets		−0.128***	−0.128***	−0.100***		−0.032*	−0.032*	−0.023
		(0.022)	(0.023)	(0.028)		(0.019)	(0.019)	(0.023)
Log(Sales)		−0.002	−0.001	0.000		0.017***	0.018***	0.015***
		(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.004)
Tobin's Q adjusted		0.015***	0.016***	0.018***		0.006	0.008*	0.009*
		(0.004)	(0.003)	(0.003)		(0.004)	(0.004)	(0.005)
AFTER*EBIT/Assets				−0.055*				−0.014
				(0.028)				(0.025)
AFTER*Log(Sales)				0.000				0.007***
				(0.001)				(0.002)
AFTER*Tobin's Q adjusted				−0.007				−0.004
				(0.005)				(0.007)
Number of Firms	2,983	2,948	2,948	2,948	2,983	2,948	2,948	2,948
Observations	15,814	15,310	15,310	15,310	15,814	15,310	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Adj. R^2 (within)	0.034	0.064	0.072	0.073	0.015	0.019	0.021	0.022

the impact of SARFAESI on the use of secured debt using the standard DID framework. To control for firm-level heterogeneity, we use firm fixed effects in all regressions. We also include year fixed effects to control for aggregate economic shocks. In column 1, we report the basic regression results. It can be seen that average *Secured Debt*/*Assets* ratios went down by 5.2% after the secured transactions law was passed. In column 2, we add additional controls for profitability, size, and Tobin's Q. The results remain unchanged. To further test the robustness of these results, we control for industry-specific shocks by including the interaction between industry and year fixed effects. This is a nonparametric way of controlling for any observed or unobserved industry-specific changes that may be correlated with tangibility. The point estimate for the effect of the law on *Secured Debt*/*Assets* remains roughly unchanged at 4.8%. Further, we repeat this analysis separately for listed and unlisted firms and find that the basic results remain unchanged. Finally, we rerun the analysis with interactions between *After* and our controls, as our treatment and control groups are not identical. The qualitative nature of our results remains unaffected. In conclusion, these results indicate that the SARFAESI Act, on average, led to a reduction in *Secured Debt*/*Assets* ratios of about 5.0%.

In columns 5 to 8 of Table V, we investigate the impact of SARFAESI using *Secured Debt*/*Debt* as the dependent variable. It can be seen from column 5 that, on average, *Secured Debt*/*Debt* declined by 3.2% in the basic specification. In column 6, we add additional controls for profitability, size, and Tobin's Q. The results remain unchanged at 3.3%. We further add the interaction between industry and year fixed effects to control for industry specific trends. The results remain fairly unchanged at 2.6%. All the results indicate that there is a reduction in the use of secured debt as a percentage of total debt and that the magnitude of this reduction is about 3.0%.

A.1. Exploring Cross-Sectional Heterogeneity

In the identification strategy detailed above, we compared the secured debt use of firms that have more tangible assets (treatment group) with that of firms that have less tangible assets (control group). In this section, we conduct additional tests to examine if there are heterogenous treatment effects.

A substantial body of empirical work investigates the determinants of firms' capital structure choices. Although there is still a lot of work to be done, some stylized facts have emerged.[31] Size seems to be positively correlated with leverage, whereas firm profitability is negatively correlated with leverage. Older and more mature firms seem to have higher leverage and firms with higher growth opportunities have lower leverage. Given these stylized facts, it is natural to expect that hardening of secured debt claims brought about by SARFAESI would generate similar cross-sectional effects. That is, we expect a bigger reduction in

[31] See Harris and Raviv (1991) and Roberts and Sufi (2009) for two excellent surveys on this topic.

secured debt for firms with higher growth opportunities, more profitable firms, and smaller and younger firms.[32]

To investigate these cross-sectional effects, we further interact the treatment dummy $1_{(A=H)}$ with the characteristics mentioned above (using their pretreatment values) and estimate the following regression specification:

$$y_{ijt} = \alpha_i + \gamma_t + \delta \times 1_{(E=1)} + \upsilon \times \bar{Z}_i + \theta \times 1_{(A=H)} + \beta_1 \times 1_{(E=1)} \times \bar{Z}_i + \beta_2 \times 1_{(E=1)} \times 1_{(A=H)} + \beta_3 \times 1_{(A=H)} \times \bar{Z}_i + \eta \times 1_{(E=1)} \times 1_{(A=H)} \times \bar{Z}_i + \omega \times X_{ijt} + \varepsilon_{ijt}.$$

As before, i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest, which in this case is the ratio of secured debt to total assets; α_i and γ_t are firm and year fixed effect, respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for years 2002, 2003, and 2004 and zero otherwise; $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the high tangibility group and zero otherwise; X_{it} are firm-level control variables such as profitability, Tobin's Q, and size; and ε_{it} is the error term. The variable $\bar{Z}_i$ is a continuous variable that proxies for the characteristics of interest (size, growth opportunities, profitability, and liquidity reserves) and is based on a 3-year average using the pretreatment years 1998, 1999, and 2000.[33] The variable of interest is η, which captures the DIDID effect. An advantage of this specification over the previous specification (DID) is that it allows us to control (nonparametrically) for any group-specific trends because it allows us to include group interacted with year fixed effects ($1_{(A=H)} \times \gamma_t$).

We report the results from our different specifications in Table VI. We find that, within our tangibility-defined treatment and control groups, younger firms are significantly more likely to reduce their secured debt use as compared to more mature firms (column 1, coefficient of 0.001). In terms of economic magnitudes, this implies that a one standard deviation reduction in firm age (20.25 years) leads to a 2.0% reduction in secured debt use. Age could proxy for the stability of cash flows. Alternatively, age may proxy for reputational capital in the spirit of Diamond (1989), which increases the pledgeable cash flows.

In a similar vein, we find that firms with higher growth opportunities (column 3), as proxied by Tobin's Q, are more likely to reduce their equilibrium level of secured debt. The coefficient on the interacted Tobin's Q variable is −0.021 and statistically significant. In terms of economic magnitudes, a one standard deviation increase in investment opportunities (0.56) leads to a 1.17% reduction in secured debt. This is consistent with the notion presented in Jensen and Meckling (1976) that firms with higher growth opportunities are potentially the ones that have higher asset substitution risk.

In column 5, we investigate the differential effect for large versus small firms and find that large firms are less likely to be affected by secured debt as compared to small firms, though this result is not statistically significant. This

[32] As discussed before, these implications also can be generated from our simple model.

[33] We use pretreatment measures of these variables because these variables themselves can get affected by the legal change.

Table VI

Exploring Cross-Sectional Heterogeneity

We interact the treatment dummy $1_{(A=H)}$ with the characteristics above (using their pretreatment values) and estimate the following regression specification: $y_{ijt} = \alpha_i + \gamma_{jt} + \delta \cdot 1_{(E=1)} + \upsilon \cdot \bar{Z}_i + \theta \cdot 1_{(A=H)} + \beta_1 \cdot 1_{(E=1)} \cdot \bar{Z}_i + \beta_2 \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \beta_3 \cdot 1_{(A=H)} \cdot \bar{Z}_i + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} \cdot \bar{Z}_i + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. The dependent variable is Secured Debt/Assets. Here, i indexes firms, t indexes time, j indexes industries, y_{ijt} is the dependent variable of interest, which in this case is the ratio of secured debt to total assets; α_i and γ_{jt} are firm and industry effects interacted with year fixed effects respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for years 2002, 2003, and 2004 and zero otherwise; $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the high tangibility group and zero otherwise; X_{it} are firm-level control variables such as profitability, Tobin's Q, and size; and ϵ_{it} is the error term. The variable $\bar{Z}_i$ is a continuous variable that proxies for the characteristics of interest (size (log(sales), growth opportunities (Tobin's Q), profitability (EBIT/Assets), age, and liquidity (cash/assets)) and is based on a 3-year average using the pretreatment years 1998, 1999, and 2000. The variable of interest is η, which captures the DIDID effect. Double-clustered standard errors are reported in parentheses (clustering done at company and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Secured Debt/Assets (DIDID Specification)											
Variables	1	2	3	4	5	6	7	8	9	10	11	12
AFTER*TANG DUM*AGE	0.001***	0.001***									0.001***	0.001***
	(0.000)	(0.000)									(0.000)	(0.000)
AFTER*TANG DUM*TOBIN			−0.021**	−0.021**							−0.024***	−0.025***
			(0.009)	(0.009)							(0.009)	(0.009)
AFTER*TANG DUM*SIZE					0.002	0.003					0.001	0.001
					(0.003)	(0.003)					(0.004)	(0.004)
AFTER*TANG DUM*CASH							1.069	1.046			0.914	0.893
							(0.813)	(0.810)			(0.841)	(0.838)
AFTER*TANG DUM*PROF									−0.133*	−0.129*	−0.156*	−0.153*
									(0.071)	(0.072)	(0.088)	(0.088)
Controls (X)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firms	2,946	2,946	2,938	2,938	2,932	2,932	2,948	2,948	2,948	2,948	2,920	2,920
Observations	15,303	15,303	15,290	15,290	15,278	15,278	15,310	15,310	15,310	15,310	15,251	15,251
HIGH TANG DUM*Year Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Adj. R^2 (within)	0.0746	0.0769	0.0737	0.076	0.0717	0.074	0.0722	0.0744	0.0772	0.0792	0.0829	0.085

is consistent with the notion that large firms are well diversified (see Rajan and Zingales (1995)) and thus have a lower probability of financial distress. In column 7, we explore the differential effect of liquidity as defined by the sum of liquid reserves (cash and bank balance). As with size, these results are not statistically significant.

Furthermore, in column 9 we examine the effect between low and high profitability firms and find that firms that have higher profitability reduced secured debt more compared to lower profitability firms (coefficient of −0.133). In terms of economic magnitude, a one standard deviation increase in profitability (0.09) leads to a 1.19% reduction in secured debt. The passage of SARFAESI increases the overall cost of contracting with secured debt and, as a result, profitable firms now use more internal reserves to reduce the amount of secured debt.

An obvious advantage of the specification is that it allows us to control for group specific trends because we can include $1_{(A=H)} \times \gamma_t$ fixed effects in our regression specification. In columns 2, 4, 6, 8, and 10, we find that the results are robust to the inclusion of these fixed effects. In columns 11 and 12, because some of these variables might be correlated, we run a "horse race" by including all these variables together. As can be seen, the results remain unaffected—the same variables (age, Tobin's Q, and profitability) retain their statistical and economic significance.

B. Total Debt

Although the main thrust of this paper focuses on the use of secured debt, the passage of the Act also allows us to examine the effect of SARFAESI on total debt. In this section, we investigate the impact of the SARFAESI Act on leverage. Following the previous literature, we define leverage as debt to assets, where debt is defined in one of the three ways. In the first definition, debt is the sum of long-term and short-term debt, whereas, in the second definition, debt simply stands for the total long-term debt of the firm. The third definition of debt includes cash as negative debt, that is, debt is defined by the sum of long-term debt and short-term debt minus cash. For assets, we use the book value of assets.

As before, we provide a graphical snapshot of our main results. In Figure 5, we plot de-meaned leverage for both the high and low tangibility groups. Leverage is defined as total debt (short-term and long-term) divided by total assets.[34] It can be seen that leverage for the two groups moved together before the legal change; however, high tangibility firms reduce their leverage after the regulatory change. In addition, in Figure 6 we plot the Epanechnikov kernel densities of *Total Debt / Assets* ratios for both the treatment and control groups before and after the law. It can be seen that there is a leftward shift of the kernel density for the treatment group after the passage of SARFAESI, whereas there is no such shift for the control group. Further, this shift in the density for the treatment group is statistically significant because the Kolmogrov–Smirnov test for

[34] The patterns for the other specifications of leverage are exactly the same.

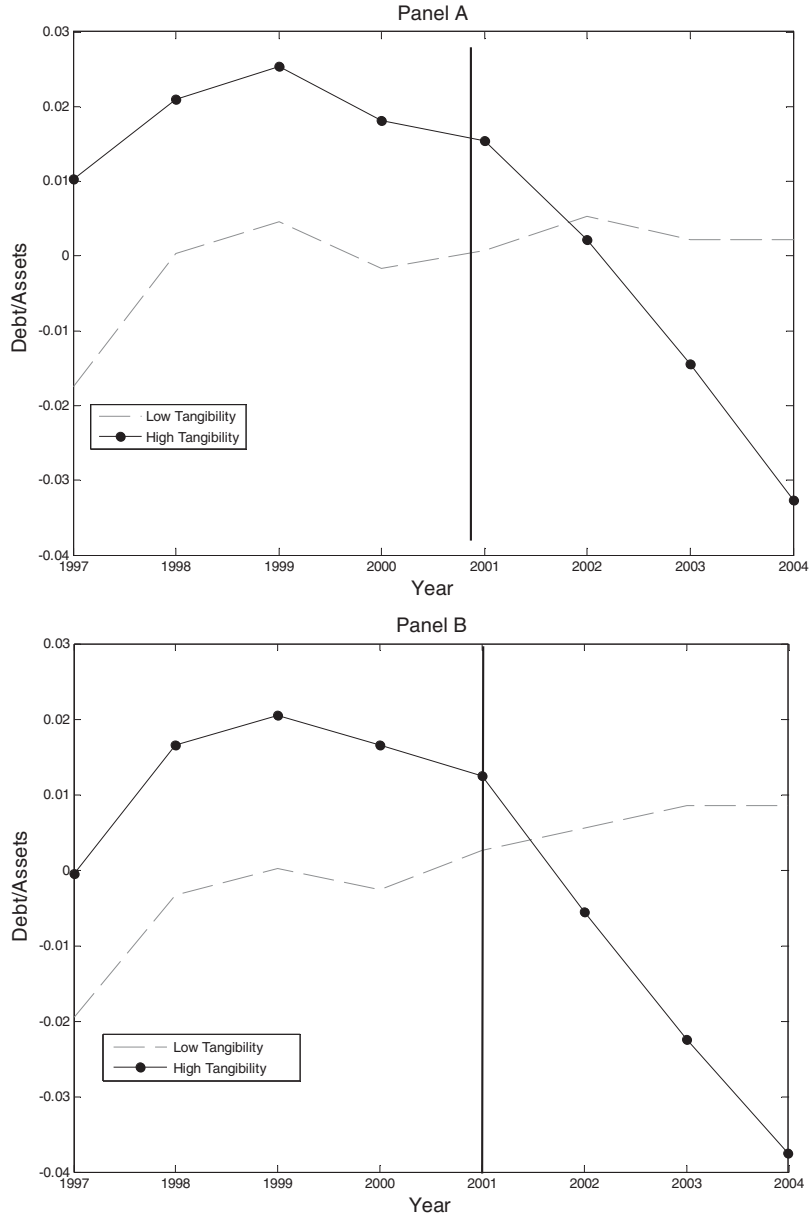

Figure 5. Debt to assets. Here, we plot the de-meaned values of the ratio of total debt to total assets for both the high tangibility and the low tangibility groups. Total debt is defined as the sum of short-term and long-term debt. In Panel A, we divide firms into quartiles based on pretreatment values of tangibility and plot the time series for the highest tangibility quartile and the lowest tangibility quartile. In Panel B, we repeat the exercise but group firms according to their pretreatment values of tangibility terciles, that is, we plot firms in the lowest tangibility tercile and firms in the highest tangibility tercile. Tangibility is defined as the ratio of net fixed assets to total assets. Source: CMIE database.

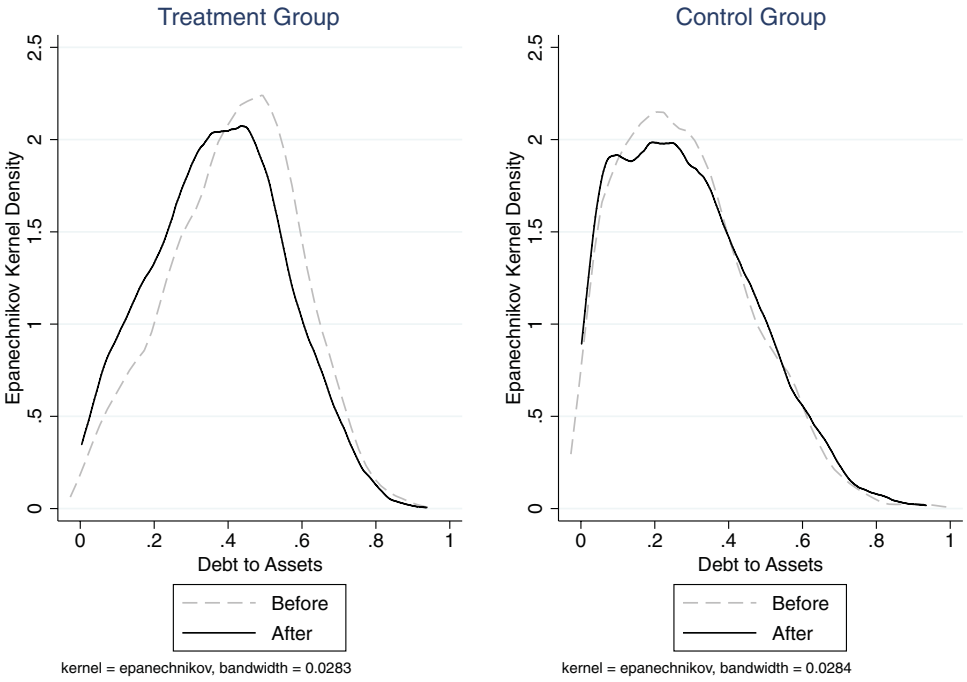

Figure 6. Debt to assets. This figure depicts the Epanechnikov kernel density of the ratio of debt to assets for both the high tangibility ("treatment") group and the low tangibility ("control") group terciles. The bandwidth for the density estimation is selected using the plug-in formula of Sheather and Jones (1991). A Kolmogorov-Smirnov test for the equality of the distribution functions cannot be rejected at the 1% level for the control group and is clearly rejected for the treatment group, which depicts a marked reduction in the debt to assets ratio for the treatment group. Tangibility is defined as the ratio of net fixed assets to total assets. Source: CMIE database. Years spanned: 1997 to 2004.

the equality of the distribution functions is rejected at the 1% level. These figures thus depict a reduction in the use of total debt for the treatment group but no reduction for the control group.

In Table VII, we investigate the impact of the Act on total debt, where total debt is again defined as the sum of short-term and long-term debt. The dependent variable is total debt to assets. We use firm fixed effects in all our regressions to control for firm-level heterogeneity. In column 1 of Table VII, we report a reduction in leverage of 4.6% for the high tangibility group as compared to the low tangibility group. In column 2, we add controls such as profitability, size, and Tobin's Q. The results remain stable at 4.4%. Further, these results are unaffected by the inclusion of industry interacted with year fixed effects (column 3), and thus are not driven by industry-specific trends. In columns 4 to 6, we investigate the impact of SARFAESI on leverage as defined by total debt minus cash to assets. As can be seen, on average, leverage falls by about 5.7% (5.3% when adding controls). The above results indicate a reduction in leverage as a consequence of the SARFAESI Act. Further, we repeat this

Table VII
Effect of SARFAESI Act on Total Debt

This table reports the regression results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. Leverage, defined as debt to total assets, is the dependent variable. Debt is defined in two ways. In columns 1 to 3, we define debt as the sum of short-term and long-term debt. In columns 4 to 6, we define debt as short-term debt plus long-term debt minus cash. Assets refers to the book value of total assets. Here, i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest; α_i and γ_t are firm and year fixed effects respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003 or 2004 and 0 otherwise. $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility, where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Debt/Assets			(Debt-Cash and Bank Balance)/Assets		
Variables	1	2	3	4	5	6
AFTER*HIGH TANG DUM	−0.046***	−0.044***	−0.041***	−0.057***	−0.053***	−0.049***
	(0.009)	(0.009)	(0.009)	(0.011)	(0.010)	(0.010)
EBIT/Assets		−0.133***	−0.133***		−0.165***	−0.163***
		(0.023)	(0.023)		(0.028)	(0.029)
Log(Sales)		−0.007**	−0.006*		−0.009**	−0.008**
		(0.003)	(0.003)		(0.004)	(0.004)
Tobin's Q adjusted		0.012***	0.013***		0.009**	0.012***
		(0.003)	(0.003)		(0.004)	(0.004)
Number of Firms	2,983	2,948	2,948	2,983	2,948	2,948
Observations	15,814	15,310	15,310	15,814	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes	No	No	Yes
Adj. R^2 (within)	0.025	0.054	0.064	0.028	0.060	0.066

analysis separately for listed and unlisted firms and find that the basic results remain unchanged. Finally, we rerun the analysis with interactions between *After* and our controls as our treatment and control groups are not identical. The qualitative nature of our results remains unaffected.

The intuition for this result is as follows. We have argued that a strengthening of secured creditor rights introduces a liquidation bias and that borrowers therefore want to contract out of secured debt. So what do these borrowers do? If these borrowers can substitute their secured borrowings with unsecured borrowings, then one would not observe a reduction in total debt but only a shift in the composition of financing. However, this may be unlikely for a couple of reasons. First, a strengthening of secured creditors' rights imposes a negative

externality on unsecured creditors, which may raise the cost of unsecured financing. Second, unsecured financing may only be available to borrowers with very high credit quality. Both these facts imply that not all secured debt can be substituted for unsecured debt. As a result, a reduction in secured debt may correspond to a reduction in total debt and perhaps a reduction in asset growth. An obvious implication of this argument is that the reduction in secured debt should be larger than the reduction in unsecured debt. This is consistent with what we find in the sample: secured debt decreases by 5.2% whereas total debt decreases by 4.6%.

C. Debt Maturity, Leasing, and Number of Creditors

The law also gives us the opportunity to examine the effect of this reform on the maturity structure of debt. Giannetti (2003) finds that strengthening creditor rights is correlated with longer debt maturity. Benmelech, Garmaise, and Moskowitz (2005) analyze debt maturity as a function of "asset redeployability." They find that higher asset redeployability is associated with longer maturity and larger loans. In practice, there are two major distinctions between the types of loans that are used by corporations. Firms generally use both short-term loans meant for needs related to working capital and term loans that are meant for capital expenditures. Most of the long-term loans are secured by tangible assets such as land, buildings, and plant and machinery. On the other hand, short-term loans are secured by working capital, such as accounts receivables. Unsecured loans also tend to have shorter duration (Hart (1995)). Putting it differently, firms generally cannot borrow long term on an unsecured basis. This implies that a movement from secured debt to unsecured debt has an indirect effect of shortening the debt maturity. Further, short-term loans are secured by relatively liquid assets and, as Myers and Rajan (1998) have suggested, these assets are difficult to seize. Summing up, we should see little or no effect on short-term loans. In Table VIII, we rerun the regression analysis with *Short-term Debt/Assets* and *Long-term Debt/Assets* as dependent variables. It can be seen that the effect of the Act on *Short-term Debt/Assets* is not statistically significant. Further, the law led to a shortening of debt maturity as can be seen by an increase in the ratio of short-term debt to total debt.

Next, in Table IX we examine the effect of the Act on the leasing of assets. Leasing can be considered an extreme form of creditor rights as the lessor can always seize the assets in the event of default. Leasing is thus a way to boost debt capacity when creditor rights are weak (Eisfeldt and Rampini (2009)). Strengthening creditor rights potentially reduces the need to lease assets. We rerun our analysis with leased assets to total assets as the dependent variable and find a slight reduction in the use of leased assets. Finally, our data allow us to examine the effect of this law on the number of credit relationships. In our simple model, we had assumed that there were no renegotiation frictions. whereas most of the debt in India is in the form of bank-held debt, firms (especially larger firms) tend to borrow more from several creditors. In fact,

Table VIII

Effect of SARFAESI Act on Debt Maturity

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. Here, i indexes firms, t indexes time, j indexes industries; y_{it} is the dependent variable of interest; α_i and γ_t are firm and year fixed effects respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003, or 2004 and zero otherwise. $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Short-Term Debt/Assets			Long-Term Debt/Assets			Short-Term Debt/Debt		
Variables	1	2	3	4	5	6	7	8	9
AFTER*HIGH TANG DUM	−0.005	−0.004	−0.001	−0.041***	−0.040***	−0.040***	0.038***	0.035***	0.044***
	(0.004)	(0.003)	(0.004)	(0.008)	(0.008)	(0.008)	(0.010)	(0.011)	(0.012)
EBIT/Assets		−0.066***	−0.065***		−0.067***	−0.067***		−0.026	−0.024
		(0.011)	(0.011)		(0.016)	(0.016)		(0.018)	(0.019)
Log(Sales)		0.005***	0.005***		−0.012***	−0.011***		0.016***	0.017***
		(0.002)	(0.002)		(0.002)	(0.002)		(0.003)	(0.003)
Tobin's Q adjusted		0.001	0.001		0.010***	0.011***		−0.006	−0.006
		(0.002)	(0.002)		(0.002)	(0.002)		(0.004)	(0.004)
Number of Firms	2,983	2,948	2,948	2,983	2,948	2,948	2,983	2,948	2,948
Observations	15,814	15,310	15,310	15,814	15,310	15,310	15,814	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes
Adj. R^2 (within)	0.010	0.021	0.026	0.029	0.051	0.057	0.011	0.014	0.015

Table IX

Effect of SARFAESI Law on Lending Relationships and Leases

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. Here, i indexes firms, t indexes time, j indexes industries; y_{it} is the dependent variable of interest; α_i and γ_t are firm and year fixed effect respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003, or 2004 and zero otherwise; $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Number of Banks			Leased Assets/Assets		
Variables	1	2	3	4	5	6
AFTER*HIGH	− 0.032	− 0.044	− 0.066	− 0.004	− 0.003	− 0.006*
TANG DUM	(0.074)	(0.076)	(0.085)	(0.003)	(0.002)	(0.004)
EBIT/Assets		− 0.623**	− 0.663**		− 0.002	− 0.004
		(0.278)	(0.282)		(0.006)	(0.005)
Log(Sales)		0.315***	0.315***		0.001	0
		(0.066)	(0.071)		(0.001)	(0.001)
Tobin's Q adjusted		0.04	0.042		− 0.002**	− 0.002**
		(0.043)	(0.040)		(0.001)	(0.001)
Number of Firms	1,306	1,297	1,297	2,983	2,948	2,948
Observations	6,099	5,942	5,942	15,814	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes	No	No	Yes
Adj. R^2 (within)	0.002	0.033	0.042	0.010	0.010	0.013

the average number of credit relationships in our sample is 2.65. One might, therefore, expect that debt may become more concentrated after SARFAESI. As can be seen from Table IX, the Act led to a reduction in the number of creditors (debt became more concentrated). However, these results are not statistically significant. One caveat of this analysis is that the data are only available for a small sample of firms.

D. Liquidity Management

In this section, we examine the effect of SARFAESI on cash holdings by firms. Consistent with the precautionary motive of cash, we find that firms respond to SARFAESI by hoarding more cash. Because cash offers insurance against liquidity shocks, more affected firms, that is, firms in our treatment group, end up hoarding more cash as compared to firms in our less affected or control

Table X

Effect of SARFAESI Act on Cash/Assets Ratios

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. In columns 1 to 3, the dependent variable is cash divided by assets and in columns 4 to 6, the dependent variable is cash plus bank account balances divided by assets. Here, i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest; α_i and γ_t are firm and year fixed effect respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003 or 2004 and zero otherwise. $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Cash and Bank Balance/Assets		
Variables	1	2	3
AFTER*HIGH TANG DUM	0.009***	0.007***	0.006***
	(0.003)	(0.002)	(0.002)
EBIT/Assets		0.020***	0.018***
		(0.005)	(0.005)
Log(Sales)		0.001	0.001
		(0.001)	(0.001)
Tobin's Q adjusted		0.007***	0.006***
		(0.002)	(0.002)
Number of Firms	2,983	2,948	2,948
Observations	15,814	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes
Adj. R^2 (within)	0.005	0.013	0.024

group because cash holdings allow them to mitigate some of the adverse effects of SARFAESI. To identify this effect, we employ the same specification as before and use cash to total assets as our dependent variable. As can be seen from Table X, firms increase their cash holdings by 0.6% more in absolute terms for the treatment group as compared to the control group. This represents roughly an 18% increase in cash reserves for the firms.[35]

E. Total Assets, Profits, and Profitability

In this section, we investigate the impact of SARFAESI on firms' profitability and total assets. To do so, we run a DID specification with log of EBIT and *EBIT/Assets* as the dependent variables. In columns 1 through 6 of Table XI,

[35] The average cash holdings of firms to total assets in our sample is roughly 3.4% (Table III.A).

Table XI

Effect of SARFAESI Act on Profitability and Assets

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. In columns 1 to 3, the dependent variable is log of EBIT. In columns 4 to 6, the dependent variable is profitability defined as EBIT divided by book value of assets and in columns 7 to 9 the dependent variable is given by log of book value of assets. Here, i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest; α_i and γ_t are firm and year fixed effect respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003, or 2004 and zero otherwise. $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004.

	Log (EBIT)			EBIT/Assets			Log (Assets)		
Variables	1	2	3	4	5	6	7	8	9
AFTER*HIGH TANG DUM	0.003	0.001	0.036	0.020***	0.020***	0.021***	−0.156***	−0.162***	−0.159***
	(0.046)	(0.036)	(0.042)	(0.007)	(0.006)	(0.006)	(0.038)	(0.040)	(0.040)
Log(Sales)		0.786***	0.777***		0.031***	0.030***		0.243***	0.238***
		(0.037)	(0.038)		(0.002)	(0.002)		(0.019)	(0.019)
Tobin's Q adjusted		0.088***	0.079***		0.004	0.003		−0.022	−0.019
		(0.027)	(0.028)		(0.005)	(0.005)		(0.014)	(0.014)
Number of Firms	2,745	2,730	2,730	2,983	2,948	2,948	2,983	2,948	2,948
Observations	13,376	13,183	13,183	15,814	15,310	15,310	15,814	15,310	15,310
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes
Adj. R^2 (within)	0.018	0.273	0.283	0.022	0.058	0.063	0.209	0.392	0.408

we report the results from this regression analysis. Interestingly, we find that the Act had no significant effect on firms' overall profits. However, profitability significantly improved as fewer assets were used to generate the same profits. This is consistent with the view that hard claims discipline management (Hart (1995) and Jensen (1986)). In columns 7 to 9, we rerun the analysis using log of assets as our dependent variable. It can be seen that firms with lower tangibility grew more than firms with high tangibility. These results suggest that firms with high tangibility (treated group) invested less than firms with low tangibility (control group). These results also confirm our previous finding that a change in assets is not driving the results. If anything, it is the firms with low tangibility that have increased assets more, and thus any variation in the assets works to strengthen our results.[36]

F. Cost of Borrowing

Because we only have interest rates on the aggregated level of debt, and not separately for secured and unsecured loans, we examine the effect of SARFAESI on the total cost of borrowing in Table XII. It can be seen from columns 1 through 3 that the overall cost of borrowing seems to have gone down by roughly 0.6% after the enactment of SARFAESI. It is important to note that one has to be careful in interpreting this result because there is also a drop in the level of secured debt. To the extent that interest rates on secured debt are lower than the interest rates on unsecured debt, the results suggest that this is driven by a higher reduction in secured debt interest rate. An analysis of 231 working capital loan contracts with a 1-year maturity suggests that rates for secured debt have dropped 77 basis points more than for unsecured debt because of the implementation of the Act. These results suggest that the cost of borrowing with secured debt has come down more than with unsecured debt.[37]

G. Alternate Explanations

This paper shows that both secured debt and total debt ratios have come down following the passage of a secured transactions law. In this section, we evaluate the robustness of our results to alternate stories and specifications. First, it might have been the case that the passage of the law coincided with

[36] We rerun our entire analysis using lagged assets in the denominator instead of current assets. Our results remain unaffected. This suggests that the numerator is driving our results.

[37] It should be noted that both an outward shift in the supply of secured debt and an inward shift in the demand for secured debt would contribute to lower interest rates. Combined with the quantity result (secured debt quantity goes down), this result indicates that it is a shift in the demand for secured debt rather than an increase in supply. These results also suggest that the results are not driven by a negative supply effect that may accompany a strengthening of secured creditor rights—the possibility of a creditor run may make creditors less willing to supply secured credit. The presence of a negative supply effect would not work against the central premise of the paper and would underscore the importance of bankruptcy laws that must accompany changes in collateral laws.

Table XII
Effect of SARFAESI Act on Cost of Debt

This table reports results for the regression $y_{ijt} = \alpha_i + \gamma_t + \delta \cdot 1_{(E=1)} + \theta \cdot 1_{(A=H)} + \eta \cdot 1_{(E=1)} \cdot 1_{(A=H)} + \omega \cdot X_{ijt} + \varepsilon_{ijt}$. In columns 1 to 3, the dependent variable is interest expenses divided by total debt and in columns 4 to 6, the dependent variable is cash plus bank account balances divided by assets. Here, i indexes firms, t indexes time, j indexes industries; y_{ijt} is the dependent variable of interest; α_i and γ_t are firm and year fixed effect respectively; $1_{(E=1)}$ is an indicator variable that takes on a value of one for 2002, 2003, or 2004 and zero otherwise. $1_{(A=H)}$ is an indicator variable that takes on a value of one if the firm belongs to the treated group and zero if it belongs to the control group. We divide firms into three bins based on tangibility where tangibility is defined as net fixed assets to total assets. We define the top 33% of firms (based on the measure of tangibility) as high tangibility firms and the bottom 33% as the low tangibility group. The high tangibility group is the treated group whereas firms belonging to the low tangibility group form the control group. ϵ_{it} is the error term. X_{it} are firm-level control variables such as profitability, Tobin's Q, and size. The variable of interest is η, which captures the DID effect. Double-clustered standard errors are reported in parentheses (clustering done at firm and year level). ***, **, and * implies significance at the 99% level, 95% level, and 90% level, respectively. Source: CMIE database. Coverage: 1997 to 2004

	Interest Expense/Debt		
Variables	1	2	3
AFTER*HIGH TANG DUM	−0.006**	−0.006**	−0.006**
	(0.002)	(0.003)	(0.003)
Controls	No	Yes	Yes
Number of Firms	2,916	2,894	2,894
Observations	15,009	14,672	14,672
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry*Year Fixed Effects	No	No	Yes
Adj. R^2 (within)	0.436	0.444	0.446

the development of the equity market in India and that, as a result, firms were simply tapping another source of capital that was previously unavailable. At first glance, this story may potentially explain the reduction in both secured debt and total debt use by firms. Alternatively, this story could simply be one of market timing, where market timing refers to the practice of issuing equity when market prices are high relative to book values and repurchasing the equity when market prices are low. As Baker and Wurgler (2002) show, firms do indeed tend to time equity markets. So could this have simply been a market timing story? Because our empirical methodology relies on a DID specification, for market timing to be an issue it would have to be the case that market timing is more pronounced in the treated group as compared to the control group.[38] Also, a special feature of our data set helps us further address these concerns. Because we have detailed information on whether firms are listed or unlisted, we rerun our analysis restricting our sample to only unlisted firms.

[38] If the market timing effects are the same across the two groups, they would simply get differenced out.

The economic and statistical significance of our results remain unchanged. The above analysis suggests this does not bias our results.

Second, the passage of SARFAESI may have coincided with differing accounting practices in the classification of secured debt. More specifically, it might have been the case that, before SARFAESI, both secured and unsecured debt were loosely defined because the definition did not matter much, but that accountants and auditors were more careful about these classifications post-SARFAESI. In other words, the reduction may be driven by changes in the quality of the accounting variables. Such a shift, even if caused by SARFAESI, would not have any economic relevance. It is important to note that, if this were the case, then the passage of the law should have changed the composition of secured and unsecured debt, but not the level of total debt. Our analysis, however, suggests that SARFAESI led to a reduction in total debt. Hence, this alternative is not likely to be driving our results.

Third, the results might be driven by a threat of a creditor run. Several commentators, most notably Aghion, Hart, and Moore (1992), have postulated that collective enforcement problems seem to be the major impediment to reorganizations in emerging and transition economies. Although bond markets were virtually nonexistent in India during this time period, firms borrowed from several creditors. We examine whether coordination problems (or the threat of a creditor run on the assets) explain the result. Although this mechanism is consistent with the central thesis of this paper, that creditor rights can lead to inefficiencies, we check the extent to which this may explain the results documented in this paper. To do so, we compare the differential behavior of firms that have single or multiple creditors. We find no differential effect for firms that have multiple creditors, suggesting that coordination problems are probably not a major driver of our results.

Fourth, it is quite likely that SARFAESI increased the transaction costs of contracting with secured debt, for example, due to increased costs of compliance. This could have resulted in a reduction in secured debt as the transaction costs would have increased secured debt prices relative to unsecured debt or equity. Because there are no market data on prices of secured debt and unsecured debt to examine this claim, we hand collect data on a subset of loans (working capital loan contracts). As loan contracts differ along several price and nonprice dimensions, we focus on contracts that have the same duration and are given to borrowers with similar ratings. An analysis of 231 working capital loan contracts with a 1-year maturity suggests that rates for secured debt have dropped 77 basis points more than for unsecured debt because of the implementation of the Act. These results suggest that the cost of borrowing with secured debt has come down more than the cost of borrowing with unsecured debt.[39]

[39] This should not come as a surprise because the law has a direct effect on secured debt. Further, the law may cause a negative spillover effect to unsecured debt because secured creditors impose a negative externality on unsecured creditors.

Fifth, though the cross-sectional heterogeneity tests do allay some concerns on the nature of the omitted variable, we conduct another test to nail our channel down more precisely. In 2004, there was a partial softening of the SARFAESI Act, as legislators reduced the appeal amount from 75% to 20%. We find that this softening of the law reduced the precipitous decline in secured debt or, put differently (controlling for trends), the secured debt quantity picked up slightly.

Finally, to address sample selection and attrition issues, we rerun our analysis with a balanced panel. Our results are robust to these specification checks. In addition, we investigate if there is any differential attrition in our treatment and control group. We do not find this to be the case.

V. Conclusion

Much of our understanding of creditor rights is based on the notion that better enforcement of contracts reduces borrowing costs, thereby relaxing financial constraints. The economic justification for this view is that strengthening creditor rights expands the contract space, which constitutes a Pareto improvement. In this paper, we investigate the effect of strengthening creditor rights in India on firms' financial policies. We find that an increase in the rights of secured creditors led to a reduction in the use of secured debt. These results suggest that welfare implications of strengthening creditor rights are not clear cut.

It is important to emphasize that this paper does not take a stand on the welfare implications of this law. Although there are obvious benefits from strengthening creditor rights, such as better resource allocation, we find that stronger creditor rights may cause some firms to be worse off. In such situations, a statement of welfare implications involves making an implicit assumption about the importance of the firms that are worse off. Because there is no objective way to do this, the aggregate welfare effects of this law are not obvious.

Recent empirical literature based on cross-sectional regressions finds somewhat similar results. Davydenko and Franks (2008) examine the effect of bankruptcy laws on financially distressed firms in the United Kingdom, Germany, and France. The reported use of secured debt is lower in the United Kingdom than in France, despite the fact that the United Kingdom has a more creditor-friendly law. Because the Davydenko and Franks (2008) study is based on a cross-sectional setting, the authors are unable to distinguish between demand and supply effects. Their finding, however, is consistent with our analysis. Creditor rights affect both supply of, as well as demand for, credit. Suppliers of secured credit are clearly better protected in the United Kingdom than in France and therefore are more willing to supply secured credit. However, stronger creditor protection also makes borrowers more cautious because it makes secured creditors less willing to compromise. It is quite plausible that this is the reason that less secured debt is used in the United Kingdom as compared to France.

This paper points to several research questions regarding the effect of creditor rights on bank relationships and the concentration of lenders. In the last

few years, India has witnessed mergers of banks specializing in short-term loans with development financial institutions that specialize in long-term loans. When creditor rights were weak, separate creditors (acting without regard to other creditors) were necessary to enforce borrowing discipline. With stronger creditor rights, it makes sense to remove duplication of monitoring costs across institutions, leading to mergers. Stronger creditor rights also make unobservable borrower information, which can only be acquired over time through relationships, less important. This lowers a key entry barrier.

It is also likely that the ease of enforcement of any legal code will be different across different types of borrowers. For example, if one believes a priori that it is easier for a bank to enforce a strong law against an individual consumer rather than a corporate consumer, one would expect the bank portfolio to move toward collateralized retail lending. This implies that the boom in real estate and auto loans in India over the past few years may have been started by the SARFAESI Act.[40] Our ongoing research attempts to investigate these questions further.

Initial submission: June 4, 2009; Final version received: January 2, 2013
Editor: Campbell Harvey

REFERENCES

Acharya,Viral,Yakov Amihud, and Lubomir Litov, 2011, Creditor rights and corporate risk-taking, *Journal of Financial Economics* 102, 150–166.

Acharya, Viral, Kose John, and Rangarajan K. Sundaram, 2011, Cross-country variations in capital structure: The role of bankruptcy codes, *Journal of Financial Intermediation* 20, 25–54.

Acharya, Viral, and K. Subramanian, 2009, Bankruptcy codes and innovation, *Review of Financial Studies* 22, 4949–4988.

Aghion, Philippe, and Patrick Bolton, 1992, An incomplete contracts approach to financial contracting, *Review of Economic Studies* 59, 473–494.

Aghion, Philippe, and B. Hermalin, 1990, Legal restrictions on private contracts can enhance efficiency, *Journal of Law, Economics and Organization* 6, 381–409.

Aghion, Philippe, Oliver Hart, and John Moore, 1992, The economics of bankruptcy reform, *Journal of Law, Economics and Organization* 8, 523–546.

Alderson, Michael, and Brian Betker, 1995, Liquidation costs and capital structure, *Journal of Financial Economics* 39, 45–69.

Asquith, Paul, Robert Gertner, and David Scharfstein, 1994, Anatomy of financial distress: An examination of junk-bond issuers, *The Quarterly Journal of Economics* 109, 625–658.

Baker, Malcolm, and Jeffrey Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Batra, Sumant, 2003, *The Asian recovery: Progress and pitfalls, The position of India, Global Forum on Insolvency Risk Management*, World Bank, Washington DC.

Beck, Thorsten, Asli Demirguc-Kunt, and Ross Levine, 2004, *Law and firms' access to finance*, Working Paper 10687 National Bureau of Economic Research, Inc.

Bekaert, Geert, Campbell Harvey, and Christian Lundblad, 2005, Does financial liberalization spur economic growth, *Journal of Financial Economics* 77, 3–55.

[40] Such consumer lending booms have also coincided with collateral law changes in several Eastern European countries.

Benmelech, Efraim, Mark Garmaise, and Tobias Moskowitz, 2005, Do liquidation values affect financial contracts? Evidence from commercial loan contracts and zoning regulation, *Quarterly Journal of Economics* 120, 1121–1154.

Berglof, Erik, and Ernst-Ludwig von Thadden, 1994, Short-term versus long-term interests: Capital structure with multiple investors, *Quarterly Journal of Economics* 109, 1055–1084.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics* 119, 249–275.

Bertrand, Marianne, Paras Mehta, and Sendhil Mullainathan, 2002, Ferreting out tunneling: An application to Indian business groups, *Quarterly Journal of Economics* 117, 121–148.

Bester, Helmut, 1985, Screening vs. rationing in credit markets with imperfect information, *American Economic Review* 75, 850–855.

Bolton, Patrick, and David Scharfstein, 1990, A theory of predation based on agency problems in financial contracting, *American Economic Review* 80, 93–106.

Bolton, Patrick, and David Scharfstein, 1996, Optimal debt structure and the number of creditors, *Journal of Political Economy* 104, 1–25.

Chakravarty, Manas, Why has credit not picked up?, *Business Standard*, August 14, 2003.

Chibber, Pradeep K., and Sumit K. Majumdar, 1999, Foreign ownership and profitability: Property rights, control, and the performance of firms in Indian industry, *Journal of Law and Economics* 42, 209–238.

Davydenko, Sergei, and Julian Franks, 2008, Do bankruptcy codes matter? A study of defaults in France, Germany, and the U.K., *Journal of Finance* 63, 565–608.

Dewatripont, Mathias, and Jean Tirole, 1994, A theory of debt and equity: Diversity of securities and manager-shareholder congruence, *Quarterly Journal of Economics* 109, 1027–1054.

Diamond, Douglas W., 1989, Reputation acquisition in debt markets, *Journal of Political Economy* 97, 828–862.

Diamond, Douglas W., 1991, Debt maturity structure and liquidity risk, *Quarterly Journal of Economics* 106, 709–737.

Diamond, Douglas W., 1993, Seniority and maturity of debt contracts, *Journal of Financial Economics* 33, 341–368.

Djankov, Simeon, and Caralee McLiesh, 2006, Doing Business in 2006: Creating Jobs (The world Bank and the international Finanace Corporation).

Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer, 2007, Private credit in 129 countries, *Journal of Financial Economics* 84, 299–329.

Eisfeldt, Andrea L., and Adriano A. Rampini, 2009, Leasing, ability to repossess, and debt capacity, *Review of Financial Studies* 22, 1621–1657.

Erel, Isil, Brandon Julio, Kim Woojin, and Michael Weisbach, 2009, Market conditions and the structure of securities, NBER Working Papers 14952, National Bureau of Economic Research, Inc.

Fan, Wei, and Michelle White, 2003, Personal bankruptcy and the level of entrepreneurial activity, *Journal of Law and Economics* 42, 545–567.

Franks, Julian, and Oren Sussman, 2005, Financial distress and bank restructuring of small to medium size U.K. companies, *Review of Finance* 9, 65–96.

Giannetti, Mariasunta, 2003, Do better institutions mitigate agency problems? Evidence from corporate finance choices, *Journal of Financial and Quantitative Analysis* 38, 185–212.

Gopalan, Radhakrishnan, Vikram Nanda, and Amit Seru, 2007, Affiliated firms and financial support: Evidence from Indian business groups, *Journal of Financial Economics* 86, 759–795.

Gropp, Reint, John Karl Scholz, and Michelle J. White, 1997, Personal bankruptcy and credit supply and demand, *Quarterly Journal of Economics* 112, 217–251.

Harris, Milton, and Artur Raviv, 1991, The theory of capital structure, *Journal of Finance* 46, 297–355.

Hart, Oliver, 1995, *Firms, Contracts, and Financial Structure* (Oxford University Press, Oxford).

Hart, Oliver, 2001, Financial contracting, *Journal of Economic Literature* 39, 1079–1100.

Hart, Oliver, Rafael La Porta, Florencio Lopez-de-Silanes, and John Moore, 1997, A new bankruptcy procedure that uses multiple auctions, *European Economic Review* 41, 461–473.

Hart, Oliver, and John Moore, 1994, A theory of debt based on the inalienability of human capital, *Quarterly Journal of Economics* 109, 841–879.

Hart, Oliver, and John Moore, 1999, Foundations of incomplete contracts, *Review of Economic Studies* 66, 115–138.

Haselmann, Rainer, Katharina Pistor, and Vikrant Vig, 2010, How law affects lending, *Review of Financial Studies* 32, 549–580.

Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323–329.

Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

Kang, Nimrit, and Nitin Nayar, 2003, The evolution of corporate bankruptcy law in India, *ICRA Bulletin Money and Finance* October 3–March 3, 37–58.

Khanna, Tarun, and Krishna Palepu, 2000, Emerging market business groups, foreign intermediaries, and corporate governance, in Randall K. Morck, ed.: *Concentrated Corporate Ownership* (The University of Chicago Press, Chicago).

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1997, Legal determinants of external finance, *Journal of Finance* 52, 1131–1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1998, Law and finance, *Journal of Political Economy* 106, 1113–1155.

Levine, Ross, 1998, The legal environment, banks, and long-run economic growth, *Journal of Money, Credit and Banking* 30, 596–613.

Levine, Ross, 1999, Law, finance, and economic growth, *Journal of Financial Intermediation* 8, 8–35.

Lilienfeld-Toal, Ulf, Dilip Mookherjee, and Sujata Visaria, 2010, The distributive impact of reforms in credit enforcement: Evidence from Indian debt recovery tribunals, Working paper, Boston University.

Lipsey, R.G., and Kelvin Lancaster, 1956, The general theory of second best, *Review of Economic Studies* 24, 11–32.

Myers, Stewart, and Raghuram Rajan, 1998, The paradox of liquidity, *Quarterly Journal of Economics* 113, 733–771.

Petersen, Mitchell, 2009, Estimating standard errors in finance panel data sets: Comparing approaches, *Review of Financial Studies* 22, 435–480.

Povel, Paul, 1999, Optimal "soft" or "tough" bankruptcy procedures, *Journal of Law, Economics and Organization* 15, 659–684.

Pulvino, Todd, 1998, Do asset fire sales exist? An empirical investigation of commercial aircraft transactions, *Journal of Finance* 53, 939–978.

Qian, Jun, and Philip Strahan, 2007, How law and institutions shape financial contracts: The case of bank loans, *Journal of Finance* 62, 2803–2834.

Rajan, Raghuram, and Andrew Winton, 1995, Covenants and collateral as incentives to monitor, *Journal of Finance* 50, 1113–1146.

Rajan, Raghuram, and Luigi Zingales, 1995, What do we know about capital structure? Some evidence from international data, *Journal of Finance* 50, 1421–1460.

Rasmussen, Robert K., 1992, Debtors choice: A menu approach to corporate bankruptcy, *Texas Law Review* 71, 55–121.

Rauh, Joshua D., and Amir Sufi, 2010, Capital structure and debt structure, *Review of Financial Studies* 23, 4242–4280.

Roberts, Michael R., and Amir Sufi, 2009, Financial contracting: A survey of empirical research and future directions, *Annual Review of Financial Economics* 23, 207–226.

Schwartz, Alan, 1997, Contracting about bankruptcy, *Journal of Law, Economics and Organization* 13, 127–146.

Schwarcz, Steven L., 1999, Rethinking freedom of contract: A bankruptcy paradigm, *Texas Law Review* 77, 529–534.

Scott, Jonathan A., and Terence C. Smith, 1986, The effect of the Bankruptcy Reform Act of 1978 on small business loan pricing, *Journal of Financial Economics* 16, 119–140.

Shleifer, Andrei, and Robert Vishny, 1992, Liquidation values and debt capacity: A market equilibrium spproach, *Journal of Finance* 47, 1343–1366.

Strömberg, Per, 2000, Conflicts of interest and market illiquidity in bankruptcy auctions: Theory and tests, *Journal of Finance* 55, 2641–2692.

Umarji, M.R., 2004, Law and Practice Relating to Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest (as amended by Enforcement of Security Interest and Recovery of Debts Laws (Amendment) Ordinance 2004) (Taxmann's, New Delhi).

Visaria, Sujata, 2009, Legal reform and loan repayment: The microeconomic impact of debt recovery tribunals in India, *American Economic Journal: Applied Economics* 1, 59–81.

White, Michelle J., 1996, The costs of corporate bankruptcy: A US-European comparison, in Jagdeep S. Bhandari, and Lawrence A. Weiss, eds.: *Corporate Bankruptcy* (Cambridge University Press, Cambridge).

Williamson, Oliver E., 1988, Corporate finance and corporate governance, *Journal of Finance* 43, 567–591.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

Appendix S1: Internet Appendix