Role of Collateral in Mitigating Adverse Selection: Evidence from a Natural Experiment in India

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Abstract

We investigate the role of collateral as a signaling device to mitigate adverse selection by examining the corporate debt structure of unlisted (informationally opaque) and listed (informationally transparent) firms following a securitization reform in India, the SARFAESI Act 2002, which increased the access to collateral. Using difference-in-difference (DID) methodology and data on over 22,000 firms during FY 1999-2006, we find that unlisted firms moved more towards secured debt than listed firms. We also disentangle the moral hazard reducing role of collateral from its signaling role and find that the signaling role takes prominence for unlisted firms. We find that the risk premia decreased and the long term debt increased post SARFAESI indicating a reduction in information asymmetry. We additionally find that debt maturity acts as a complementary signaling device to collateral for unlisted firms. These results are consistent with the theoretical strand of literature which proposes collateral as a means to mitigate adverse selection problems via improved signaling.

Keywords: Collateral, Asymmetric Information, Secured Debt, Unlisted Firms

JEL Classification: D82, G32, G38

EFM Classification: 110, 230, 540

1 Introduction

Over the past two decades, a significant amount of financial research has focused on questions of whether and how legal systems affect the quantity and quality of credit available in the economy. Starting with La Porta et al. (1998), this research often finds favorable effects on credit of strong creditor protections (e.g., Giannetti, 2003; Qian and Strahan, 2007), but this research typically relies on cross-country comparisons in which it is difficult to disentangle the effects of creditor rights from differences in culture and other international distinctions. As well, this research often encounters endogeneity issues in which the credit and legal protections may be jointly determined. A potential solution to these problems is to study a single nation wherein a legal change could be used as a natural experiment.

Our paper studies one such natural experiment in which creditor rights were substantially increased and uses a difference-in-difference (DID) methodology to disentangle the effects on the price and quantity of credit to informationally opaque and informationally transparent borrowers. Specifically, we examine the effects of a securitization reform called the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interests Act (SARFAESI Act henceforth) which was implemented in India in 2002 and allowed creditors to directly seize assets of the borrower in case of default, bypassing the lengthy court process which was required prior to the act. Since the act only applies to secured loans, we use it to understand the impact of collateral in reducing information asymmetry.

The theoretical models of adverse selection predict that information asymmetry gives rise to credit rationing in equilibrium if the information problem remains unresolved (Stiglitz and Weiss, 1981). In such situations, collateral is one of the contracting mechanisms that can be

used to mitigate information asymmetries and reduce credit rationing. The precise role of collateral in reducing information asymmetries has been widely debated in literature. One strand of theoretical literature views collateral as a device that reduces adverse selection by acting as a screening or signaling device (Besanko and Thakor, 1987; Bester, 1985; Chan and Kanatas, 1985). According to this view, when the borrower quality is unobserved, high quality borrowers pledge more collateral than low quality borrowers to avoid being rationed. Another strand of theoretical literature views collateral as an incentive device that reduces the moral hazard problem (Boot and Thakor, 1994; Boot et al., 1991; Chen, 2006). According to this strand, when the borrower quality is observable, low quality borrowers pledge more collateral than high quality borrowers. Neither of the two theoretical strands finds exclusive empirical support in the literature. Some studies point towards the disciplinary role of collateral solving the moral hazard problem (Berger and Udell, 1990; Chakraborty and Hu, 2006; Menkhoff et al., 2006) while others point towards the signaling value of collateral solving the adverse selection problem (Jimenez et al., 2006; Lehmann and Neuberger, 2001). The diversity in theories and results has kept this field open to research with possibilities of testing them with different and newer research designs and settings.

Our study is different from other studies in this area as most of them have empirically examined loan contracts while we focus on the corporate debt structure of firms. The problem with most studies which use loan contracts is separating the effect of collateral from other loan contract features that might impact information asymmetries. For instance, relationship lending, loan covenants etc. find limited theoretical literature (Baas and Schrooten, 2006) and hence it is difficult to control for them in empirical analysis. Our study does not face these concerns as it relies on a natural experiment in SARFAESI. We examine the role of collateral in mitigating adverse selection problems by focusing on corporate debt structure of informationally opaque

and informationally transparent firms pre and post SARFAESI. We classify unlisted firms as informationally opaque and listed firms as informationally transparent.

We find evidence that following SARFAESI (which provided easier access to collateral), compared to listed firms, unlisted firms moved towards more secured debt in order to gain better access to credit. This differential move indicates that collateral helped in reducing the problem of ex-ante information asymmetry. Unlike most of the empirical studies, we do not negate the moral hazard reducing role of collateral. Instead, we disentangle the use of collateral in mitigating ex-post moral hazard problem from its signaling role in reducing ex-ante information asymmetry by introducing observable variables of firm quality and risk, ROA and Risk Premia, in interaction with listed status of the firm. We find that while the moral hazard reducing role of collateral takes prominence in listed firms which are informationally transparent, the signaling role of collateral takes prominence for unlisted firms which are informationally opaque.

Also, the overall borrowing rates and risk premia decreased post SARFAESI indicating the mitigation of the adverse selection problem. However, the risk premia decreased less for unlisted firms than for listed firms. We attribute this to the prudent and risk averse setting of risk premia by lenders due to unestablished relationship with the newer borrowers that get access to secured debt post SARFAESI by using collateral as a signaling device. We also find that average maturity increased post SARFAESI. We find that the maturity increased less for unlisted firms and attribute this to the role of collateral and maturity acting as complementary signaling devices in reducing ex-ante information asymmetry. Unobservably higher quality firms among unlisted firms use shorter maturity of debt in conjunction with higher collateral to signal their quality.

1.1 The SARFAESI Act

The SARFAESI Act allowed creditors to directly seize assets of the borrower in case of default, bypassing the lengthy court process which was required prior to the act. The act was retroactive, i.e. it applied to both existing and new borrowers. Further, the act naturally applied only to secured 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 notice of 60 days.

Before the passage of the SARFAESI act, a secured creditor had no power to claim an asset outside of court/tribunal proceedings, the length of which was typically 10 to 15 years (Kang and Nayar, 2003). 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. Hence, the worthiness of collateral as a contracting device in debt contracts was significantly low.

The SARFAESI Act 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. The impact of the act is corroborated by both anecdotal and empirical evidence. Plenty of litigation suits to question the constitutional validity of the act followed the passage. Visaria (2009) documents a positive stock price increase for banks following the act. Data on recovery and NPAs also suggests that the law had a positive impact (Vig, 2013). Thus, it can be concluded

the worthiness of collateral significantly increased after the passage of SARFAESI. The official date of the act is June 21, 2002. However, discussion in the press started in 1999. For this paper we consider the period before FY 2003 as pre SARFAESI period from FY 2003 as post SARFAESI period.

The rest of the paper is organized as follows. Section 2 presents a literature review of the effect of collateral on adverse selection and moral hazard. Section 3 discusses the theoretical framework and hypotheses of this paper. Section 4 discusses data and empirical methodology used in this paper. Section 5 discusses the results obtained and its implications. Section 6 concludes.

2 Literature Review

Stiglitz and Weiss (1981) was one of the first few papers that looked at collateral as a mechanism to reduce information asymmetry in credit contracts. The authors examined how the problem of credit rationing could arise due to information asymmetry about firm type while lending and how the existence of collateral could alleviate the problem. However, the way in which collateral reduces information asymmetry is widely debated in theoretical literature. Whether collateral reduces ex-ante reduction of adverse selection or acts as an incentive mechanism to solve ex-post moral hazard has been widely debated in both theoretical and empirical literature.

A first category of theoretical models views collateral as a signaling device, reducing the adverse selection problem. The willingness of the entrepreneur to pledge collateral positively influences the quality of the credit request, as perceived by the bank. Collateral has a signaling

role: the borrower signals the real value and belief in the quality of the project to the bank (Besanko and Thakor, 1987; Bester, 1985; Chan and Kanatas, 1985). Within this strand of theoretical literature, it is concluded that, in equilibrium, low risk borrowers pledge more collateral than high risk borrowers when the borrower quality is unobservable. A second category of theories views collateral as an incentive device, reducing the moral hazard problem (Boot and Thakor, 1994; Boot et al., 1991; Chen, 2006). Compared to the previous strand of literature discussed, these theories predict the opposite: high risk borrowers pledge more collateral than low risk borrowers. Collateral can be seen as a means to prevent the high risk firm switching from a lower to a higher risk project after the loan has been granted, or doing less effort to realize the proposed project (Boot et al., 1991). The risk of losing the collateral pledged would prevent any risk shifting behaviour by the (high risk) entrepreneur after receiving the loan.

In a majority of empirical studies collateral seems to play a disciplinary role in the behaviour of the borrower as it seems to solve the moral hazard aspect of the informational asymmetries between borrower and lender. For example, (in Berger and Udell, 1990; Chakraborty and Hu, 2006; Menkhoff et al., 2006), collateral is most often associated with riskier borrowers, riskier loans, and riskier banks; most likely due to the moral hazard problem. However, empirical studies by Lehmann and Neuberger (2001) and Jimenez et al.(2006) show contrasting results. The results of these studies suggest a signaling value of collateral, solving the adverse selection problem: low risk borrowers pledge more collateral to signal their quality. Lehmann and Neuberger (2001) find that borrowers with a high credit rating have a lower percentage of their loan collateralized. Jimenez et al. (2006) find that, among young borrowers who cope with information asymmetries, the likelihood of pledging collateral is positively associated with the credit quality. However, both of these papers study the likelihood of pledging collateral in

association with observable loan or borrower characteristics and indirectly establish the signaling role of collateral by finding contrasting results to the empirical literature that establishes moral hazard reducing role of collateral. This is because the signaling theories are based on ex-ante private information which is empirically difficult to capture.

Some studies attempt to find proxies for private information to test the ex-ante signaling theories of collateral. Gonas et al. (2004) find that large exchange-listed firms and those with public debt ratings are less likely to pledge collateral for bank loans. Berger et al. (2011a) exploits exogenous variation in lender information related to the adoption of an information technology that reduces ex-ante private information, and compare collateral outcomes before and after adoption. Their results are consistent with this central implication of the private-information models and support the economic importance of the signaling role of collateral in reducing ex-ante information asymmetry. Our study owes a similarity to these studies as we also use unlisted companies as being informationally opaque thus having more ex-ante information asymmetry than listed or informationally transparent firms.

Most of the above discussed empirical literature studies data on loan contracts and tries to analyze the collateral as impacted by loans or firm specific variables. One of the problems with such a methodology is separating the effect of collateral from other loan contract features that might impact information asymmetries, e.g relationship lending, loan covenants etc. The theoretical literature on such variables is also limited (Baas and Schrooten, 2006) and hence it is difficult to control for them in empirical analysis.

A better method to study the effect of collateral on information asymmetries is by using natural experiments. Empirical literature that uses natural experiments in this area has been scarce

because it is very difficult to find such events which concern only collateral. One such paper is by Cerqueiro et al (2016) who study a change in law as a natural experiment in Sweden, following which the banks reduced their assessed value of collateral and contemporaneously increased the interest rate. Another such study with emphasis on creditor rights through increased access to collateral and subsequent changes in supply of secured debt is by Vig (2013) who examines borrowing patterns (instead of the usual loan contracts) in the context of the SARFAESI Act. Vig (2013) finds that the reduction in demand due to liquidation bias outweighs the increase in supply due to easier access to collateral.

Our study is the first to use a natural experiment to establish the role of collateral as a signaling device. Our study is also different from other studies in this area as we examine corporate debt structure of firms as compared to majority of the studies that examine loan contracts. Our study is different from Cerqueiro et al (2016) since they examine the role of collateral in debt contracts and incentives of banks to monitor the same while we examine the role of collateral as a signaling device. While Vig (2013) establishes how SARFAESI didn't have intended consequences of increase in secured debt at an aggregate level due to liquidation bias, we focus on the problem of adverse selection for informationally opaque firms and provide strong support that better access to collateral mitigated this problem via improved signaling.

We establish the role of collateral as a signaling device by examining the difference-in-difference (DID) in secured debt of informationally opaque and informationally transparent firms after the SARFAESI act that increased the access to collateral. We use unlisted and listed firms as proxies for informationally opaque and informationally transparent firms respectively. The use of unlisted firms as informationally opaque is consistent with Giannetti (2003) which uses data on unlisted companies to show that institutions play an important role in determining

the extent of agency problems finds that the sources of agency problems do not appear to be relevant for listed companies as compared to unlisted companies.

Most of the extant empirical literature fails to disentangle the signaling role and the moral hazard reducing role of collateral by treating them in isolation. One of the papers that tests both theories and segregates the impact of two is Berger et al., (2011b) which attempts to do so using a credit registry that is unique in that it allows the researcher to have access to some private information about borrower risk that is unobserved by the lender. Its results suggest that the ex-post theories of collateral are empirically dominant, although the ex-ante theories are also valid for customers with short borrower- lender relations that are relatively unknown to the lender. Our study contributes to this scarce empirical literature that studies both signaling role and moral hazard reducing role of collateral. We find that signaling role of collateral is more prominent among unlisted firms and moral hazard reducing role is more prominent among listed firms.

Our paper also contributes to the literature that proposes signaling role of debt maturity. The theoretical literature that supports this is provided by Flannery (1986) and Diamond (1991) who propose that when borrowers have private information about their future prospects, they can signal their good quality by taking shorter maturity debt. Berger et al. (2005) provide empirical support for the same. By examining the change in long term debt as a proportion of total debt as a proxy for debt maturity, we find that while long term debt increases post SARFAESI due to increased creditor rights, it increased less for unlisted firms as compared to listed firms indicating the use of maturity as being complementary to the use of collateral as a signaling device. This result is a unique contribution to this strand of literature.

3 Hypotheses Development

According to the theory that views collateral as a solution to the problem of ex-ante information asymmetry, we would expect informationally opaque firms to shift their preference to secured debt after SARFAESI. The good firms among the informationally opaque can be expected to take advantage of providing collateral as a signaling device. After SARFAESI, these good opaque firms are now likely to have better access to credit because of the improvement in lender's access to collateral. Provision of collateral increases both from the demand and supply side then we can expect a unidirectional effect: a shift in good opaque firms providing more collateral. We do not expect this same shift by informationally transparent firms. Hence, we propose the following hypothesis:

H1(i): *There is a positive difference-in-difference effect between secured debt of opaque and transparent firms, after SARFAESI and before SARFAESI.*

We do not negate the use of collateral in alleviating moral hazard. The theories of moral hazard argue that when the borrower quality is *observable*, lower quality and riskier firms are likely to pledge higher collateral. We control for ROA and Risk Premia as observable quality and risk characteristics respectively while testing the above mentioned hypothesis. One might also argue that the hypothesized increase in secured debt among informationally opaque firms is due to the moral hazard reducing role of collateral. In other words, increased access to collateral is solving the moral hazard problem rather than the performing a signaling role in mitigating adverse selection. For this argument to hold, lower quality and riskier firms among the opaque firms should tend to increase secured debt more as compared to lower quality and riskier firms

among the transparent firms. However, since the borrower quality is observable more in transparent firms rather than in opaque firms by definition, the moral hazard reducing effect should be more in transparent firms than opaque firms. We test for the same using the following hypothesis:

H1(ii): *Post SARFAESI, lower quality and riskier firms among the transparent firms increase their secured debt indicating the existence of moral hazard reducing impact of collateral. The differential of the above effect for opaque firms as compared to transparent firms is negative indicating that the moral hazard reducing role of collateral among opaque firms is not as much as among opaque firms. The overall increase in secured debt is still more among opaque firms as compared to that in transparent firms indicating the existence of signaling role of collateral even after controlling for moral hazard reducing effect.*

We also expect risk premia to go down for both informationally opaque and informationally transparent firms, due to reduction in information asymmetry. However, we expect risk premia for informationally opaque firms to go down less. This is due to the fact that as newer opaque firms are able to access credit by using collateral as a signaling device, they are likely to get loans at higher interest rates because they don't have an established relationship with the lenders. The lenders would agree to provide credit due to collateral being pledged but would be risk averse and prudent in setting the risk premium. Based on this discussion, we propose the following hypotheses:

H2 (i): *There is a decrease in borrowing rates and risk premia of transparent firms after SARFAESI.*

H2 (ii): *The decrease in borrowing rates and risk premia is less for opaque firms than that for transparent firms after SARFAESI.*

We also expect an increase in the use of long term debt by all firms. This is due to easier access to collateral enabling lenders' willingness to lend at longer maturities to *all* kind of firms. However, maturity itself also acts as a signaling device (Diamond, 1991; Flannery, 1986). Previous empirical literature (Berger et al., 2005) has shown that unobservable high quality firms go for shorter maturity loans to signal their quality as they are more likely to rollover their debt when their quality is revealed later. However, it is not known how collateral and debt maturity act is signaling devices in conjunction. If collateral acts as a substitute to maturity as a signaling device, we expect that informationally opaque firms would move to longer maturity. However, if they act as complements, informationally opaque firms would move towards shorter maturity debt. Based on the above discussion, we formulate the following hypotheses:

H3(i): *There is an increase in average maturity after SARFAESI due to reduction in information asymmetries through greater use of collateral as a signaling device.*

H3(ii): *If maturity and collateral act as substitutes in reducing information asymmetry, the increase in maturity is more for opaque firms. However, if they act as complements, the increase in maturity is less for opaque firms.*

4 Data and Methodology

4.1 Data and Variables

The primary database employed in the study is the Prowess database, compiled and maintained by the Center for Monitoring the Indian Economy (CMIE), a leading private think-tank in India. Our sample contains financial information of both listed and unlisted firms for 22,533 firms across eight years spanning 1999-2006 with total firm-year observations exceeding 90,000, although sample size varies on account of missing information for some of the variables used in the analysis. The four-year period with FY ending 1999-2002 is taken to be pre-SARFAESI since the act came into effect in June, 2002 and the period with FY ending 2003-2006 is taken to be post-SARFAESI. The data is available for 11,311 firms with 32,281 firm-year observations in the pre-SARFAESI period and 21,077 firms with 61,560 firm-year observations in the post-SARFAESI period. In Table 1, we show the summary statistics for a few variables. We also show the difference in averages post-SARFAESI and pre-SARFAESI for these variables.

<INSERT TABLE 1 HERE>

Column 6 of Table 1 shows that that average debt-to-assets ratio is 52.07% while secured debt comprises of 73.47% of the total debt indicating that a large part of the borrowing is through secured debt. The average borrowing rate as can be seen is 13.95%. The summary statistics also reveal a Post-SARFAESI phenomenon. Overall debt as a percentage of total assets increased from 49.09% to 53.84% while secured debt as a percentage of assets and as a percentage of total debt remained almost unchanged (as shown by statistically insignificant t-statistic of difference in means) indicating that *SARFAESI* didn't have the intended impact of

encouraging secured borrowings. This is in line with Vig (2013) who attributes this to liquidation bias. However, he doesn't differentiate between opaque and transparent firms in coming to this conclusion. Our hypotheses depend on this differentiation. It is also evident from table 1 that the overall borrowing rate reduced from 15.99% to 12.58% (with a statistically significant t-statistic of difference in means) indicating the possibility of reduction in adverse selection.

The dependent variables are secured debt to debt ratio, borrowing rates and maturity which is proxied by long term debt to total debt. The treatment variable is borrower opacity which is not easy to capture. Previous literature has used size, whether a firm is rated or not (e.g. Gonas et al., 2004) and whether a firm is listed or not (e,g Giannetti, 2003) as proxies for borrower opacity. In our sample, almost 95% of the firms are unrated. Hence, we believe that rating would not be an appropriate proxy for opacity in the Indian context. Gianetti (2003) finds that the sources of agency problems do not appear to be relevant for listed companies as compared to unlisted companies. Hence, we use whether or not a firm is listed on either Bombay Stock Exchange (BSE) or National Stock Exchange (NSE) as proxy for borrower opacity unlisted firms being opaque.[1] Hence for the purpose of our study unlisted firms can be considered to be as the treatment sample and listed firms as the control sample. Table 2 summarizes the relevant statistics for listed and unlisted firms.

<INSERT TABLE 2 HERE>

Table 2 shows that that unlisted firms are smaller in size with average sales of 405 million rupees as compared to 1308 million rupees for listed firms. Moreover, the percentage of rated

[1] These are the two major stock exchanges in India and SEBI has standard reporting requirements in order to list.

firms among unlisted firms is much smaller at 2.48% as compared to 21.31% rated firms among listed firms. Also, the average number of lenders for unlisted firms is smaller (2.35) than that of listed firms (3.06) implying more access to credit for listed firms. Please note that for the number of lenders statistic, there is a lot of missing data and the missing data is more for unlisted firms than for listed forms (5856 out of 18442 data points available for unlisted firms whereas 3641 out of 4111 data points available for listed firms). Therefore, the difference in average number of lenders is a conservative estimate. Based in the above discussion, we suggest that unlisted firms are more informationally opaque than listed firms. In Figure 1 and Figure 2, we plot the de-meaned time series of *Secured Debt to Assets and Secured Debt to Debt* ratios for listed and unlisted firms from 1999-2006.

<INSERT FIGURE 1 AND FIGURE 2 HERE>

It shows how the use of secured debt has differently evolved over the period for both listed and unlisted firms. Consistent with Vig (2013), there is a decrease in the use of secured debt in the post SARFAESI period specifically for listed firms. However, for unlisted firms, there is an increase in secured debt as a proportion of total debt. This is consistent with our prediction that unlisted firms, being more opaque, benefit more from use of collateral as a signaling device to signal their quality, as compared to listed firms. Hence post SARFAESI when the credibility of collateral as a contracting device increased, unlisted or opaque firms increased their usage of secured loans. It is also consistent with the theories proposing signaling value of collateral as a solution to the problem of credit rationing arising due to ex-ante unobservable information asymmetry (e.g Besanko and Thakor, 1987; Bester, 1985; Chan and Kanatas, 1985). The descriptive statistics call for a formal investigation of the same.

In Figure 3 and Figure 4, we plot the de-meaned time-series for effective borrowing rates and risk premia for listed and unlisted firms from 1999-2006.

<INSERT FIGURE 3 AND FIGURE 4 HERE>

Risk premium is calculated by deducting US 10-year treasury rates from the effective borrowing rate. Risk premium is a better measure of price of debt as borrowing rates also include the impact of changing interest rate environment. The US 10-year treasure is taken as a benchmark for global risk free rate. The graphs show that borrowing rates and risk premia declined for both types of firms in the post SARFAESI period indicating the mitigation of adverse selection. Since the figures don't tell us the differential impact between listed and unlisted firms, we look at the formal regression in the results section.

In Figure 5, we plot de-meaned time series of long term debt to debt for listed and unlisted firms. The graph shows that long term debt as a proportion of debt increased for both listed and unlisted firms. Long term debt to debt seems to have increased slightly more for listed firms than for unlisted firms. We investigate this further in the results section.

<INSERT FIGURE 5 HERE>

4.2 Methodology

We compute difference in difference estimates to examine the change in dependent variables in opaque and bad firms before and after SARFAESI. The regression estimated is:

$$Y_{it} = \alpha_i + \beta * Post + \delta * Opacity + \mu * Post * Opacity + \varphi * X_{it} + \varepsilon_{it}$$

where,

Y_{it} is the dependent variable e.g secured debt/assets, borrowing rates etc.

$Post$ is a dummy variable which equals 1 for the post-SARFAESI period and 0 for pre-SARFAESI period;

$Opacity$ is a dummy variable which equals 1 for informationally opaque firms and 0 for informationally transparent firms;

X_{it} are control variables;

The coefficient of interest is μ which represents the difference-in-difference estimate.

5 Results

5.1 Secured Debt

In Table 3 and Table 4, we show the difference-in-difference estimates for Secured Debt to Assets and Secured Debt to Debt for listed and unlisted firms before and after SARFAESI.

<INSERT TABLE 3 AND TABLE 4 HERE>

For DID estimates including all subsequent ones, we 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. As can be seen, there was a slight decrease in secured debt after SARFAESI for listed firms consistent with Vig (2013). However, on the contrary, there was a statistically significant increase in secured debt for unlisted firms. This result is consistent with the descriptive results in figure 2. In table 5, we present the regression results that formally show the DID effects. The regression equation is the one discussed earlier in the methodology section.

$$Secured\ Debt\ to\ Debt_{it} = \alpha_i + \beta * Post + \delta * Unlisted + \mu * Post * Unlisted + \varepsilon_{it}$$

We take *Secured Debt to Debt* as the dependent variable, as we want to disentangle the decision of use of secured debt from the leverage decision. The variable *Post* is a dummy variable which takes the value 1 if the observation is after SARFAESI and 0 if it is before SARFAESI. The coefficient of interest is that of the interaction variable *Unlisted*Post,* δ, which represents the DID effect of SARFAESI on unlisted firms as compared to listed firms.

<INSERT TABLE 5 HERE>

We perform the regression for four different specifications presented in columns 1 to 4 of regression results. The results in column 1 represents a simple DID regression with firm and year fixed effects. The results in column 2 are additionally controlled for whether a firm is rated or not by taking *Unrated* as a dummy variable which takes the value 1 if the firm has a credit rating. This variable is also taken as a proxy in prior literature (e.g. Gonas et al., 2004) for borrower opacity and hence we control for this variable. The results in column 3 are further controlled for size as measured by *log of sales* which is also taken sometimes (e.g. Gonas et al., 2004) as a measure of borrower opacity smaller firms being more opaque. The results in column 4 control for observable firm specific variables *ROA* and *Risk Premium*. ROA represents the observable borrower quality and risk premium represents the observable riskiness of the firm. As per theories of moral hazard that explain the use of collateral, we should see higher secured debt in observably lower quality and riskier firms (e.g in Berger and Udell, 1990; Chakraborty and Hu, 2006; Menkhoff et al., 2006). Hence, specification 4 disentangles the impact of moral hazard on the use of collateral from our results.

Our results show that the coefficient of *Post* is negative in all specifications and statistically significant in specifications 1-3. This implies that the use of secured debt decreased post SARFAESI for listed firms. The coefficient of our interest *Unlisted*Post* is positive and significant in all the specifications and represent a positive DID impact on unlisted or opaque firms. This is consistent with our hypothesis H1(i) and supports the argument that opaque firms tend to use collateral as a signaling device as their quality is unobservable. The coefficient of *Unrated* is also positive and significant indicating that firms which are not rated and hence opaque tend to go for more secured debt as expected. The coefficient of *log_sales* was expected to be negative because we hypothesized that smaller firms would have higher secured debt due to their opacity. We find, however, that the coefficient is positive and significant but small. The positive coefficient could be due to the fact that large firms are generally capital intensive and have large fixed assets to pledge as collateral, allowing them to hold higher secured debt which decreases their cost of capital.

In specification 4, the coefficient of *ROA* is negative and coefficient of *Risk Premium* is positive, and both are statistically significant. This result indicates that lower quality and riskier firms tend to have higher secured debt. The coefficient of *Unlisted*Post* remains positive and significant and actually increases in magnitude in specification 4 as compared to the other three specifications implying that when controlled for observable firm specific variables ROA and risk premia that control for moral hazard reducing effect of collateral, the signaling value of collateral is even higher.

We also test for an alternate explanation as per hypothesis H1(ii) that could lead to this result. One could argue that the increase in collateral in opaque firms as compared to transparent firms

could be due to the the fact that it is the lower quality and riskier firms among the firms moving towards more secured debt consistent with the role of collateral in alleviating moral hazard and not as a signaling device to alleviate ex-ante adverse selection. To test this explanation, we interact *Unlisted*Post* variable with observable indicators of firm quality *ROA* and *Risk Premium* and report these results in Table 6.

<INSERT TABLE 6 HERE>

We perform the regression for four different specifications presented in columns 1 to 4 of regression results. The results in column 1 represents a simple DID regression with firm and year fixed effects and Unrated, ROA and Risk Premium as control variables. The results show that the coefficient of *ROA* is negative and the coefficient of *Risk Premium* is positive indicating that observably lower quality and riskier firms require more secured debt indicating the overall role of collateral in reducing moral hazard related information asymmetry. The results in columns 2, 3 and 4 additionally include the interaction of *Risk Premium, ROA* and each separately with the variables *Post* and *Unlisted*Post* to test for the differential role of collateral between unlisted and listed firms in reducing moral hazard problem. The negative coefficient of *ROA*Post* and the positive coefficient of *Risk Premium*Post* will indicate the increase in the use of secured debt post-SARFAESI for lower quality and riskier firms among the listed firms. The results in column 2, 3 and 4 show that these coefficients are as per expectations and statistically significant. This is consistent with our hypothesis H1(ii). The coefficient of *ROA*Unlisted*Post* and the coefficient of *Risk Premium*Unlisted*post* indicate the differential role of collateral in reducing moral hazard among unlisted firms as compared to listed firms. The positive and statistically significant coefficient of *ROA*Unlisted*Post* and the negative and statistically significant coefficient of *Risk Premium*Unlisted*post* show that

the lower quality and riskier firms decreased their use of secured debt post SARFAESI among the unlisted firms as compared to listed firms. This result is also consistent with H1(ii) indicating that the moral hazard reducing role of collateral is not as much among unlisted firms. As before, the coefficient of *Unlisted*Post* is positive reaffirming the increased role of collateral as a signaling device to reduce adverse selection among unlisted firms. These results disentangle the role of collateral as moral hazard reducing agent and as a signaling device. Clearly, for unlisted firms which are opaque, the collateral assumes the role of a signaling device more as compared to the moral hazard reducing role.

5.2 Borrowing Rates and Risk Premia

Figure 3 and Figure 4 showed that both borrowing rates and risk premia declined for both types of firms in the post SARFAESI period indicating the mitigation of adverse selection. Since the figures don't tell us the differential impact between listed and unlisted firms, we look at the formal regression results in Table 7 that give us the DID coefficients. We use risk premium and not borrowing rate as a dependent variable for regression because it represents the pricing of debt disentangled from the macroeconomic interest rate environment.

<INSERT TABLE 7 HERE>

We perform the regression for four different specifications presented in columns 1 to 4 of regression results. The results in column 1 represents a simple DID regression. The results in column 2 include firm and year fixed effects. The results in column 3 are additionally controlled for whether a firm is rated or not by taking *Unrated* as a dummy variable which takes the value 1 if the firm has a credit rating. This variable is also taken as a proxy for borrower opacity and hence we control for this variable. The results in column 4 are further

controlled for ROA and long term debt to total debt which proxy for borrower quality and maturity respectively. We expect the lower quality firms to have higher risk premia and firms with higher long term debt to have higher risk premia.

Our results show that the coefficient of *Post* in all the specifications is negative and statistically significant indicating the reduction in risk premia for listed firms post SARFAESI. The decline in risk premia is as per expectations, since the supply of secured debt was expected to increase post SARFAESI due to easier access to collateral consistent with Vig (2013). The decline in risk premia for listed firms supports our hypothesis H2(i) that predicted a decrease in risk premia for informationally transparent firms post SARFAESI and also indicates a reduction in overall adverse selection. It can also be reaffirmed by the statistic that average number of lenders increased from 2.99 to 3.33 for listed firms post SARFAESI. The coefficient of *Unlisted*Post* is positive and significant in all four specifications indicating that that the reduction in risk premia for unlisted firms post SARFAESI was less than the reduction in risk premia for listed firms. The positive coefficient of *Unlisted*Post* supports our hypothesis H2(ii). The positive coefficient of *Unlisted*Post* can be attributed to more unlisted firms being able to afford secured credit due to use of collateral as a signaling device. When more such firms with higher opacity get into new relationship with lenders, the risk premium charged is expected to be slightly higher. Hence, the decrease in borrowing rates might not be as much as for listed firms. This is also supported by another statistic that while average number of lenders increased for listed firms as shown above, it decreased from 2.46 to 2.36 for unlisted firms post SARFAESI indicating newer borrowers entering into a relationship with a lender. In specification 3, we see that coefficient of *Unrated* is positive and significant which indicates that unrated (and hence opaque) firms have to pay more risk premium. In specification 4, The coefficient of ROA is negative and significant which supports the claim that lower quality

borrowers pay higher risk premia. The coefficient of long term debt to debt is positive and significant which supports the claim firms that have debt with longer maturity pay higher risk premia.

The results in this section support the signaling role of collateral in mitigation of adverse selection post SARFAESI via increased access to collateral. The lower decrease in borrowing rates for unlisted firms post SARFAESI as compared to that of listed firms supports our claim that newer higher quality borrowers among opaque borrowers can use the signaling role of collateral to get access to debt but lenders are prudent and risk averse to set borrowing rates for new entrants.

5.3 Debt Maturity

We next show the impact of SARFAESI on debt maturity for listed and unlisted firms. The graph in Figure 5 showed that average long term debt as a proportion of debt increased for both listed and unlisted firms. Long term debt to debt seemed to have increased slightly more for listed firms than for unlisted firms. In table 8, we show the results of DID regression using long term debt to total debt as the dependent variable.

<INSERT TABLE 8 HERE>

We perform the regression for four different specifications presented in columns 1 to 4 of regression results. The results in column 1 represents a simple DID regression. The results in column 2 include firm and year fixed effects. The results in column 3 are additionally controlled for whether a firm is rated or not by taking *Unrated* as a dummy variable which

takes the value 1 if the firm has a credit rating. The results in column 4 are further controlled for ROA as higher quality firms are expected to have higher maturity loans.

Our results show that the coefficient of *Post* is positive and statistically significant for all four specifications indicating that long term debt as a proportion of total debt increased for listed firms. The decrease in long term debt to debt post SARFAESI is consistent with our hypothesis H3(i) which proposes an increase in average maturity for both types of firms due to reduction in information asymmetries via increased role of collateral as a signaling device. The decrease in long term debt is also consistent with literature that show that stronger creditor rights lead to longer maturities (e.g., Giannetti, 2003; Qian and Strahan, 2007). The coefficient of *Unlisted*Post* is negative and statistically significant for all four specifications indicating that the increase in long term debt to debt was less for unlisted firms as compared to listed firms.

This is consistent with our hypothesis H3(ii) that for unlisted firms among which unobservably good firms can also use maturity as a signaling device by going for shorter maturity loans since they have higher confidence of a rolling over the debt, the signaling role of maturity as a contractual device further increases. Hence collateral and maturity of debt act as complementary contractual devices rather than substitutes. The lower increase in long term debt for unlisted firms can also be attributed to the fact that as more firms enter into debt contracts for the first time using collateral as a signaling device, the lenders would be hesitant to give them loans of higher maturity and would likely offer them shorter maturity loans and only after they establish a relationship are they likely to get longer maturity loans.

6 Conclusion

Much of our understanding of the role of collateral on information asymmetry emerges from two broad strands of literature. Whereas one strand of theoretical literature views collateral as a device that reduces adverse selection by acting as a screening or signaling device, the other strand views collateral as an incentive device reducing the moral hazard problem. Previous empirical studies have found results in favor of both and so far it has been hard to conclude which one dominates.

Our findings are consistent with the first strand that collateral mitigates the adverse selection problem by playing the role of a signaling device. Using SARFAESI act, which increased access to collateral, as a natural experiment and DID methodology, we find that informationally opaque or unlisted firms moved more towards secured debt as compared to informationally transparent or listed firms. This differential response points to the role of collateral in mitigation of information asymmetry. We further disentangle the role of collateral in reducing moral hazard and in mitigating adverse selection. We do find the evidence of existence of a moral hazard reducing role of collateral. However, for unlisted firms, we find that collateral plays more of a signaling role in mitigating adverse selection. We also find that the borrowing rates and risk premia for both types of firms decreased indicating the possibility of reduction in information asymmetry. We find support for our hypothesis that as new firms among unlisted firms get access to credit using collateral as a signaling device thus reducing credit rationing, the banks are prudent and risk averse to set borrowing rates for such firms and hence the risk premia decreased less for unlisted firms as compared to listed firms. We also find that long term debt increased post SARFAESI indicating the role of stronger creditor rights in

increasing debt maturity consistent with prior literature. We further find that collateral and maturity as contracting terms act as complements while playing a signaling role in mitigation of information asymmetry.

Our findings also have implications from a policy perspective. The intended impact of SARFAESI was not reduction of information asymmetry but improvement of creditor rights which could increase the supply of secured debt. According to Vig (2013), the act didn't have the intended impact as reduction of demand from firms due to threat of premature liquidation outweighed the increase in supply. However, as shown in this paper, there was a positive impact of the act as it helped in mitigation of adverse selection problems wherein good quality firms among unlisted firms moved towards more secured debt and got access to credit. Hence we suggest that the impact of policies involving change in creditor rights or enforcement of debt contracts be looked not only from an aggregate perspective but also how they impact different players (e.g listed and unlisted firms in our paper) differently.

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Figure 1: De-meaned time series of Secured Debt to Assets

Here we plot the de-meaned values of the variable secured debt/total assets on the y-axis

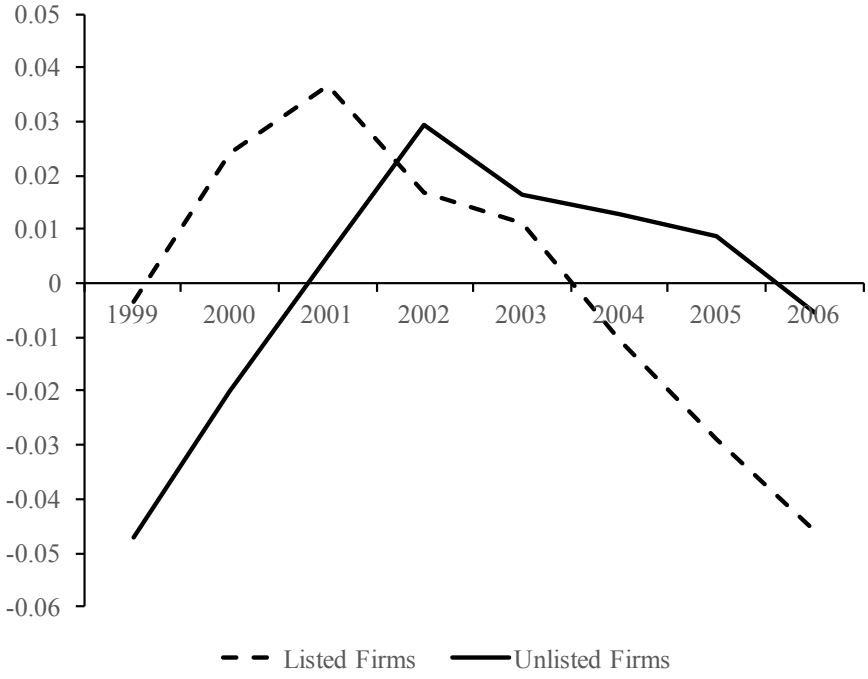

Figure 2: De-meaned time series of Secured Debt to Total Debt

Here we plot the de-meaned values of the variable secured debt/total debt on the y-axis

Figure 3: De-meaned time series of borrowing rates of listed and unlisted firms

Here we plot the de-meaned values of the variable borrowing rates on the y-axis

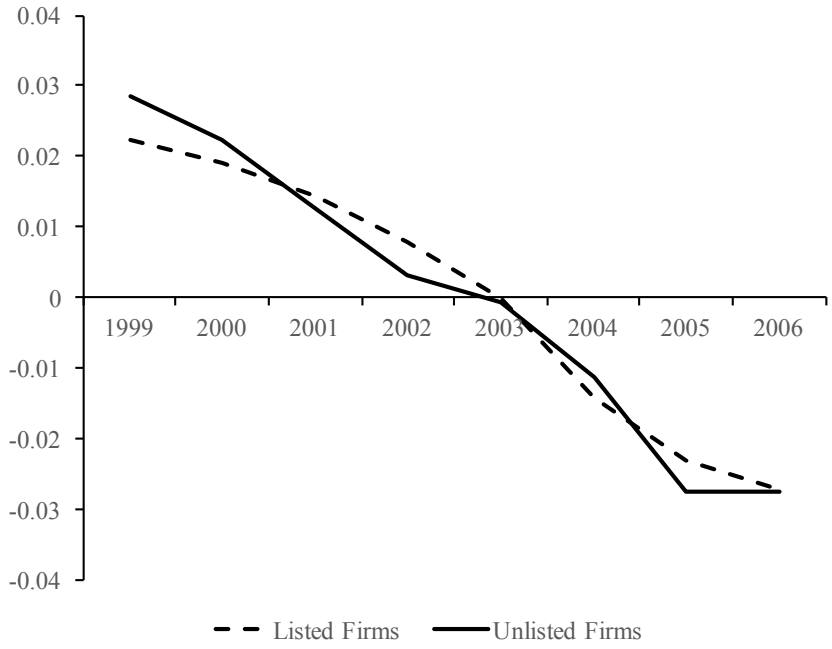

Figure 4: De-meaned time series of risk premia of listed and unlisted firms

Here we plot the de-meaned values of the variable risk-premia on the y-axis

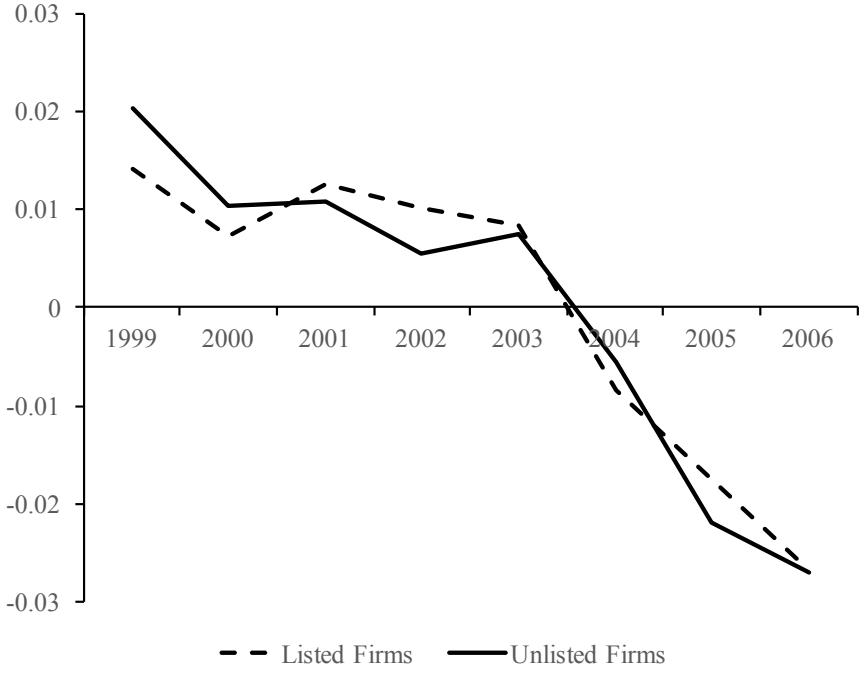

Figure 5: De-meaned time series of long term debt to debt of listed and unlisted firms

Here we plot the de-meaned values of the variable long term debt/total debt on the y-axis

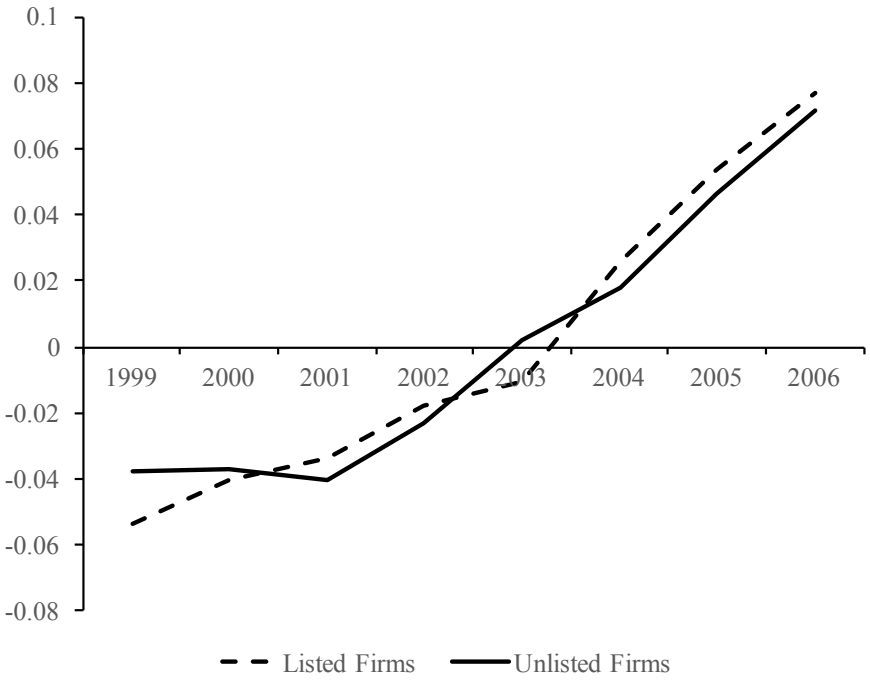

Table 1: Descriptive Statistics: Pre and Post SARFAESI

This table reports summary statistics for variables used in the analysis. Apart from the average values across FY 1999-2006 in the last column, the table reports pre-SARFAESI and post-SARFAESI values of the variables, their difference (Post-Pre) and the t-statistic to check statistical significance of the difference. The data is collapsed firm wise such that one firm takes not more than one value each in pre-SARFAESI and post-SARFAESI period. The data for Total Assets and Sales is reported in INR million. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

Variable	Pre-SARFAESI	Post-SARFAESI	Difference (Post-Pre)	t-stat	Average
Total Assets	1096.43	868.18	-228.25	-4.80	947.91
Sales	712.61	625.20	-87.41	-3.19	657.08
Total Debt to Assets	49.09%	53.84%	4.76%	5.71	52.07%
Secured Debt to Total Assets	34.76%	34.73%	-0.02%	-0.04	34.74%
Secured Debt to Total Debt	73.06%	73.73%	0.68%	1.73	73.47%
Long Term Debt to Total Debt	26.61%	35.18%	8.57%	16.62	32.09%
Borrowing Rate	15.99%	12.58%	-3.42%	-12.02	13.95%
Number of Lenders	2.74	2.68	-0.06	-1.32	2.70
Number of Firms	11,311	21,077			22,553
Number of Listed Firms	3,611	3,052			4,111
Proportion of Listed Firms	31.92%	14.48%			18.23%
Number of Rated Firms	1,041	871			1,333
Proportion of Rated Firms	9.20%	4.13%			5.91%

Table 2: Descriptive Statistics of Listed and Unlisted firms

This table reports summary statistics for variables used in the analysis for listed and unlisted firms for the period FY 1999-2006, their difference (Unlisted-Listed) and the t-statistic to check statistical significance of the difference. The data is collapsed firm wise such that one firm takes not more than one value. The data for Total Assets and Sales is reported in INR million. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

Variable	Listed	Unlisted	Difference (Unlisted-Listed)	t-stat	Average
Total Assets	1847.63	621.72	-1225.91	-14.13	846.87
Sales	1307.73	405.29	-902.45	-17.51	587.49
Total Debt to Assets	48.90%	52.78%	3.88%	3.59	51.94%
Secured Debt to Total Assets	37.62%	32.69%	-4.93%	-6.34	33.96%
Secured Debt to Total Debt	76.15%	72.22%	-3.93%	-8.38	73.23%
Long Term Debt to Total Debt	27.67%	36.11%	8.44%	14.01	33.69%
Borrowing Rate	15.06%	13.42%	-1.64%	-4.19	13.84%
Number of Lenders	3.06	2.35	-0.71	-13.07	2.62
Number of Firms	4,111	18,442			22,553
Number of Rated Firms	876	457			1,333
Proportion of Rated Firms	21.31%	2.48%			5.91%

Table 3: DID estimates for Secured Debt to Assets

The table reports the difference-in-difference (DID) estimates for secured debt to assets for unlisted and listed firms, post-SARFAESI and pre-SARFAESI. For DID estimates we collapse the data points into single data points (based on firm averages) both before and after. This results in not more than one data point per firm post-SARFAESI and pre-SARFAESI each. The third column reports the standard errors of the differences, the fourth column reports the t-statistics and the fifth column reports the p-values. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

	Secured Debt to Assets	**SE**	**t-stat**	**P>|t|**
Listed Firms				
Pre-SARFAESI	0.367			
Post-SARFAESI	0.326			
Difference	*-0.041*	*0.011*	*-3.76*	*0.000****
Unlisted Firms				
Pre-SARFAESI	0.335			
Post-SARFAESI	0.353			
Difference	*0.018*	*0.007*	*2.49*	*0.013***
Diff-in-Diff	**0.059**	**0.013**	**4.51**	**0.000****

Table 4: DID estimates for Secured Debt to Debt

The table reports the difference-in-difference (DID) estimates for secured debt to total debt for unlisted and listed firms, post-SARFAESI and pre-SARFAESI. For DID estimates we collapse the data points into single data points (based on firm averages) both before and after. This results in not more than one data point per firm post-SARFAESI and pre-SARFAESI each. The third column reports the standard errors of the differences, the fourth column reports the t-statistics and the fifth column reports the p-values. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

	Secured Debt to Debt	**SE**	**t-stat**	**P>|t|**
Listed Firms				
Pre-SARFAESI	0.766			
Post-SARFAESI	0.76			
Difference	*-0.006*	*0.007*	*-0.76*	*0.446*
Unlisted Firms				
Pre-SARFAESI	0.708			
Post-SARFAESI	0.731			
Difference	*0.024*	*0.005*	*4.88*	*0.000****
Diff-in-Diff	**0.029**	**0.009**	**3.31**	**0.001****

Table 5: DID effect of SARFAESI on Secured Debt of listed and unlisted firms

The table reports the results for the regression $Secured\ Debt\ to\ Debt_{it} = \alpha_i + \gamma_t + \beta * Post + \delta * Unlisted + \mu * Post * Unlisted + X_{it} + \varepsilon_{it}$. Here i indexes firm and t indexes time; $\alpha_i$and γ_t are firm and times fixed effects respectively. *Post* is a dummy variable that takes the value 1 if the it is post-SARFAESI period. *Unlisted* is a dummy variable that takes the value 1 for unlisted firms. Unlisted firms are the treated group whereas listed firms are the control group. X_{it} are the control variables such as Unrated, log_sales, ROA and Risk Premium. The coefficient of interest is μ which captures the DID effect. t-statistics are reported in parenthesis. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

	Secured Debt to Debt			
Variables	1	2	3	4
Unlisted	-0.009**	-0.010**	-0.010**	-0.011**
	(-2.10)	(-2.20)	(-2.10)	(-2.31)
Post	-0.007*	-0.008**	-0.008**	-0.002
	(-1.90)	(-2.14)	(-2.00)	(-0.56)
Unlisted*Post	0.008**	0.009**	0.006*	0.011***
	(2.26)	(2.39)	(1.75)	(2.82)
Unrated		0.014***	0.016***	0.016***
		(3.06)	(3.32)	(3.41)
log_sales			0.002*	
			(1.70)	
ROA				-0.039***
				(-4.22)
Risk Premium				0.093***
				(12.60)
R-sqr	0.001	0.001	0.001	0.007
dfres	42100	42099	39865	35631
N	56430	56430	53645	48127
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

Table 6: DID effect of SARFAESI on Secured Debt of listed and unlisted firms

The table reports the results for the regression $Secured\ Debt\ to\ Debt_{it} = \alpha_i + \gamma_t + \beta * Post + \delta * Unlisted + \tau * Unlisted * Firm\_Quality + \omega * Post * Firm\_Quality + \mu * Post * Unlisted + \theta * Post * Unlisted * Firm\_Quality + X_{it} + \varepsilon_{it}$. Here i indexes firm and t indexes time; α_i and γ_t are firm and times fixed effects respectively. *Post* is a dummy variable that takes the value 1 if the it is post-SARFAESI period. *Unlisted* is a dummy variable that takes the value 1 for unlisted firms. Unlisted firms are the treated group whereas listed firms are the control group. *Firm_Quality* is represented by the variables ROA and Risk Premium. X_{it} are the control variables such as Unrated, ROA and Risk Premium. The coefficient θ captures moral hazard reducing role for unlisted firms as compared to that for listed firms. The coefficient of interest is μ which captures the DID effect after disentangling for moral hazard reducing effect. t-statistics are reported in parenthesis. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

Secured Debt to Debt				
	1	2	3	4
Unlisted	-0.011**	-0.016***	-0.013**	-0.018***
	(-2.31)	(-3.16)	(-2.57)	(-3.40)
Post	-0.002	-0.006	-0.003	-0.007
	(-0.56)	(-1.43)	(-0.68)	(-1.54)
Unlisted*Post	0.011***	0.014***	0.011***	0.015***
	(2.82)	(3.21)	(3.00)	(3.38)
Unrated	0.016***	0.016***	0.016***	0.016***
	(3.41)	(3.42)	(3.44)	(3.45)
ROA	-0.039***	-0.039***	-0.020	-0.020
	(-4.22)	(-4.20)	(-1.13)	(-1.12)
Risk Premium	0.093***	0.041**	0.093***	0.041**
	(12.60)	(2.53)	(12.60)	(2.52)
Unlisted*Risk Premium		0.062***		0.062***
		(2.83)		(2.87)
Post*Risk Premium		0.042*		0.042*
		(1.89)		(1.89)
Unlisted*Post*Risk Premium		-0.028		-0.029
		(-0.99)		(-1.02)
Unlisted*ROA			-0.068***	-0.068***
			(-2.99)	(-2.99)
Post*ROA			-0.031	-0.031
			(-1.23)	(-1.25)
Unlisted*Post*ROA			0.104***	0.104***
			(3.43)	(3.45)
R-sqr	0.007	0.007	0.008	0.008
dfres	35631	35628	35628	35625
N	48127	48127	48127	48127

Table 7: DID effect of SARFAESI on Risk Premia of listed and unlisted firms

The table reports the results for the regression $Risk\ Premium_{it} = \alpha_i + \gamma_t + \beta * Post + \delta * Unlisted + \mu * Post * Unlisted + X_{it} + \varepsilon_{it}$. Here *i* indexes firm and *t* indexes time; α_i and γ_t are firm and times fixed effects respectively. *Post* is a dummy variable that takes the value 1 if the it is post-SARFAESI period. *Unlisted* is a dummy variable that takes the value 1 for unlisted firms. Unlisted firms are the treated group whereas listed firms are the control group. X_{it} are the control variables such as Unrated, ROA and long term debt to total debt. The coefficient of interest is μ which captures the DID effect. t-statistics are reported in parenthesis. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

	Risk Premium			
Variables	1	2	3	4
Unlisted	-0.006*	-0.004	-0.004	-0.007*
	(-1.90)	(-0.96)	(-1.09)	(-1.93)
Post	-0.029***	-0.045***	-0.046***	-0.049***
	(-12.68)	(-13.75)	(-13.98)	(-15.90)
Unlisted*Post	0.010***	0.013***	0.013***	0.008***
	(3.40)	(4.17)	(4.32)	(2.82)
Unrated			0.014***	0.001
			(3.59)	(0.17)
ROA				-0.028***
				(-3.72)
LongTermDebt_TotalDebt				0.060***
				(15.83)
R-sqr		0.010	0.010	0.038
dfres		41481	41480	18229
N	55815`	55815	55815	26915
Firm Fixed Effects	No	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	Yes

Table 8: DID effect of SARFAESI on debt maturity of listed and unlisted firms

The table reports the results for the regression $Long\ term\ debt\ to\ Total\ Debt_{it} = \alpha_i + \gamma_t + \beta * Post + \delta * Unlisted + \mu * Post * Unlisted + X_{it} + \varepsilon_{it}$. Here *i* indexes firm and *t* indexes time; $\alpha_i$and γ_t are firm and times fixed effects respectively. *Post* is a dummy variable that takes the value 1 if the it is post-SARFAESI period. *Unlisted* is a dummy variable that takes the value 1 for unlisted firms. Unlisted firms are the treated group whereas listed firms are the control group. X_{it} are the control variables such as Unrated and ROA. The coefficient of interest is μ which captures the DID effect. t-statistics are reported in parenthesis. ***, **, and * implies significance at 99% level, 95% level and 90% level repectively. The data spans FY 1999-2006. Source: CMIE Prowess (publishes detailed financial information on Indian firms)

Long Term Debt to Total Debt				
Variables	1	2	3	4
Unlisted	0.048***	0.019***	0.019***	0.016**
	(8.39)	(2.72)	(2.73)	(2.28)
Post	0.071***	0.095***	0.096***	0.095***
	(17.25)	(16.28)	(16.28)	(16.09)
Unlisted*Post	-0.027***	-0.034***	-0.034***	-0.034***
	(-5.13)	(-6.08)	(-6.09)	(-6.14)
Unrated			-0.004	-0.003
			(-0.62)	(-0.40)
ROA				0.049***
				(3.61)
R-sqr		0.025	0.025	0.026
dfres		20867	20866	20296
N	30534	30534	30534	29758
Firm Fixed Effects	No	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	Yes