

# Creditor Rights and Allocative Distortions – Evidence from India

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## ABSTRACT

Efficient exits ensure resources are forced away from unproductive firms. I exploit a collateral reform in India that made it easier for secured creditors to seize defaulters' assets thereby making the process of exit of firms efficient. Post the passage of the law, banks cut credit to low-quality firms and increased credit to high-quality firms. Subsequently, low-quality firms cut capital expenditure and employment. This is partly attributable to a reduction in credit to otherwise insolvent borrowers (zombies). Importantly, the resulting decongestion increased secured debt, employment and capital expenditure of non-zombie borrowers that operated in previously zombie-dominated industries and reallocated labor and capital away to firms with higher marginal products of labor and capital.

**Keywords:** Misallocation, Access to credit, Financial Institutions, Zombies.

**JEL Classification:** G21

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*“The Charkravyuha legend from the Mahabharata describes the ability to enter but not exit, with seriously adverse consequences. It is a metaphor for the workings of the Indian economy in the 21st century, the legacy of several decades of economic policy making.”*

— Economic Survey 2015–16, Ministry of Finance, India

Misallocation of resources across firms can lower aggregate efficiency, particularly for developing countries (Hsieh and Klenow (2009)). While this can be attributed to a variety of government policies and institutional settings, I study one factor: the exit of firms which is necessary for the efficient functioning of a market economy. This idea that exits or creative destruction is important goes as far back as Joseph Schumpeter. The process of creative destruction through efficient exits ensures that resources are allocated away from unproductive uses. In this paper I focus on one important aspect of making the process of firm exits efficient, that is, creditors’ ability to seize defaulters’ assets.

Underdeveloped and politicized institutions hinder the process of creative destruction and can result in sluggish creation, technological sclerosis and spurious reallocation of factors of production (Caballero and Hammour (1998), Caballero and Hammour (2001)). It follows that making this process of creative destruction more efficient can reduce and reallocate rents, which leads to better allocation of resources over time. I exploit a 2002 collateral reform in India that made it easier for secured creditors to seize defaulters’ assets, as a natural experiment in which to examine reallocation of resources across firms. When banks are no longer encumbered by a poor institutional setting to recover their loans, creditors can force poor quality firms to realign their operations and improve their productive efficiency.

The passage of the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interests Act of 2002 (SARFAESI) made it easier for creditors to seize the assets of defaulting borrowers and access the collateral securing the loan. Prior to the reform, the slow judicial process made it difficult for creditors to recover their assets and creditors usually went through a long judicial battle to liquidate the firm. Additionally, several loopholes meant

that firms could indefinitely stall the judicial process.<sup>1</sup> The reform allowed creditors to seize and liquidate assets of a defaulting firm, thereby circumventing the long judicial process. Importantly, the law only applied to secured borrowers and not to unsecured borrowers.

In this paper I examine whether the above collateral reform, which strengthened the rights of secured borrowers, allocated secured debt away from low quality borrowers to high quality borrowers. I examine whether the reduction in secured debt to low quality borrowers was partly attributable to a reduction in continued financing or *evergreening* of loans to unprofitable borrowers (also called zombies). I then examine how the reduction in secured debt affected the capital expenditure and employment of low quality firms relative to high quality firms. In order to see whether the reduction in secured debt had an impact on other firms that operate in decongested industries, I examine the spillovers on debt, capital expenditure and employment of the remaining non-zombie firms. I conclude by examining the overall impact on profitability and reallocation of labor and capital.

Figure 1 motivates our analysis. This graph shows that the reform had an immediate impact on the health of firms in the economy. The number of firms with interest coverage ratio (ICR)<sup>2</sup> less than 1 fell from 30 percent in March 2002 to 14 percent in 2006. The percentage of firms with negative profit fell from 38 percent to 23 percent in 2006. This graph summarizes the motivation for our analysis: overall health in terms of firm profitability and debtor profile improved dramatically post the reform, that is, when creditor rights increased. The challenge, of course, is in establishing this improvement in borrower health and profitability is attributable to the improvement in creditor rights.

I begin by analyzing the impact of the reform on the change in secured debt<sup>3</sup> holdings of low quality borrowers relative to high quality borrowers. Low quality borrowers are defined as firms with median ICR of less than one in 2001 (one year before the reform).<sup>4</sup> On average,

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<sup>1</sup>For examples, defaulters can file at the Board for Industrial and Financial Reconstruction (BIFR) as a way to delay legal actions by banks for debt recovery <http://www.livemint.com/Industry/t1UKPlhvAfnzcz1smml6e0/Sick-firms-take-BIFR-route-to-delay-legal-action-by-banks.html>.

<sup>2</sup>ICR is the ratio of earnings before interest and taxes to total interest expense.

<sup>3</sup>I examine the change in debt which I also refer to simply as borrowings. When borrowings are negative this refers to a decline in secured debt.

<sup>4</sup>The baseline results are robust to alternate definitions of low quality borrowers and are described in the appendix, Section B.

borrowings of low quality borrowers *declined* by 40 million *relative* to high quality borrowers.

The empirical challenge in estimating the differential impact of the law is that the relative decline of secured borrowings of low quality borrowers could be attributed to other macroeconomic factors that changed simultaneously with the reform. As a solution to this endogeneity problem, I exploit cross-sectional variation in a firms' ability to collateralize assets to generate variation in the treatment effect.<sup>5</sup> Since the law applied only to secured borrowers, firms with more collateralizable assets were more affected by the law compared to firms with less collateral. Since only tangible assets can be effectively collateralized in India, I use the tangibility measure as defined in Rajan and Zingales (1995) to classify firms into treatment and control groups. The treatment group comprises of firms with above median asset tangibility in 2001, one year before the reform, whereas the control group comprises of firms with the below median asset tangibility.<sup>6</sup> Thus, I adopt a differences-in-difference-in-difference (DDD) strategy by using the relative difference in secured borrowings of low quality borrowers to high quality borrowers for borrowers and then comparing this relative difference for the high tangibility group versus the low tangibility. My primary hypothesis is that reform differentially affected the secured borrowings of low quality borrowers relative to high quality borrowers. But, to account for other macroeconomic factors that could also differentially affect low quality borrowers, I measure the effect relative to a similar difference between low quality and high quality borrowers *but* with low tangibility of assets. Thus, in the preferred DDD empirical specification I find that low quality borrowers reduced secured borrowing by INR 39 million. Additionally, since the law did not pertain to unsecured debt, there was no relative difference in unsecured borrowings of low and high quality borrowers.

One way to interpret the reduction in secured debt results is that it is driven by a Coasian response of low quality firms fearing liquidation preemptively cutting back on secured borrowings. A long law and finance literature has focused on the liquidation bias arising out of higher creditor rights. This literature (Hart and Moore (1994) and Hart and Moore (1999))

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<sup>5</sup>Vig (2007) uses similar cross-sectional heterogeneity.

<sup>6</sup>Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms.

argues that giving excessive rights to creditors may result in inefficiencies and may result in a decline in credit access, in contrast to the commonly held view that increased creditor rights improve credit access. This argument is similar to Vig (2007) who also finds that post the reform, secured debt of borrowers with higher proportion of tangible assets declined. Vig (2007) argues that because these borrowers have the most to lose, firms undo some of the inefficiency caused by the increased creditor rights by cutting down their secured borrowings. These arguments, however, emphasize that it is the *excessive* creditor rights that leads to a reduction in secured borrowings. I show, however, that it is *only* the low quality borrowers among the firms with a high proportion of tangible assets that cut down on secured borrowings. None of the reduction in secured debt of borrowers with high asset tangibility is driven by the high quality borrowers. Thus, low quality borrowers with a higher proportion of tangible assets had the most to lose post the reform and preemptively cut back on secured borrowings.

I hypothesize that the reduction in secured debt is also partly attributable to reduced evergreening of loans by banks. In periods with weak creditor rights, lenders have no other recourse to recover their bad loans and hence may need to evergreen loans in the hope that firms recover in due time. Additionally, given the higher risk capital requirements lenders are reluctant to recognize loans as non-performing assets. Thus, I hypothesize that post the reform, creditors no longer needed to continue evergreening loans. Following Caballero et al. (2008), unprofitable borrowers or zombies are defined as firms with interest rates below the minimum prime lending rate. In the preferred DDD specification, I find that firms that were classified as zombies in the pre-SARFAESI reduced secured borrowings by an average of INR 35 million relative to an average of INR 62 million before the reform. Further, I find that firms were 10 percent more likely to transition to non-zombie status after the reform.

The reduction in secured debt also affected capital expenditure and employment. Capital expenditure of low quality borrowers declined by an average of INR 21 million relative to high quality borrowers representing a 35 percent reduction in capital expenditure. Using a unique dataset on planned expenditure, I also find that the reduction in expenditure is concentrated in non-core projects implying post the reform, banks potentially forced firms to refocus their operations.

I supplement this analysis with employment data at the factory level.<sup>7</sup> Number of employees of low quality borrowers declined by an average of 13 employees relative to the high quality borrowers relative to an average of 306 employees representing 6 percent decline.

Profitability in terms of operating margin and return on assets of low quality borrowers also increased after the law. Underperforming factories were 4 percent more likely to be shut down following the act. Recent papers (Nini et al. (2012a) and Nini et al. (2012b)) have found that banks can influence the operations of firms which violate financial covenants. Similar to my results, Ersahin et al. (2016) look at the US and show that firms which violate covenants are forced by creditors to shed workers and close/sell establishments in noncore business lines.

I turn to the next main set of results on the spillover effects of the law. This analysis is in the spirit of Caballero et al. (2008) who examine the increase in number of zombie firms in the 1990s in Japan and find that zombie-dominated industries exhibited more depressed job creation and destruction which in turn had spillover effects and depressed investment and employment growth of non-zombies. In my setting, the process of exit of firms became easier which implies that the resulting decongestion — through a reduction in evergreening of loans — should increase credit to the non-zombies. Indeed, I find that non-zombies in sectors with the highest number of zombies (above median percentage of zombies) before the reform witnessed the benefits of this decongestion and increased secured borrowings on average by Rs 41 million relative to an average of 64 million. Capital expenditure of non-zombies in these industries increased by INR 47 million and number of employees increased by 16 representing a 35 percent and 6 percent increase respectively. Industries that witnessed the greatest decongestion (reduction in number of zombies) also had higher tangibility. Thus, another way of interpreting the results on spillovers is that non-zombies, especially in industries with high tangibility witnessed the highest reallocation of debt, capital and labor.

One concern is that the industry-level variation in number of zombie could be proxying for some other factor that made a particular industry more attractive. To address this concern I

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<sup>7</sup>For the baseline analysis I use Prowess CMIE data. However, since 90 percent of the employment numbers are missing in the CMIE database, I take the employment numbers from Annual Survey of Industries (ASI). The disadvantage of the ASI data is that it restricts to only manufacturing industries and pertains to factories. So I interpret these results as pertaining to the manufacturing industries and on the intensive margin of firms, that is, at the factory or establishment level.

turn to an alternate specification that uses within-industry variation. I look at whether the reallocation of labor and capital increased to firms with higher marginal products of capital and labor. Indeed, I find that capital was redeployed to firms with higher marginal product of capital especially so for firms with higher tangibility of assets within an industry. Similarly, labor was reallocated towards firms with higher marginal product of labor. This reallocation of capital and labor from low quality to high quality firms significantly increased the marginal productivity of both capital and labor.

To summarize, my results show that the congestion created by low-quality firms before the reform allocated debt away from healthier firms. The presence of zombie firms depressed employment and investment of high quality firms that operated in these congested industries. Post the reform, banks increased secured credit to high-quality firms and cut secured credit to low-quality firms. The resulting decongestion increased employment and investment of high-quality borrowers that operated in the same industry. My analysis suggests that both capital and labor reallocation due to a reallocation in debt arising from improved creditor rights can affect aggregate productivity and performance of firms.

The paper is organized as follows. Section I reviews this paper's contributions to the existing literature. Section II and section III describes the institutional details and data. Section IV describe the empirical methodology. Section V describes the impact of the Act on firm borrowings and real outcomes respectively. Section VI examines zombie distortions and spillovers on non-zombie firms. Section VII concludes. Additional robustness results are described in greater detail in the appendix Section B.

## **I. Related Literature**

My results touch on several strands of literature. A large older law and finance literature starting with the seminal paper by La Porta et al. (1997b) have found that better creditor rights are associated with higher financial development. These findings along with La Porta et al. (1997b), Levine (1998), Levine (1999), Djankov et al. (2007), Beck et al. (2004) and Haselmann et al. (2010a) find that ownership protection, particularly in credit markets, helps

financial development by lowering the cost of credit. In a similar vein, Banerjee and Duflo (2005) point to how financial frictions hinder firm investment and economic development. This law and finance literature emphasizes how improved creditor rights can result in improved credit access for borrowers. Creditor rights can also affect debt enforcement and corporate policies (Acharya et al. (2005), Haselmann et al. (2010b), Acharya and Subramanian (2009)), Bae and Goyal (2009), Acharya et al. (2011), Gopalan et al. (2016)) and can reduce agency problems and conflicts of interest between creditors and firms usually during the bankruptcy or contracting stage (Gale and Hellwig (1985), Townsend (1979), Jensen and Meckling (1976) and Smith and Warner (1979)). More recent papers such as Nini et al. (2012a), Nini et al. (2012b)) and Ersahin et al. (2016) also show that higher creditor rights can influence firm day to day operations and force underperforming borrowers to tighten their operations.

Most of the above papers have focused on the positive effects of improved creditor rights. This literature is in contrast to the long law and finance literature that focuses on the liquidation bias arising out of higher creditor rights. This literature (Hart and Moore (1994) and Hart and Moore (1999)) argues that giving excessive rights to creditors may result in inefficiencies and may result in a *decline* in credit access, in contrast to the commonly held view that increased creditor rights improve credit access.

As discussed in the previous section, Vig (2007) finds that post-SARFAESI, secured debt of borrowers with higher proportion of tangible assets declined. As Vig (2007) argues, strengthening of creditor rights can generate two simultaneous effects, one an income effect and the other a substitution effect. The income effect is in line with the older law and finance literature which argues that an improvement in creditor rights results in greater credit access since lenders have greater access to collateral and thus the liquidation value of the firm is higher. In contrast, since firms can credibly threaten to seize defaulters assets firms may prefer to undo the inefficiency from higher creditor rights by cutting back on secured debt and substituting into other forms of debt. This is the liquidation bias argument. These arguments emphasize that is it the *excessive* creditor rights that lead to a reduction in secured borrowings borrowers. However, I show that it was *only* the low quality borrowers with high proportion of tangible assets that cut down on secured borrowings. In line with above, Alok et al. (2016)

also finds that borrowers with higher proportion of tangible assets switch away from secured debt to trade credit, and away from capital to labor. Both Vig (2007) and Alok et al. (2016) highlight the unintended consequences of increasing creditor rights. While Vig (2007) shows that the SARFAESI had the unintended consequence of lowering secured debt of borrowers with a high proportion of tangible assets, Alok et al. (2016) shows that these borrowers subsequently substitute away from secured formal credit towards trade credit and away from capital to labor. Their results emphasize the unintended consequence of *excessive* creditor rights, particularly after the passage of the SARFAESI. My results, on the other hand, highlight one aspect of the Lucas Critique, that is, policy evaluation often does not account for the fact that economic agents can change their behavior in response to policy. Thus, while the SARFAESI Act had the effect of decreasing debt to some borrowers, I show that it also had the perhaps *intended* consequence of allocating debt away from low quality borrowers to high quality borrowers.

Lilienfeld-Toal et al. (2012) highlight another reason why stronger legal enforcement can result in lower credit access to some borrowers. They argue that stronger legal enforcement of lender rights and subsequent increase in credit access for *all* borrowers is true only under the assumption that supply of credit is infinitely elastic. With inelastic supply, stronger enforcement generates general equilibrium effects that may *reduce* credit access for small borrowers while expanding credit access for wealthy borrowers. My paper provides another reason stronger creditor rights can reduce credit access to *certain* borrowers, namely, low quality borrowers. Improving legal enforcement of lender rights allows banks to exit existing creditor relationships more easily and thus they may not be willing to continue lending — in other words, evergreening — in the hopes that the firms will turnaround. Instead the ability to liquidate or simply the threat of being able to do so results in firms cutting down on borrowings, streamlining their operations and improving profitability and efficiency.

My paper is also related to the literature looking at the spillover effects of zombies. Caballero et al. (2008) examine the increase in number of zombie firms in the 1990s in Japan and found that zombie-dominated industries exhibited more depressed job creation and destruction, and lower productivity. They found that the increase in zombies depressed the investment and employment growth of non-zombies and widened the productivity gap between zombies and non-

zombies. Caballero and Hammour (1998), Caballero and Hammour (2001) and subsequently Caballero et al. (2008) emphasize two effects “sclerosis” and “scrambling” when there are frictions to creative destruction. First, “sclerosis” in my setting refers to the preservation of firms or projects that would not have survived without the evergreening of loans by banks or simply because of their inability to force defaulting firms to streamline their operations and improve profitability. The second effect “scrambling” in my setting refers to the survival of firms that are less productive and subsequently this keeps banks from either allocating resources to more productive firms, or very simply keeps out new entrants. In this paper, I find that when the impediments to creative destruction — inability of lenders to quickly liquidate — are removed both sclerosis and scrambling decline and hence capital and labor gets allocated away from poor quality borrowers to higher quality borrowers. Importantly, my results highlight that while weak creditor rights can hinder the reallocation of capital towards more productive projects (La Porta et al. (1997a), Demirguc-Kunt and Maksimovic (1998) and Djankov et al. (2005)), an improvement in these creditor rights can reallocate resources towards more productive projects.

## **II. Institutional Details and the collateral reform**

Bankruptcy laws determine the process by which recovery proceeds. Historically, the enforcement of creditor rights in India has been extremely cumbersome and marked with significant judicial delays. Prior to 1993, due to the absence of defined mechanisms to deal with non-performing assets (NPAs) banks and financial institutions had to take recourse to long legal procedure against defaulting borrowers which started by filing claims in courts. The already burdened civil courts had a backlog of pending cases and thus filing claims had no immediate effect. In light of these long judicial delays, the Committee on the Financial System headed by Shri M. Narasimham (Narasimham Committee I) in 1991 recommended setting up Special Tribunals to ease the existing workload on the court system. based on this recommendation, the government of India introduced Debt Recovery Tribunals (DRTs) in 1993 to facilitate speedy recovery of delinquent loans. The DRTs were quasi-legal institutions that streamlined the legal

procedure and were meant to allow speedy adjudication and swift execution of the verdict (see Visaria (2009) for further detail). In fact, Visaria (2009) finds that the setting up of DRTs reduced borrower delinquency and led banks to provide cheaper credit.

However, due to inadequate infrastructure and shortage of recovery personnel, the DRTs too soon got clogged with excessive cases and ended up being ineffective. Thus, based on another set of recommendations by the Narasimham Committee II (1998) and the Andhyarujina Committee (1999), the government enacted the reform in 2002. The SARFAESI Act allows secured creditors to recover their non-performing assets by taking possession, managing and selling the securities *without* the intervention of a court or tribunal. The Act essentially provided three alternative methods for recovery of NPAs, namely through securitisation, asset reconstruction and enforcement of security without intervention of the court. That is, secured creditors could circumvent the lengthy judicial process and seize the assets securing the loan. The Act applied to both pre-existing contracts as well as new contracts. In particular, the law specifically applied to banks and financial institutions and not to non-banking financial companies (NBFCs).<sup>8</sup>

Under the SARFAESI Act (section 13 (2)), after a loan has been classified as a non-performing asset (NPA) by the secured creditor, a notice is sent to the relevant borrower. If the borrower fails to discharge his liability in repayment of any secured debt within 60 days from the date of notice by the secured creditor, the creditor is entitled to (i) take possession of the secured assets of the borrower (ii) takeover of the management of the business of the borrower (iii) appoint any person to manage the secured assets, possession of which is taken by the secured creditor, and (iv) require any person who has acquired any of the secured assets from the borrower and from whom money is due to the borrower to directly pay the secured creditor to cover the secured debt owed to the creditor.

In the cases where collateral is insufficient to fulfill obligations to creditors, the creditors can then file an application to the DRT for recovery of the remaining portion of the dues. The initial versions of the Act gave borrowers no rights to appeal against this notice but upon

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<sup>8</sup>While the law did not apply specifically to NBFCs, this did not stop these institutions from seizing assets of firms under SARFAESI. After a long legal battle, the supreme court specified that the NBFCs could not seize collateral under the SARFAESI.

subsequent reinterpretation of the law, it allowed borrowers to appeal against secured creditor notices.

The enactment of the collateral reform has been a benchmark reform in the Indian banking sector. According to RBI's 2003 report on trends and progress of banking <sup>9</sup>, the act enabled banks to recover around Rs.500 crore within a year by end-June 2003. The significant progress was also evidenced by the fact that during 2002-03, reductions outpaced NPA additions, especially for public sector banks and reflected an overall reduction of NPAs to 9.4 percent of gross advances from 14.0 percent in 1999-2000. Figure2, panel A shows the accretion to NPAs and the ratio of the accretion to NPAs to gross advances. The accretion to NPAs declined drastically following the enactment of the SARFAESI. Further, since the SARFAESI allowed secured creditors to bypass the judicial court, it fixed one important loophole through which defaulters could delay the judicial process, namely by filing at the federal bankruptcy court, the Board of Industrial and Financial Reconstruction (BIFR). The BIFR adjudicates cases between creditors and delinquent but bankrupt firms. Although the BIFR applies only to bankrupt borrowers, prior to the SARFAESI, delinquent borrowers despite being capable of repaying their debts could delay the DRT process by simultaneously filing at the BIFR. Figure2, panel B shows that the number of cases filed under BIFR fell drastically once SARFAESI was enacted.

While the SARFAESI had an impact when it was enacted, interpretation and reinterpretation of the law have rendered it less effective over time. Figure A3 repeats the graph Figure2, panel A and extends it to the period following 2007. Additionally, there has been a sharp increase in NPAs following the global financial crisis. While India was relatively well insulated from the global financial crisis in the beginning, there has been a steady increase in NPAs of Indian banks since 2008 arising out of the spillover effects of the global financial crisis starting 2007 (see Das et al. (2017) and Acharya and Kulkarni (2017)). Despite the criticisms of the SARFAESI, a report put out by the by the Planning Commission of India based on a high level committee headed by Raghuram Rajan (rajan Committee (2008)) found that the business community views the SARFAESI as a law that “works”. Despite complaints by creditors that

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<sup>9</sup>See <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/40092.pdf>

the limited appeal rights under SARFAESI are subject to abuse, they still view it as the most effective among all options open to them. Thus, while the effectiveness of the law has declined and the reinterpretation of the law has rendered it less effective over time I find that the SARFAESI did have an immediate effect. Additionally, as the balance sheets of banks themselves deteriorated after the crisis they might have been less willing to recognize bad loans on their balance sheets.<sup>10</sup> To avoid the confounding effects of the global crisis, I confine my analysis to the period before the crisis and end the baseline analysis in 2006. I leave the jump in NPAs and impact of SARFAESI post the global crisis for future work.<sup>11</sup> Note, however, what matters for our analysis is not the actual amount recovered through the SARFAESI but credibility of the threat posed by SARFAESI to delinquent borrowers.

### III. Data

#### A. Sample Construction

The primary database used in my study is the ProwessDx database, maintained by Centre for Monitoring Indian Economy (CMIE). This database provides financial data for all Indian firms, both listed as well as unlisted, and has been used in several other research studies (Bhue et al. (2015), Gopalan et al. (2016)) for firm-level analysis. While the coverage for listed firms is comprehensive (due to reporting requirements), the coverage for unlisted firms is limited. I collect information under five broad categories from Prowess: identity, standalone annual financial statements, credit ratings, bankers and BSE and NSE Stocks Trading Data. Data is downloaded for the period April 01, 1991 to March 31, 2015 from the March 2016 vintage of the CMIE Prowess, which covers 37,873 unique firms over the period. An identity dataset maintained by CMIE contains identifiers for firms covered by Prowess. I use the Prowess Company code, a numerical code assigned to every company in the CMIE database, to identify

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<sup>10</sup>For example, Peek and Rosengren (2005) studied the Japanese banks during the 1990s and found that *weaker* Japanese banks continued to lend or evergreen loans to unprofitable borrowers. Thus, as the health of Indian banks deteriorated post 2007 they might have become less willing to recognize bad loans and pursue borrowers under the SARFAESI.

<sup>11</sup>OnSectiob B I do provide some evidence that the SARFAESI does continue to have an effect despite popular perception to the contrary.

unique entities. The variables used in the study are described in Table A1. In all there are 50,039 firm-year observations.

I download stand-alone annual financial statements for all companies. The vast majority of Indian corporate firms have fiscal year end  $t$  in March. Our notation is that all fiscal year  $t$  variables are as of March 31 of calendar year  $t$ . If the year end is in a month other than March, we assign all firms with year end before September 30 in calendar year  $t$  to fiscal year  $t$  and firms with all other year-ends to year  $t+1$ . For our baseline analysis we restrict to the period 1997 to 2006.

In my analysis, I control for variables that are understood to affect firm debt structure. I controls for profitability (EBITDA/Assets) and size ( $\log(\text{sales})$ ). The baseline analysis includes both listed and unlisted firms. In the appendix I also control for growth opportunities with Tobins Q which then restricts to listed firms.

For the bank level analysis, I do the following. The CMIE data does not provide the amount of loan provided by each bank or lender. However it does indicate the primary lender for a given firm. The data on bankers is extracted from CMIE as a separate dataset that gives name of the bank which is the banker to the firm in that particular year. A firm may have more than one banker in a year. The data field “Order” stores a number that determines the order in which the banks appear in the source document i.e. the annual report of the company. In case of multiple bankers, we retain the top banker based on “Order no.” as it is assumed that firms display the name of its most important banker or the bank which has the highest exposure to the company at the top of the list. The top bank is assigned to a firm. This assignment makes a strong assumption that all increase in debt of a firm is from the top banker.

The stock price data and returns data is also extracted from Prowess database’s “BSE and NSE Stocks Trading Data”. The returns are expressed as a ratio of the closing price, gains/losses arising due to capital action and dividend per share (if any) to the closing price of previous day. A ratio of more than one indicates a positive return whereas a ratio less than one denotes negative returns. The remaining variables pertaining to banks in our dataset is extracted from DBIE (Database on Indian Economy) and Reserve Bank of India. For easy extraction of some of the RBI related data we also relied on IndiaStat.

For the analysis on capital expenditures, we use the CapExDx database on planned investment projects. This dataset is provided by the CMIE and provides data on planned capital expenditure at the project level. An investment project in the database is any project that involves some capital expenditure and some capacity expansion. It tracks the announcement, implementation and completion of projects. The database excludes financial investment projects such as investment in secondary capital markets. It is thus ideal for our purposes. The database captures projects with capital expenditure greater than INR 10 million. The data is collected by the CMIE team from publicly available sources, by contacting the firm and internal experts. It is not based on official or regulatory data, but is useful for our purposes because it supplements the analysis on actual capital expenditure from the Prowess data. Importantly, CMIE provides a link between the projects and the Prowess database based on the company identifier. Thus, we restrict to companies for which CapExDx has at least one project for any company used in our analysis. Not all projects in Prowess are covered by CapExDx and not all CapExDx companies appear in Prowess. The expenditure amount of implemented projects, announced projects and completed projects is aggregated to company level and we have 25,623 firm-year observations. CMIE has been monitoring projects since 1976 and reliable information on data is available only starting 1996. The project also lists an industry code. I define non-core projects as those where the project industry code does not match the firm industry code. The CapExDx database also tracks the life-cycle of the project since it is first announced.

I also supplement the analysis with data on workers and debt data of factories. For this analysis I use the Annual Survey of Industries (ASI). The survey is conducted by the Ministry of Statistics and Program Implementation (MoSPI) in India and provides information about industrial units with firms employing 10 or more workers using electricity (20 or more if the unit does not use electricity). To generate employment related statistics I use data on all average number of all workers, permanent workers, contract workers and factory staff as reported in ASI. Wages for each category is also taken from ASI. I also complement the analysis on debt by using debt data for each factory from ASI. Debt stands for total liabilities. Since data is at the factory level, I calculate low quality with ICR calculated at the factory level. So low

quality here refers to factories whose median ICR in 1999 or 2000 is less than 1. Trade credit is defined as working sundry creditors while formal credit is defined as working overdraft. This data allows us to look at the impact on the intensive margin of employment. Particularly, it gives information on number of permanent workers, contract workers and staff (white collar employees) at each factory within a firm. Note, the ASI dataset captures only manufacturing firms.

## **B. Identification of Zombie Firms**

In our analysis we need to identify firms which had evergreened loans, that is they continued to receive loans despite being unprofitable. These firms are also referred to as zombies (Caballero et al. (2008)). A firm is classified as a zombie if it obtains subsidized credit from its bank or the actual interest payment of the firm is below the interest expense of the most credit-worthy firms in the economy. I define zombie as a firm that has borrowed funds on interest rate below prevailing prime lending rates, despite not being the highest rated firm, has an interest coverage ratio (ICR) less than equal to 1, leverage (total external debt to total assets) of greater than 0.20 and has taken additional loan in year  $t$ . Below I define the reasoning behind using this criteria.

In their seminal paper, Caballero et al. (2008) determine a zombie firm as one whose interest payment is lower than the risk-free interest payments. However, this criteria it does not take into account evergreening of loans. Additionally, it is likely that during the times of weak demand, banks might commit to offer credit below their prime lending rates in order to attract reputable firms. Hence, it becomes important to modify the Caballero et al. (2008) definition of zombies and avoid the mistreatment of any firm, which otherwise is healthy, as zombie.

The definition also needs to look at zombie credibility, profitability and most importantly, any evidence of evergreening. Thus, the following criteria also need to be accounted for. First is the credibility criteria. If a firm's interest cost is below our cut-off, but it is the highest rated firm, we do not classify it as zombie, taking into consideration the fact that the firm might be availing the advantage of its goodwill by getting credit at a subsidized rate. Second

is the profitability criteria. If a firm's interest coverage ratio is more than 1 or in other words, if its earnings before interest and taxes (EBIT) exceed its interest expenses; it is excluded from zombies. Simultaneously, we look at another measure of firm's health i.e. leverage. Low leveraged firms having external debt less than 20 percent of their total assets are also excluded from the category of zombies. Excluding these firms from zombies ensures that healthy firms are not being classified as zombies. And third is the evergreening criteria, under which unprofitable and highly leveraged firms with increased external borrowing as compared to last year are included as zombies. Firms with negative EBIT and large external debt should ideally not be taking a new loan. Therefore, by classifying such firms as zombies, the modified criteria is more likely to be accurately categorizing unhealthy firms as zombies.

Taking all the above into account, a zombie is a firm in my analysis that has interest rate below the minimum prime lending rate. To determine which firms are receiving subsidized credit, I use SBI (largest public sector bank in India) prime lending rates as our benchmark or cut-off rates and calculate if the interest cost on long term loans for a firm is lower than the minimum prime lending rate of the 5 institutions in that year. The general principle behind this choice is to select the interest rates that are extremely advantageous for the borrower. SBI being the largest public sector bank in India, its PLR is an indication of the interest rate, at which most creditworthy firms in the economy avail credit. Since we do not have the exact interest payments on new loans, we see if the interest expense under the prime lending rate is less than what the firm currently pays and infer this to mean the firm has borrowed funds on interest rate below prevailing prime lending rates. In addition the firm has an interest coverage ratio (ICR) less than equal to 1, leverage (total external debt to total assets) of greater than 0.20 and has taken additional loan in year  $t$ . For our baseline we define additional loans in terms of all loans. In some robustness checks (where specified), we also take only if the secured debt increased since SARFAESI only applied to secured debt.

## C. Summary Statistics

Table I shows the summary statistics of the variables used in our analysis. The mean and standard deviation are shown. We also separate firms into low and high quality and into pre and post period within that. Panel A shows the data for all the 6,927 firms used in our analysis. The data is for 50,039 firm-year observations. There are 3,371 listed firms (roughly 50 percent). 2,267 (33 percent) firms are classified as low quality borrowers and the remaining 4,660 firms are classified as high quality borrowers. The table shows there are 15,319 firm-year observations for low quality borrower data and 34,720 high quality borrower firm-year observations.<sup>12</sup> The data is for the period 1997 to 2006 used in our baseline analysis.

Secured borrowings is defined as the year-on-year change in secured debt and is in INR million. A positive value depicts an increase in secured debt and a negative value depicts a decline in secured debt. We also sometimes call this the change in secured debt. The table shows that firms on average had an increase in secured debt of INR 36.6 million. There was significant variation across firm-years of INR 160 million. Looking at the low quality borrowers, the average secured borrowings *declined* from INR 41 million in the pre-SARFAESI period to INR 29 million in the post-SARFAESI period. This is striking since increased creditor rights resulted in a reduction in secured debt. For high quality borrowers, on the other hand secured debt *increased* from INR 31 million to INR 44 million consistent with high creditor rights leading to higher credit access.

Average unsecured borrowing was a much smaller INR 2 million, just 5 percent of secured borrowings during the same period. Both low quality borrowers and high quality borrowers on average increased their unsecured borrowings after SARFAESI. While the aggregate numbers show that there was some increase in unsecured debt of low quality borrowers, the magnitude of increase was a small INR 2.5 million.

Capital expenditure was an average if INR 69 million with a wide standard deviation of 214 million. Low quality borrowers reduced capital expenditure from INR 48 million to INR 41 million. On the other hand, high quality borrowers, on average, increased capital expenditure

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<sup>12</sup>There are some firms for which there are missing variables, but these numbers refer to the variables in the baseline analysis.

from INR 72 million to INR 87 million. This is in line with the average numbers for secured debt.

On average firms had 101 employees during our sample period. There is a large standard deviation of 432 employees. Number of employees however, seems to have increased for both low quality and high quality borrowers.

The profitability measures we use in our analysis are operating margin, return on assets and total factor productivity. Operating margin is the ratio of earnings before interest, taxes, depreciation and amortization to total sales. Return on assets is the ratio of earnings before interest, taxes, depreciation and amortization to total assets. TFP (total factor productivity) is calculated as in Caballero et al. (2008) and is simply  $\log(\text{sales}) - 1/3 * \log(\text{capital}) - 2/3 * \log(\text{employees})$ . Operating margin was on average 11 percent. Return on assets was 6 percent and total factor productivity during this period was 2.1. Profitability of low quality firms increased on average and that for high quality firms declined. These numbers are in line with our hypothesis. Note, profitability of low quality firms on average was negative in the pre-SARFAESI period and increased post-SARFAESI. Profitability of high quality firms declined. As we will show in more formal analysis, this is attributable to the increase in the denominator of these ratios, namely sales and assets. Note, despite the increase in profitability of low quality firms and decline in profitability of high quality firms, the average profitability of high quality borrowers was still higher. This is consistent with Caballero et al. (2008) who witnessed a widening in profitability and productivity of low quality and high quality borrowers. By extension, it follows that the gap between low quality and high quality borrowers should narrow after creditor rights increase.

I will analyze these findings more formally in Section V. But first, I describe the empirical methodology below.

## IV. Identification and Empirical Framework

The structural relationship of interest is the effect of the law on low quality borrowers relative to high quality borrowers:

$$y_{it} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \beta \times X_{it} + \epsilon_{ijt} \quad (1)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ).  $\mathbb{1}_{(LowQ)} = 1$  for “Low Quality” firms. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level. In the baseline analysis, the dependent variable is change in secured debt between  $t$  and  $t-1$ . Analogously, I also look at real outcomes with the dependent variable, capital expenditure and employment (number of employees) and growth in profits (operating margin and return on assets).

The coefficient of interest is  $\eta$ , which measures the difference, conditional on controls, in outcome  $y$  between low quality and high quality borrowers after the passage of the reform relative to before the reform and is analogous to a difference-in-difference (DD) estimate. The OLS estimate for  $\eta$  is unbiased if  $\mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)}$  is orthogonal to  $\epsilon_{ijt}$ : i.e., if the law was unrelated to other factors that might also have impacted the low quality borrowers differentially relative to high quality borrowers. By looking at the relative difference in outcomes of low quality borrowers and high quality borrowers, I remove time-varying trends which affected *both* groups simultaneously. However, the identifying assumption could be violated if there are other non-reform related factors that affected low quality borrowers differentially compared to high quality borrowers.

Thus, I turn to a difference-in-difference-in-difference (DDD) specification. Similar to Vig (2007), I too exploit cross-sectional variation in a firms’ ability to collateralize assets to generate variation in the treatment effect. Since the reform applied to only secured borrowers, firms with more collateralizable assets were more affected by the law compared to firms

with less collateral. Since only tangible assets can be effectively collateralized in India, I use the tangibility measure as defined in Rajan and Zingales (1995) to classify firms into treatment and control groups. The treatment group comprises of firms with above median asset tangibility whereas the control group comprises of firms with the below median asset tangibility. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms.

$$\begin{aligned}
y_{it} = & \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \nu \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighT)} \\
& + \phi \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} \times \mathbb{1}_{(HighT)} + \beta \times X_{it} + \epsilon_{ijt}
\end{aligned} \tag{2}$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{(HighT)} = 1$  for “High Tangibility” firms, with high tangibility.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ).  $\mathbb{1}_{(LowQ)} = 1$  for “Low Quality” firms.  $\phi$  is coefficient estimate of interest. Standard errors are clustered at the firm level.  $y_{it}$  is the dependent variable of interest.

$\phi$ , the estimate of interest, compares the differential effect — between low quality borrowers and high quality borrowers — of the SAFARAESI on high tangibility firms relative to low tangibility firms. The rationale for this specification is that the DD estimate for the low quality borrowers relative to the high quality borrowers does not take into account the non-reform factors that differentially affected the low quality borrowers relative to high quality borrowers. However, the firms with low tangibility of assets were not affected (or affected to a lesser extent) by the reform. So the DD estimate for the low quality and high quality firms with *low* tangibility provides an estimate of the non-reform factors that differentially affected low quality borrowers. Subtracting the second DD estimate from the first DD estimate, the DDD estimate, therefore adjusts for other macroeconomic trends that may have differentially affected all low quality borrowers relative to high quality borrowers.

To facilitate transparent examination of trends over time, I also estimate a year-by-year specification and present all my results as event study plots. Similar to a difference-in-difference strategy, there is an implicit parallel trends assumption in the DDD specification. To examine the parallel trends assumption I also plot the event study graphs below.

First separately for firms with high tangibility and low tangibility, I use the following specification:

$$y_{ijt} = \alpha_i + \gamma_t + \sum_{\tau} \eta_{\tau} \times (\mathbb{1}_{\tau} \times \mathbb{1}_{(LowQ)}) + \beta \times X_{it} + \epsilon_{ijt} \quad (3)$$

where  $\tau$  ranges from 1996 to 2007,  $\mathbb{1}_{\tau} = 1$  if year is  $\tau$  and  $\eta_{\tau}$  is coefficient of interest. Bars show the 95% confidence intervals,  $\tau = 0$  is the year the reform was announced, and all coefficients are normalized relative to  $\tau = 1$ . Robust standard errors are clustered at the firm level. The dependent variable is change in secured borrowings, change in unsecured borrowings, capex and employment. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. The coefficient of interest is  $\eta_{\tau}$ , which measures the difference, conditional on controls, in outcome  $y$  between low quality and high quality borrowers  $\tau$  years after the passage of the reform.

In addition, I also explicitly plot the coefficients of the DDD specification over time ( $\phi_{\tau}$ ) below.

$$y_{it} = \alpha_i + \gamma_t + \sum_{\tau} \eta_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \sum_{\tau} \nu_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighT)} + \sum_{\tau} \phi_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} \times \mathbb{1}_{(HighT)} + \beta \times X_{it} + \epsilon_{ijt} \quad (4)$$

$\mathbb{1}_{(HighT)}$  is one for above median tangibility firms.

I also augment the analysis with the following intermediate specifications. To transparently examine the components of above DD, I also look at the following specification separately for the low quality and high quality borrowers:

$$y_{it} = \gamma_t + \eta' \times \mathbb{1}_{Post} + \beta \times X_{it} + \epsilon_{ijt} \quad (5)$$

where  $i$  indexes firms,  $t$  indexes time,  $\gamma_t$  are year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ). The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level. The coefficient of interest is  $\eta'$ , which measures the difference, conditional on controls, in outcome variable before and after the passage of the reform separately for low quality and high quality borrowers

## A. Zombie lending

To examine whether the reduction in secured debt in the period following the passage of the reform is due to a reduction in zombie lending. I run the following specification analogous to Equation 1.

$$y_{it} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{Zombie} + \beta \times X_{it} + \epsilon_{ijt} \quad (6)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when reform is in effect ( $\geq 2002$ ). A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero.  $\mathbb{1}_{Zombie}$  if a firm is classified as a zombie in the pre-reform period. The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level.  $y_{it}$ , the dependent variable, is either change in secured debt.

The coefficient of interest is  $\eta$ , which measures the difference, conditional on controls, in outcome variable between zombie and non-zombie after the passage of the reform relative to before the reform. As before, this estimate may be confounded if other non-reform factors differentially affected low quality borrowers. I also examine a DDD specification similar to

Equation 2.

$$y_{it} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{(Zombie)} + \nu \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighT)} + \phi \times \mathbb{1}_{Post} \times \mathbb{1}_{(Zombie)} \times \mathbb{1}_{(HighT)} + \beta \times X_{it} + \epsilon_{ijt} \quad (7)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{(HighT)} = 1$  for “High Tangibility” firms, with high tangibility.  $\mathbb{1}_{Post} = 1$  for years when reform is in effect ( $\geq 2002$ ).  $\mathbb{1}_{Zombie}$  if a firm is classified as a zombie.  $\phi$  is coefficient estimate of interest. Standard errors are clustered at the firm level.  $y_{it}$  is the dependent variable of interest.

I also want to see whether firms which were zombies transitioned into non-zombie status in the period following the reform. To do that I run the following specification:

$$\mathbb{1}_{Zombie\ current} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{Zombie} + \beta \times X_{it} + \epsilon_{ijt} \quad (8)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ). A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero.  $\mathbb{1}_{Zombie}$  if a firm is classified as a zombie.  $\eta$  is estimate of interest. The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level. The coefficient of interest is  $\eta$ , which measures the difference, conditional on controls, in outcome variable between zombie and non-zombie after the passage of the reform relative to before the reform.  $\mathbb{1}_{Zombie\ current}$  is an indicator equal to one if a firm is classified as a zombie in the current period.

## B. Zombie Distortions

In a final step, I investigate whether the decline in the fraction of zombie firms has positive effects on healthy (non-zombie) firms in the same industry. The basic regression I will run in

this section follows Rajan and Zingales (1995) and is given by:

$$\begin{aligned}
y_{it} = & \alpha_i + \gamma_t + \beta_1 \times \mathbb{1}_{High\ Fraction\ Zombies} \times \mathbb{1}_{Post} + \beta_2 \times Non\ Zombie \times \mathbb{1}_{Post} \\
& + \beta_3 \times Non\ Zombie \times \mathbb{1}_{High\ Fraction\ Zombies} \times \mathbb{1}_{Post} + \beta \times X_{it} + \epsilon_{ijt}
\end{aligned} \tag{9}$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ). The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets.  $\mathbb{1}_{High\ Fraction\ Zombies}$  is an indicator for whether a sector had a high fraction of zombies in the pre-reform period. Standard errors are clustered at the firm level. The coefficient of interest is  $\beta_3$ .

### C. Within industry capital and labor reallocation

Next, we are interested in examining how an improvement in creditor rights affects the sensitivity of capital and labor reallocation within an industry. Following Bai et al. (2012), we examine how the sensitivity of capital reallocation to the marginal product of labor in industries changes after the improved in creditor rights.

$$\begin{aligned}
\Delta Capital\ Share_{ijt} = & \alpha_{jt} + \beta_0 \times MPK_{ijt} \\
& + \beta_1 \times \mathbb{1}_{Post} \times MPK_{ijt} + \beta_2 \times X_{ijt} + \epsilon_{ijt}
\end{aligned} \tag{10}$$

where  $i$  indexes firms,  $t$  indexes time,  $j$  indexes the industry in which the firm operates.  $\alpha_{jt}$  are industry-year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ).  $Capital\ Share_{ijt}$  is the capital share of firm  $i$  in industry  $j$  and time  $t$ .  $\Delta Capital\ Share_{ijt}$  is the log of the difference of this share between  $t$  and  $t-1$ .  $MPL_{ijt}$  is the log of the marginal product of capital calculated as log of the ratio of sales to capital.  $X_{ijt}$  includes age controls one-year lag of age and its squared value and ensures that the specification controls for important life-cycle patterns in productivity. Standard errors are clustered at the firm level. The industry-year

fixed effects ensures that it captures this relationship within an industry-year

$\beta_1$  is coefficient estimate of interest and tells us the sensitivity of capital reallocation to the marginal product of capital before the reform relative to after the reform. Essentially, it tests whether post-reform the way capital is allocated changes post reform.

To measure the sensitivity of labor reallocation to the marginal product of labor, we run the analogous specification below:

$$\begin{aligned} \Delta Employment Share_{ijt} &= \alpha_{jt} + \beta_0 \times MPL_{ijt} \\ &+ \beta_1 \times \mathbb{1}_{Post} \times MPL_{ijt} + \beta_2 \times X_{ijt} + \epsilon_{ijt} \end{aligned} \quad (11)$$

where  $i$  indexes firms,  $t$  indexes time,  $j$  indexes the industry in which the firm operates.  $\alpha_{jt}$  are industry-year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ).  $Employment Share_{ijt}$  is the employment share of firm  $i$  in industry  $j$  and time  $t$ .  $\Delta Employment Share_{ijt}$  is the log of the difference of this share between  $t$  and  $t - 1$ .  $MPL_{ijt}$  is the log of the marginal product of labor calculated as log of the ratio of sales to labor.  $X_{ijt}$  includes age controls one-year lag of age and its squared value and ensures that the specification controls for important life-cycle patterns in productivity. Standard errors are clustered at the firm level.  $\beta_1$  is coefficient estimate of interest and tells us the sensitivity of employment reallocation to the marginal product of labor before the reform relative to after the reform.

Since the reform applied to *secured* creditors, I exploit the fact that this sensitivity of labor and capital reallocation should be higher for firms with high tangibility.

$$\begin{aligned} \Delta Capital Share_{ijt} &= \alpha_{jt} + \beta_0 \times MPK_{ijt} \\ &+ \beta_1 \times \mathbb{1}_{Post} \times MPK_{ijt} + \beta_2 \times \mathbb{1}_{(HighT)} \times MPK_{ijt} \\ &+ \beta_3 \times \mathbb{1}_{(HighT)} \times MPK_{ijt} \times \mathbb{1}_{(HighT)} + \beta_4 \times X_{ijt} + \epsilon_{ijt} \end{aligned} \quad (12)$$

where  $i$  indexes firms,  $t$  indexes time,  $j$  indexes the industry in which the firm operates.  $\alpha_{jt}$  are industry-year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when the reform is in effect ( $\geq 2002$ ).  $Capital Share_{ijt}$  is the capital share of firm  $i$  in industry  $j$  and time  $t$ .  $\Delta Capital Share_{ijt}$  is the

log of the difference of this share between  $t$  and  $t - 1$ .  $MPL_{ijt}$  is the log of the marginal product of capital calculated as log of the ratio of sales to capital.  $X_{ijt}$  includes age controls one-year lag of age and its squared value and ensures that the specification controls for important life-cycle patterns in productivity. Standard errors are clustered at the firm level. The industry-year fixed effects ensures that it captures this relationship within an industry-year.  $\mathbb{1}_{(HighT)} = 1$  for “High Tangibility” firms, with high tangibility.

$\beta_1$  is coefficient estimate of interest and tells us the sensitivity of capital reallocation to the marginal product of capital before the reform relative to after the reform. Essentially, it tests whether post-reform the way capital is allocated changes post reform. The specification for employment share is analogously defined.

## V. Results

### A. Impact on firm borrowing

This presents evidence of the impact of the reform on secured borrowings of low quality borrowers compared to high quality borrowers. A positive change in debt captures the borrowings of a firm in given period. A negative change in debt captures whether firm debt is decreasing. Table III presents the results. As described in Section IV, to clearly see where the variation in the data is coming from, I build up to the DDD specification.

Low quality firms reduced secured borrowings by INR 20 million compared to a pre-reform period average of INR 52 million representing a 38 percent decline (column 1, Panel A). High quality borrowers on the other hand, *increased* secured borrowings by INR 18 million relative to a pre-reform period average of INR 31 million representing a 59 percent increase (column 2, Panel A). The results of the DD specification in Equation 1, are shown in columns 3 and 4. The DD specification compared the secured borrowings of low quality borrowers *relative* to high quality borrowers and eliminates the trends common to both high quality and low quality borrowers. Column 3, Panel A shows that secured borrowings declined by approximately INR 46 million for low quality borrowers *relative* to high quality borrowers in the period following

the reform. Relative to a baseline mean of INR 51 million per year, this is a 89 percent lower secured borrowings. On controlling for profitability and sales, secured borrowings declined by INR 40 million for low quality borrowers compared to high quality borrowers after the passage of the Act. In columns 5 and 6 in Panel A, shows similar results with borrowings normalized by the preceding period assets. Results are qualitatively similar with a 0.028 reduction in the ratio compared to a baseline average of 0.043 in the pre-reform period.

However, our discussion in Section IV explains why the DD estimate is confounded by other factors that could potentially also differentially affect low quality borrowers relative to high quality borrowers. Table III, Panel B shows the results if the DDD specification in Equation 2. To more transparently analyze the effects, we also run the DD specification in Equation 5 separately for low quality borrowers (column 1) and for high quality borrowers (column 2). Low quality borrowers with high asset tangibility reduced their secured debt by INR 27 million after the law was enacted compared to INR 12 million *increase* for high quality borrowers. Relative to a baseline mean of INR 51 million in the pre-reform period, secured borrowings of low quality borrowers with high tangibility of assets decreased their secured borrowings representing a 41 percent reduction. To account for confounding factors that could differentially affect the low quality borrowers, we turn to the DDD specification in columns 3 and 4 combines the samples in columns 1 and 2. First, consistent with the results in Table III low quality borrowers cut back on secured borrowings with a decline of INR 39 million (INR 28 million on adding controls) post the passage of the Act.<sup>13</sup>

Next, we turn to the identifying assumption in the DDD specification. To look at the time trends, we now analyze this in an event study analysis described in Section IV. Figure 3 shows the results of Table III in a graphical form. The coefficients from running the specification in Equation 3 are plotted Figure 3 with dependent variable secured borrowings in Panel (a). All coefficients are normalized relative to 2001 (the year before the Act was enacted). Figure 3 shows that post the passage of the Act secured borrowings dropped for low quality borrowers relative to

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<sup>13</sup>Another way of interpreting these findings is that this is similar to a horse race regression where all the reduction in secured borrowings of borrowers with more tangible assets is driven by the *low quality* borrowers and not the high quality borrowers with high tangibility of assets. This is an important way these results differ from Vig (2007).

high quality borrowers, but only for the firms with high tangibility of assets. Further, borrowings continued to decline after 2002 and the yearly magnitudes increased each year. There is an implicit parallel trends assumption in the DDD specification. To more transparently examine the parallel trends assumption, I show the dynamics of the DDD specification using Equation 3. We see that post the enactment of the Act secured borrowings of low quality borrowers relative to high quality borrowers fell and were similar in the pre-period. In the appendix, in Table A5, we show that results are qualitatively similar even after including industry-year fixed effects.

In the appendix Table A2, I show that there was no differential impact of the Act on unsecured borrowings. I find no significant differential impact of the Act on low quality borrowers relative to the high quality borrowers. Note, the reform only applied to secured credit. Thus, we don't see that low quality borrowers were substituting into unsecured borrowings which is not surprising. If the reduction in debt of low quality borrowers were driven by a reduction in evergreening of loans, it is unlikely these low quality borrowers would be able to substitute into unsecured debt. Once the banks can easily exit their banking relationship, we do not expect them to increase unsecured lending. These results can also be thought of as a placebo test. Since the Act did not apply to unsecured debt, we should not expect to see the decline in low quality borrowers relative to high quality borrowers.

Another way of interpreting the results in columns 1 and 2 of Panel B, Table III is to say that the entire effect of the reduction in secured borrowings of low quality borrowers is driven by the low quality borrowers. The results for the low quality borrowers are in line with the results in Vig (2007). Low quality borrowers fearing the higher creditor rights in the post-reform period might mean creditors could more easily seize the collateral cut back on secured borrowings. In contrast to these findings, high *quality* borrowers with high asset tangibility do not reduce their secured debt (column 2). If only the liquidation bias or creditor hold-up as in Vig (2007) were at play we would not see an effect on high quality borrowers. These results highlight that the reduction of secured borrowings of low quality borrowers could be a Coasian response of these borrowers preemptively cutting back on secured debt.

## B. Zombies

Can the drop in borrowing be attributed to a reduction in evergreening of loans by banks? In addition, to this preemptive pull back, I examine whether this continued financing of low quality borrowers can be explained by a reduction in the evergreening of loans? Prior to the Act when creditor rights were weak, lenders had no other recourse and hence had to continue refinancing or rolling-over loans. Post the passage of the law, when creditor rights improved, perhaps banks did not need to continue evergreening of loans.

To examine this, we first define a zombie firm as follows. A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero. Figure 4, panel (a) plots the percentage of firms which are zombies. Note, as described in Section III, we follow a very conservative approach to define zombies. The fraction of zombies just before 2002 was at 5.5 percent. After the passage of the reform, the number of zombies fell to around 3 percent. Since the reform only applies to secured debt, we also use an alternate definition of zombies wherein a firm is defined as a zombie if in addition to the classification above, the firm also has non-zero secured lending in a period. Using this definition of zombies, we find that the fraction of zombies fell from around 4.8 to 2.2 percent after the reform. Panel (b) shows the asset-weighted fraction of zombies where total assets in the prior period is used as the weight. Asset-weighted zombies fell from around 6.5 percent to 3 percent. Similarly, restricting to just zombies with secured debt, we find that the asset-weighted fraction of zombies dropped from 5.7 percent to 3.2 percent in 2005.

Table IV looks at whether the reduction in secured borrowing was driven by the zombie firms. As in the previous section, we first look at the DD specification of Equation 6. Panel A, Column 1 shows that the secured borrowings of zombie firms declined by INR 28 million compared to an average of INR 62 million representing a 45 percent decline after the passage of the Act. The results of the DD regression specification in Equation 6 are shown in columns 3 and 4. In column 3, we see that zombies on average reduce secured debt by INR 47 million

*relative* to non-zombies representing a decline of 76 percent compared to the pre-period. On adding controls, we see a similar decline of INR 43 million (column 4) for zombie firms relative to non-zombies.

We now look at this a different way. Were zombie firms more likely to transition to non-zombie status in the period following the reform? To do this, we track firms that were classified as zombies in the period before the reform and then see whether they became non-zombies right after. Note, in the previous regression we split the observations into zombie and non-zombie groups based on pre-reform status of zombies. Table IV, columns 5 and 6 show the regression results for Equation 8. A firm that was classified as a zombie in the pre-period, was 10 percent less likely to be classified as a zombie in the passage of the Act (columns 5 and 6). Improvement in creditor rights resulted in zombie firms no longer receiving secured loans at terms more favorable than the high rated borrowers which explains this transition from zombie to non-zombie status after the enactment of the law.

### **C. Impact on real outcomes**

This section presents the results on the impact of the reform on real outcomes, namely capital expenditure and employment. Table V Panel A presents the results of the DD specification. First simply looking separately at low quality and high quality borrowers, we find that on average capital expenditure declined by INR 11 million for low quality borrowers (column 1) but increased by INR 18 million for high quality borrowers. The DD specification results show that relative to the high quality borrowers, low quality borrowers reduced their capital expenditure by INR 43 million (INR 31 million controlling for sales and profitability. This represent approximately 72 (52) percent decline in capital expenditure of low quality borrowers. Additionally in the Appendix Table A3, I supplement the analysis with planned capital expenditures and show that the number of completed projects, announced projects and projects under implementation fell. The fall in overall planned expenditure, completed projected and the projects under implementation was driven by a reduction in the non-core projects.

Next I turn to the DDD specification in Table V, Panel B. We see that capital expenditure

declined by INR 21 (column 4) representing a 35 percent decline. Figure 5, Panel A shows the event study around the passage of the Act and allows us to examine the implicit parallel trends assumption. We see that relative to 2001, the capital expenditure of low quality firms steadily reduced compared to high quality firms.

We now look at the impact on number of employees. Since we do not have reliable data on employment at firm level, we analyze data at the factory level using the Annual Survey of Industries (ASI). Table VI shows that number of employees declined by 15 percent for low quality borrowers and increased by 7 percent for high quality borrowers. Relative to high quality borrowers and controlling for profitability and sales, employment of low quality borrowers declined by 9 percent (decline of 27). Using our preferred DDD specification, I find that this represents a decline of 6 percent for low quality borrowers relative to the high quality borrowers (after accounting for the differential impact of other non-reform factors). Figure 5, Panel B shows dynamics of this relationship. We see that relative to 2001, the number of employees reduced drastically after the Act.

In the Appendix, I also supplement the analysis on employment by looking at more detailed data on type of employment in factories. Table A4 shows that the overall decline in the number of employees was driven by the decline in contract employees and in the more skilled workers (staff). Additionally, underperforming factories were also 2 percent more likely to be shut down (Table A6).

## **VI. Spillovers Effects and Zombie Distortions**

### **A. Spillovers on secured borrowing**

I now look at the spillovers of the reduction in secured debt of zombie firms. Table VII, Panel A shows the results for the regression specification in Equation 9. I first divide the industries with above (below) median percentage of zombies in the period (2001) before the reform was passed. I then look at the impact on the non-zombies in the same industry. Columns 1 and 2 show the results of the specification in Equation 9 with secured borrowings as the dependent variable.

Consistent with the analysis in Panel A of Table IV, we find that industries with a higher percentage of zombies reduced secured borrowings in the period following the reform (column 2). Industries with high fraction of zombies in 2001 reduced secured borrowings by an average of INR 29 million (column 2). Now I look at the spillover on non-zombie firms in these industries. The triple interaction term shows that non-zombies in industries with a high percentage of zombies increased secured borrowings by an average by INR 37 million. On controlling for sales and profitability, yield similar results with industries with a high percentage of zombies reducing secured borrowings by INR 31 million after the passage of the reform. Non-zombies especially so in industries which had the highest percentage of zombies in the pre-reform period, witnessed an increased access to credit. Importantly, this result says that not only do higher creditor rights allow lenders to seize assets — or at least threaten to seize assets — it also allows them to free up capital and increase lending to other, more qualified or healthier, borrowers. Thus, in contrast to the law and finance literature which has emphasized greater credit access to all borrowers, these results show that an improvement in creditor rights allows resources (credit) to be allocated away from unprofitable borrowers (zombies) to profitable borrowers (non-zombies). As before, we do not find that the reform had an impact on unsecured debt and there were no spillover effects on unsecured debt<sup>14</sup>.

I next characterize which firms experienced the highest change in number of zombies post-reform. Building on the analysis in Section V, I compare the change in fraction of zombies with the average proportion of tangible assets of firms in the industry. Figure A1 plots the change in number of zombies against asset tangibility for each industry. Firms with higher asset tangibility witnessed a greater fall in number of zombies after creditor rights improved compared to industries with low asset tangibility.

## **B. Spillovers on real outcomes**

Caballero et al. (2008) show that 1990s in Japan, the increase in zombies depressed the investment and employment growth of non-zombies and widened the productivity gap between zombies and non-zombies. We see whether the reduction in zombies after the passage of the

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<sup>14</sup>Results available on request.

reform had an analogous effect on the non-zombies.

Table VII Panel A, columns 3 and 4 shows the regression results of the Equation 9. Columns 3 and 4 show that after the passage of the act, industries with a high percentage of zombies had a greater reduction in capital expenditure of INR 34 and 44 million respectively. This is consistent with the result in the previous section that zombies reduced secured debt. The triple-interaction term shows that the non-zombies in industries which were dominated by the zombies in the prior period increased capital expenditure by INR 40 million after the passage of the reform. Thus, the collateral reform reduced number of zombies and this had strong spillovers on the capital expenditure of non-zombies. Controlling for sales and profitability shows similar results in column 4 with an increase of INR 47 million relative to a pre-period average of INR 72 million representing a 65 percent increase.

Panel B shows the spillovers on employment. We find that post the passage of the Act, non-zombies in zombie-dominated industries increased the number of employees by an average of 15 employees . Similarly, on adding controls in column 4, we see that the number of employees for non-zombies in zombie-dominated industries increased by 16 employees relative to a pre-period average of 306 representing a 5 percent increase in number of employees.

### **C. Reallocation of labor and capital**

I now follow the analysis in Bai et al. (2012) and look at whether the reallocation of labor and capital increased to firms with higher marginal products of capital and labor. Indeed, Table IX shows that the capital was redeployed to firms with higher marginal product of capital. Using our DDD specification, I find similar effects with capital reallocated to firms with higher marginal productivity of capital. Similarly, I find that labor too was reallocated to firms with higher marginal productivity of labor.

I find that the law was associated with significant increases in the within industry reallocation of labor and capital towards higher marginal product of labor and capital firms. These reallocation of labor and capital is associated with large gains in aggregate industry productivity.

## D. Profitability of firms

In Table VIII I look the the profitability of firms. In columns 1–3 the dependent variable is the change in operating margin per year. In columns 4–6 the dependent variable is the change in return on assets per year. Column 1 shows that profitability in terms of operating margin of low quality firms increased by 6 basis points every year (similar effects in the DD specification). Return on assets increased by 4 basis points per year. The improvement in creditor rights is accompanied by a narrowing of the gaps in profitability of low quality and high quality firms. This is consistent with Caballero et al. (2008) who found that the congestion created by zombies resulted in a widening of the productivity gaps between zombies and non-zomebies. Our preferred DDD specification shows similar results with a 4 basis points improvement in operating margin and a 0.7 basis points improvement in return on assets.

## E. Bank Level Exposure

Our hypothesis is about redistribution through the banks, I look at which banks had the most reduction in secured lending to low quality borrowers. The hypothesis is that banks with the highest exposure to low quality firms in the period before the reform should be the most affected by the reform and hence should show the biggest effect on the credit of firms which borrow from them. Given our data constraints, we can only link each firm to the primary (lead) bank or lender. We do not have the loans from each bank to a given firm. Thus, we make the simplifying assumption that all debt in a given year is attributed to the primary or main lender.

Under this assumption, we calculate the bank level exposure to low quality banks in the pre-crisis period. Bank-level exposure is measured as the number of low quality firms a bank was designated as the primary lender in 2001 (year before the reform). High exposure refers to banks with above median exposure measure.

We then run the regression specification in Equation 13 and Equation 14. Results are shown in Table A10.<sup>15</sup> In column 1 we repeat our baseline regression, except we restrict to only firms whose primary lender is a bank which had low exposure to low quality borrowers in the

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<sup>15</sup>Since not all firms indicate the names of banks, the number of firms in this analysis differs from our baseline case.

pre-reform period. We find there is no statistically significant effect of low quality borrowers compared to high quality borrowers linked to the banks which did not have high exposure (were least likely to be affected by the reform). However, in column 2 we see that low quality firms whose primary lender had above median exposure to low quality firms in the pre-reform period reduced debt on average by INR 18 million. Similarly, in column 3 we show the triple-difference specification and find qualitatively similar results. Low quality firms whose primary lender had above median exposure to low quality firms in the pre-reform period reduced debt on average by INR 20 million.

The results in this section explicitly look at my hypothesis that banks were able to reallocate debt away from poor quality borrowers to better quality borrowers. Thus, banks which would have been most affected the reform — which had the highest number of low quality borrowers in the pre-reform period — should reduce (increase) their lending to low (high) quality borrowers the most.

## VII. Conclusion

In this paper, I examine the impact of improved creditor rights on the resource allocation to firms. The act enabled creditors to seize assets of defaulting firms without appealing in the court. Prior to the policy change creditors were not able to seize defaulting borrowers' assets due to which low-quality borrowers did not reduce debt. This is partly due to evergreening of loans to low-quality borrowers. Further, the presence of zombie firms depresses employment and investment of high quality firms that operate in the same industry. After the passage of the law banks reduced credit to low-quality borrowers. I also find that low-quality borrowers reduced borrowing and cut back operations due to fear of failure to repay the loan. Additionally, the resulting decongestion increased employment and investment of high-quality borrowers that operate in the same industry.

This paper highlights another important reason for the misallocation of resources across firms in India. Hsieh and Klenow (2009) highlight political reasons and financial frictions. However, this paper specifically shows how improved creditor rights did help firms at the time

it was implemented. Importantly, the threat of liquidation had important spillover effects on the remaining firms in the economy. Low creditor rights has often been cited as a reason for financial frictions in emerging markets. Even when creditor rights exist, weak implementation can make such laws ineffective. This is especially true in developing countries. Realizing this, developing countries such as Brazil and China have recently introduced new bankruptcy laws increasing the legal protection of creditors. India, too, recently enacted the Insolvency and Bankruptcy Code 2016, which improves creditor rights and streamlines the bankruptcy process. This paper highlights one important way in which despite immediate pullback in credit especially by worse performing firms, such improved bankruptcy laws can restore the health of the economy through the spillovers this has on the remaining firms in the economy.

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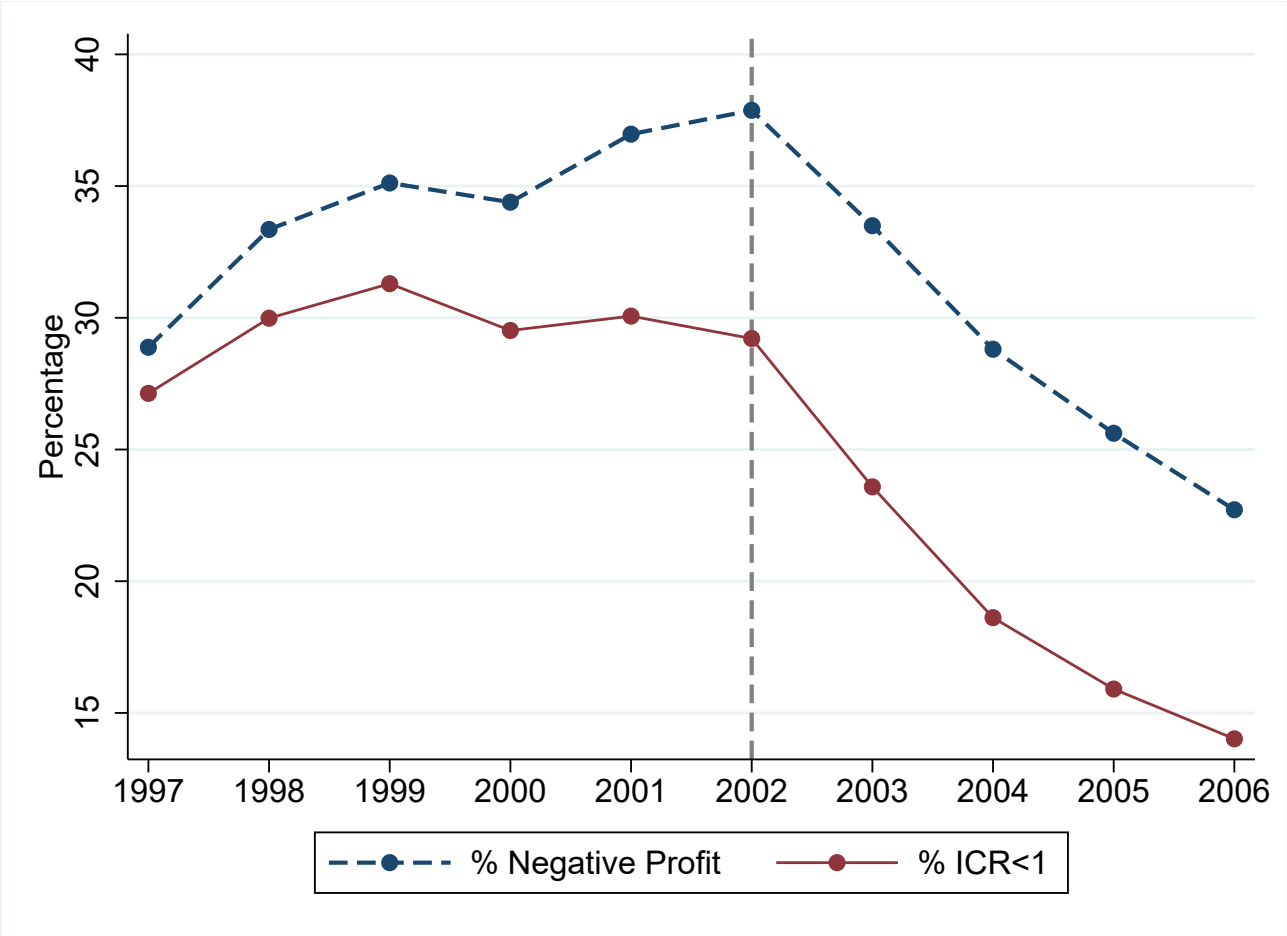
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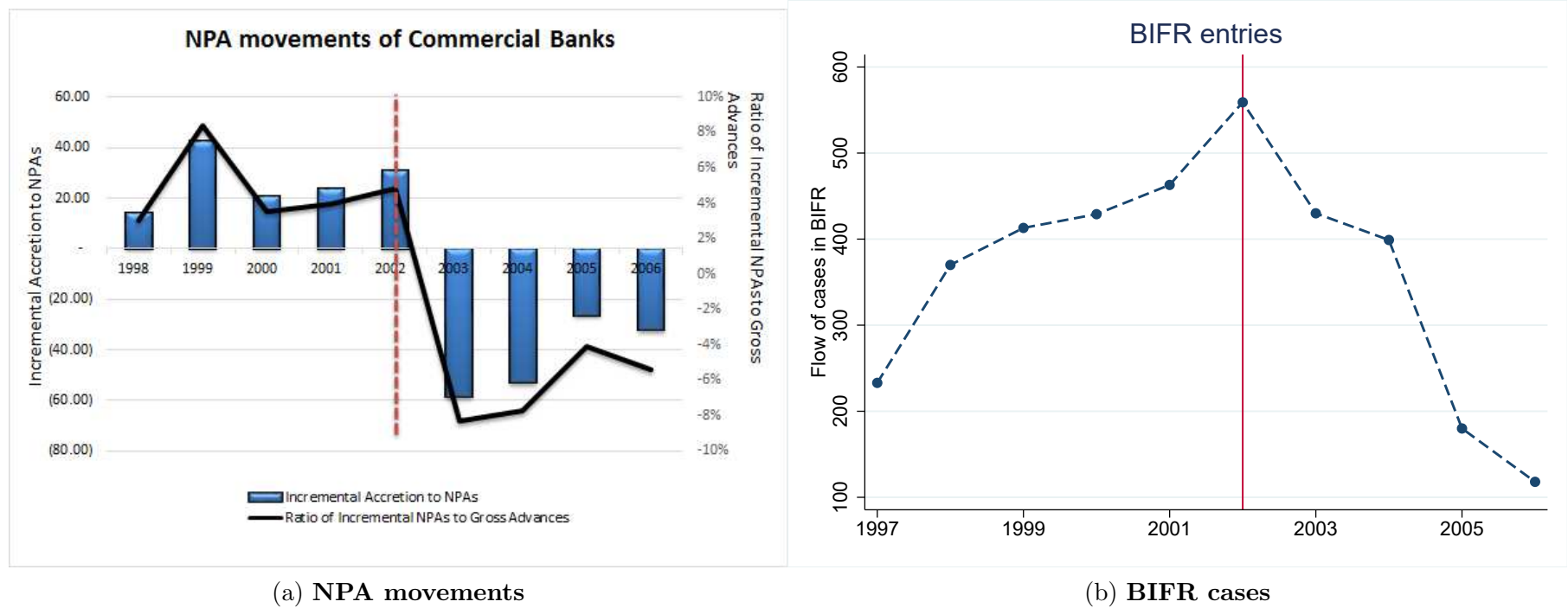
**Figure 1. Motivating Graph: Impact of the collateral reform on aggregate health of firms**

The graph below shows the percentage of firms with negative profit and the percentage of firms with interest coverage ratio (ICR) below 1 between 1997 to 2015. ICR is the ratio of earnings before interest and taxes to total interest expense. Return on assets is the ratio of earnings before interest, taxes, depreciation and amortization to total assets. Data is for the period 1997 to 2007 and is from Prowess.



**Figure 2. Effectiveness of the collateral reform**

Panel A shows incremental additions in non-performing assets (NPAs) and the ratio of incremental NPAs to gross advances. Data is from the Reserve Bank of India and collected from IndiaStat. Data is at the annual level and as of March of each year. Panel B shows the number of cases filed under the Board for Industrial and Financial Reconstruction (BIFR) which was used as a way to circumvent the liquidation process prior to the collateral reform. Data is hand-collected from the BIFR website. Data us for the period 1997 to 2007.



**Figure 3. Impact of the collateral reform on secured debt**

The graph on the left-hand-side plots the coefficient  $\eta_\tau$  from the following difference-in-difference (DiD) specification separately for high tangibility and low tangibility firms:

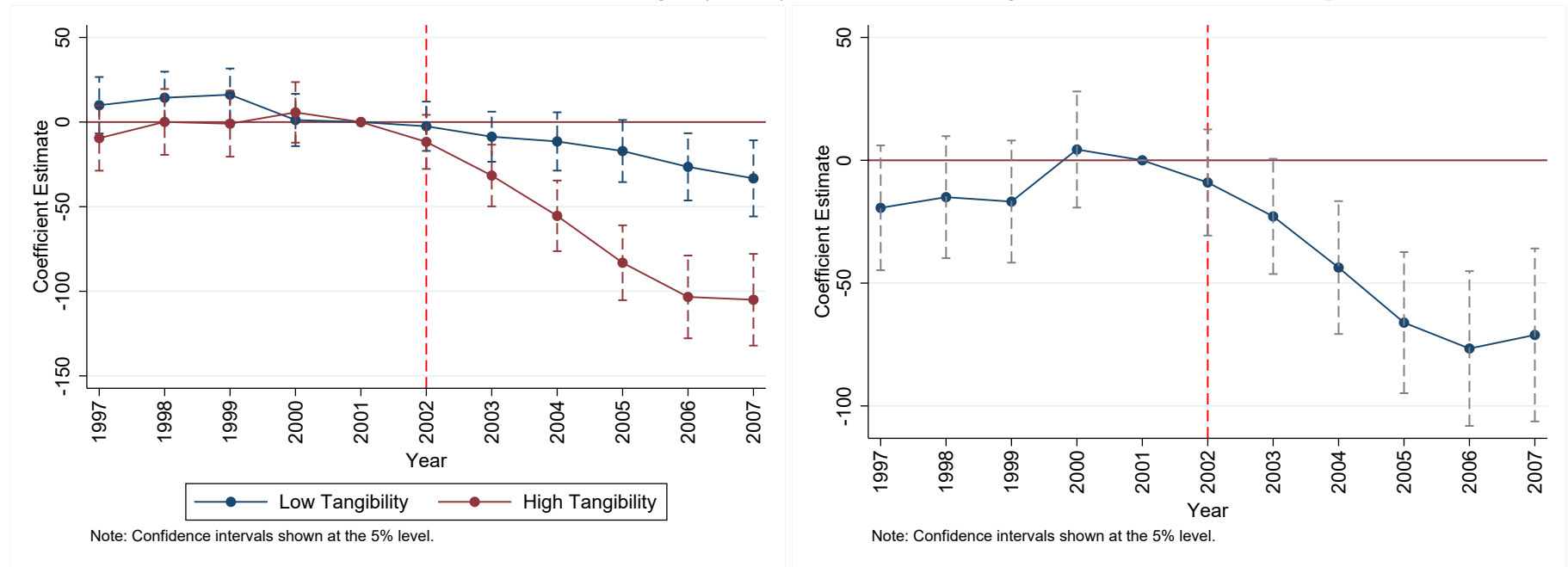
$$y_{ijt} = \alpha_i + \gamma_t + \theta \times \mathbb{1}_{Post} + \delta \times \mathbb{1}_{(LowQ)} + \sum_{\tau} \eta_{\tau} \times (\mathbb{1}_{\tau} \times \mathbb{1}_{(LowQ)}) + \epsilon_{ijt}$$

The graph on the right-hand-side plots the coefficient  $\phi_\tau$  from the following difference-in-difference-in-difference (DiDiD) specification:

$$y_{it} = \alpha_i + \gamma_t + \sum_{\tau} \eta_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \sum_{\tau} \nu_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighT)} + \sum_{\tau} \phi_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} \times \mathbb{1}_{(HighT)} + \beta \times X_{it} + \epsilon_{ijt}$$

where  $\tau$  ranges from 1996 to 2007,  $\mathbb{1}_{\tau} = 1$  if year is  $\tau$ . Bars show the 95% confidence intervals,  $\tau = 0$  is the year collateral reform was announced and all coefficients are normalized relative to  $\tau = -1$ . Robust standard errors are clustered at the firm level. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms.  $\mathbb{1}_{(HighT)}$  is one for above median tangibility firms. The solid red line shows the coefficients for above median tangibility firms and the solid blue line shows the coefficients for the below median tangibility firms.  $y_{it}$  is the secured borrowings. Data is from Prowess and for the period 1997–2007.

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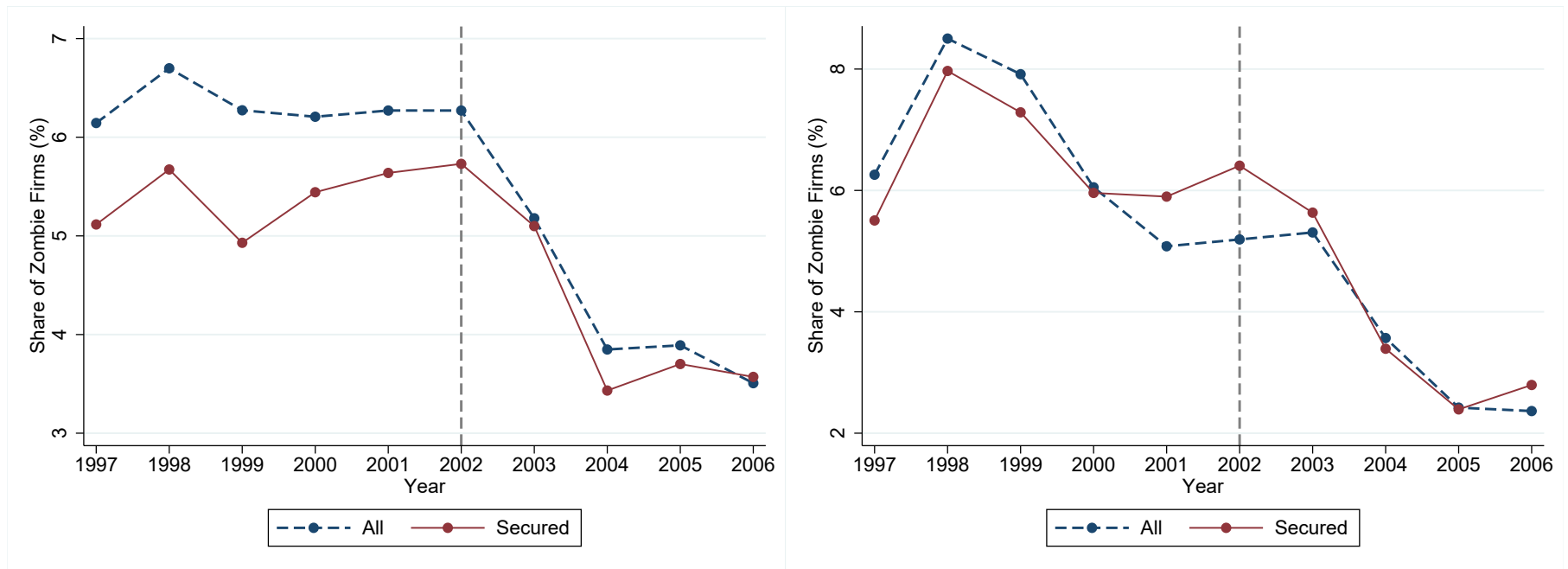


(a) Diff-in-Diff

(b) Diff-in-Diff-in-diff

**Figure 4. Impact of collateral reform on percentage of firms receiving subsidized credit**

The graphs below plot the percentage of firms that are classified as zombies relative to the total number of firms. Panel (a) plot the raw numbers and panel (b) plots the asset-weighted percentage by total assets. A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero. Since the collateral law only applies to secured debt, we also classify a firm satisfies all the conditions for a zombie and in addition the secured borrowings is greater than zero (solid red line in each graph). Data is from Prowess. Data is for the period 1997 to 2007.



(a) Raw

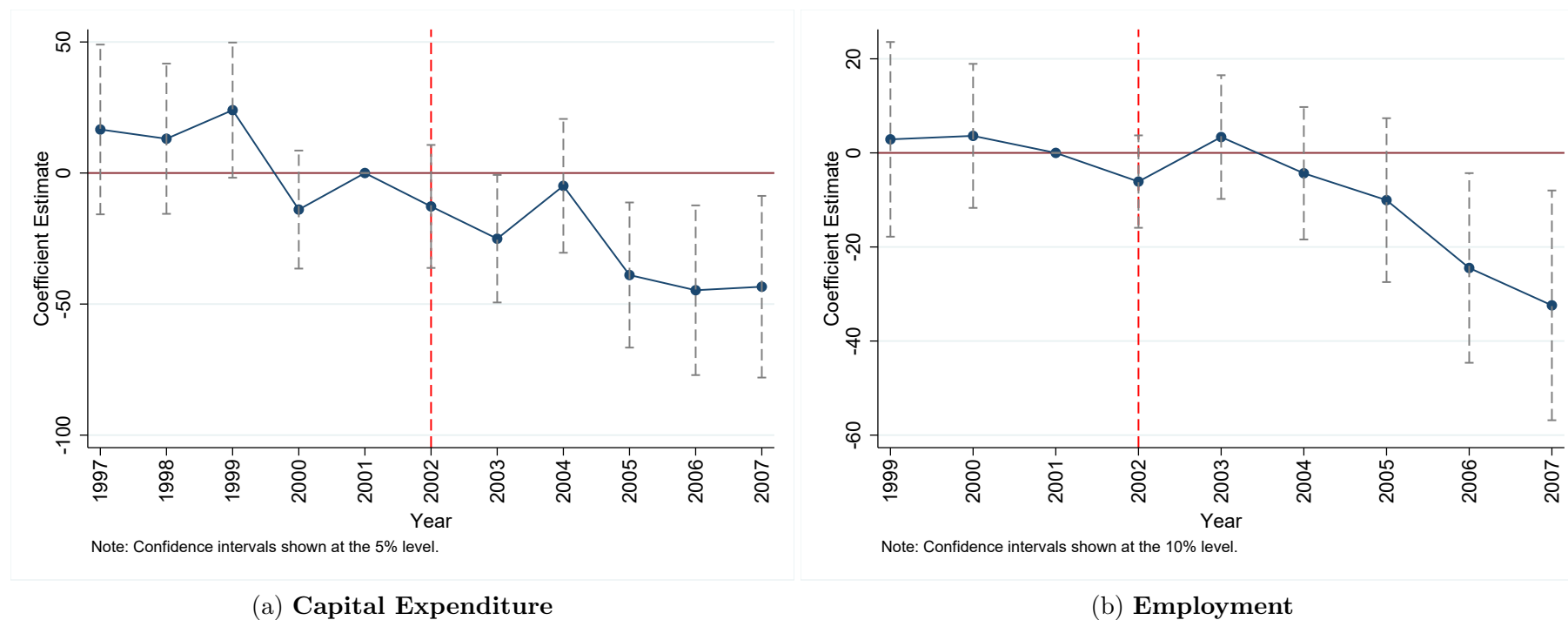
(b) Asset-Weighted

## Figure 5. Impact of the collateral reform on real outcomes: Capital Expenditure and Employment

The graphs below plot the coefficient  $\phi_\tau$  from the following difference-in-difference-in-difference (DiDiD) specification:

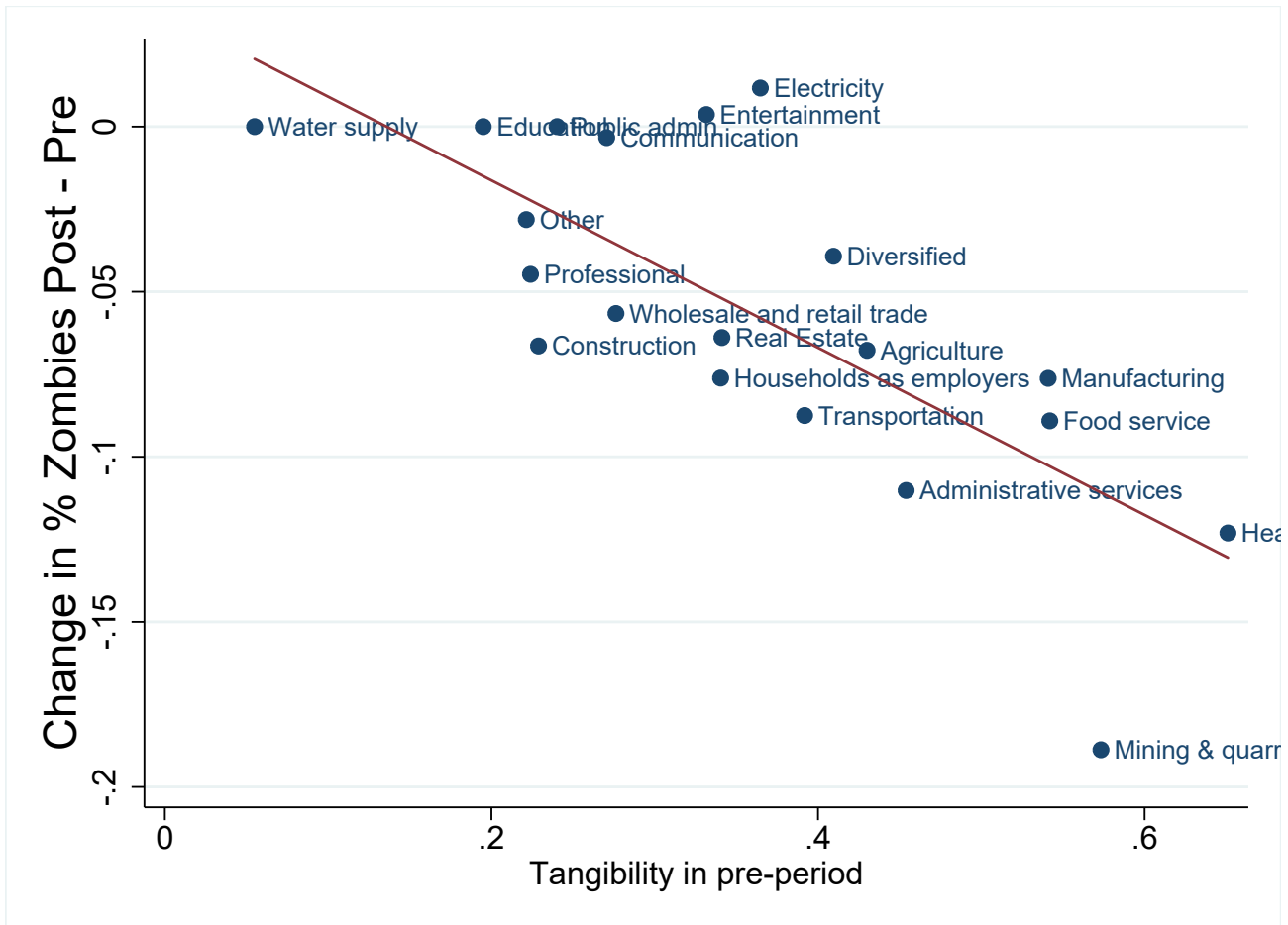
$$y_{it} = \alpha_i + \gamma_t + \sum_{\tau} \eta_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \sum_{\tau} \nu_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighT)} + \sum_{\tau} \phi_{\tau} \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} \times \mathbb{1}_{(HighT)} + \beta \times X_{it} + \epsilon_{ijt}$$

where  $\tau$  ranges from 1996 to 2007,  $\mathbb{1}_{\tau} = 1$  if year is  $\tau$ . Bars show the 95% confidence intervals,  $\tau = 0$  is the year collateral reform was announced and all coefficients are normalized relative to  $\tau = -1$ . Robust standard errors are clustered at the firm level. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms.  $\mathbb{1}_{(HighT)}$  is one for above median tangibility firms. The solid red line shows the coefficients for above median tangibility firms and the solid blue line shows the coefficients for the below median tangibility firms.  $y_{it}$  is capital expenditure in panel (a) and employment in panel (b). Data is from Prowess and for the period 1997–2007.



**Figure 6. Impact of collateral law on change in percentage of firms receiving subsidized credit and tangibility of assets**

The plot below shows the percentage change in percentage of zombies to average tangibility of firms in each industry. A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero. Percentage of zombies is the number of zombies to the total number of firms. The change is calculated as the average in period before the reform (2002 to 2007) minus the average in the period after the reform. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Industry refers to the sector that a firm operates in and provided by Prowess.



**Table I. Descriptive Statistics of firms by quality of borrower**

The tables below shows the summary statistics of all the variables used in our analysis. Data is from Prowess. ICR is the ratio of earnings before interest and taxes to total interest expense. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. The mean and standard deviation are shown in columns 1 and 2. In columns 3 and 4 shows the average for low quality borrowers in the period before and after the reform, that is 2002. Column 5 shows the t-statistic on the difference between the pre and post period for the low quality borrowers. In columns 6 and 7 shows the average for high quality borrowers in the period before and after the reform. Column 8 shows the t-statistic on the difference between the two. For the definition of remaining variables see Table A1. Data is from Prowess for the period 1997 to 2007.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Low Quality			High Quality		
	Mean	SD	Pre	Post	t-stat on Diff.	Pre	Post	t-stat on Diff.
Secured Borrowings <sup>+</sup>	45.23	191.6	51.74	37.54	(-4.78***)	30.96	56.52	(12.91***)
Unsecured Borrowings <sup>+</sup>	3.160	17.20	1.020	4.260	(13.33***)	1.530	4.730	(18.28***)
Capital Expenditure <sup>+</sup>	83.45	259.2	59.81	59.19	(-0.18)	78.02	106.7	(10.11)
Total Debt <sup>+</sup>	1058	6552	1059	1363	(3.38***)	770.7	1141	(5.35***)
Secured Debt <sup>+</sup>	506.1	1202	486.0	644.7	(7.72***)	393.6	538.1	(10.69***)
Unsecured Debt <sup>+</sup>	253.6	802.7	246.7	311.5	(4.45***)	186.1	282.3	(10.21***)
Debt to Assets <sup>+</sup>	0.340	0.340	0.450	0.560	(14.39***)	0.260	0.250	(-2.94***)
Log(Sales)	5.370	2.420	4.840	4.850	(0.12)	5.410	5.750	(13.11)
$\frac{EBITDA}{Total\ Assets}$	0.100	0.110	0.0300	0.0700	(23.56***)	0.130	0.110	(-14.54***)
<b>Observations</b>	52152		16457			35695		

<sup>+</sup> INR million.

**Table II. Descriptive Statistics of firms by whether firms receive subsidized credit (zombie status)**

The tables below shows the summary statistics of all the variables used in our analysis. ICR is the ratio of earnings before interest and taxes to total interest expense. A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero. A firm is classified as a zombie if it received zombie lending in 1998, 1999 or 2000. The mean and standard deviation are shown in columns 1 and 2. In columns 3 and 4 shows the average for zombie firms in the period before and after the collateral reform, that is 2002. Column 5 shows the t-statistic on the difference between the pre and post period for zombie firms. In columns 6 and 7 shows the average for non-zombie borrowers in the period before and after the implementation of the reform, that is 2002. Column 8 shows the t-statistic on the difference between the pre and post period for non-zombies. For the definition of remaining variables see Table A1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Low Quality			High Quality		
Variables	Mean	SD	Pre	Post	t-stat on Diff.	Pre	Post	t-stat on Diff.
Secured Borrowings	45.23	191.6	62.34	41.31	(-4.82***)	32.41	52.65	(11.40***)
Unsecured Borrowings	3.160	17.20	1.100	5.110	(10.91***)	1.410	4.490	(19.96***)
Capital Expenditure	83.45	259.2	71.84	63.71	(-1.56)	71.81	97.89	(10.55)
Total Debt	1058	6552	1373	1835	(2.82***)	752.1	1093	(5.90***)
Secured Debt	506.1	1202	533.5	724.0	(6.39***)	400.8	542.2	(11.63***)
Unsecured Debt	253.6	802.7	316.5	401.7	(3.77***)	178.8	267.7	(10.83***)
Debt to Assets	0.340	0.340	0.510	0.610	(9.05***)	0.280	0.300	(4.69***)
Log(Sales)	5.370	2.420	4.720	4.870	(3.00***)	5.340	5.590	(11.22***)
$\frac{EBITDA}{Total Assets}$	0.100	0.110	0.0200	0.0700	(17.10***)	0.110	0.110	(-4.03***)
<b>Observations</b>	52152		8791			43361		

**Table III. Impact of the collateral reform on secured borrowings**

Panel A reports results for difference-in-difference specification in Equation 1 and Panel B reports results for difference-in-difference-in-difference specification in Equation 2. The dependent variable is secured borrowings which is the change in secured debt in columns 1 to 4 (Panel A and Panel B) and the ratio of secured borrowings to total assets in columns 5 to 6. Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets. Columns 1–2 (Panel A) include firm fixed effects. Columns 3–4 (Panel A) include firm fixed effects and year fixed effects. Baseline mean is calculated for the low quality borrowers in the pre-reform period for all columns except column 2 where the same is calculated for high quality borrowers. In Panel B, Column 1 shows the regression results for the difference-in-difference specification in Equation 5 on the sub-sample of low quality borrowers. Column 2 shows the regression results for Equation 5 on the sub-sample of high quality borrowers. Columns 3 and 4 shows the regression results of Equation 2. Columns 1, 2 and 4 in Panel B include the controls. All regressions include firm fixed effects and year fixed effects. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level.

<b>Panel A: Dependent Variable - Change in Secured Debt</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
	Low Quality	High Quality	Change in Secured Debt		<i>Change in Secured Debt</i>	
	<i>(INR million)</i>		<i>(INR million)</i>		<i>Assets</i>	
Post	-19.68*** (3.824)	18.29*** (2.237)				
Low Quality Borrower * Post			-46.11*** (4.320)	-39.79*** (4.490)	-0.0280*** (0.00286)	-0.0239*** (0.00292)
Baseline Mean	51.74	30.96	51.74	51.74	0.043	0.043
No. of Obs.	16457	35695	52152	52152	45840	45840
R squared	0.399	0.341	0.360	0.362	0.261	0.265
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	N	N	Y	Y	Y	Y
Controls	N	N	N	Y	N	Y
<b>Panel B: Dependent Variable - Change in Secured Debt</b>						
	(1)	(2)	(3)	(4)		
	Low Quality	High Quality				
Low Quality * Post				-22.19*** (4.869)		-16.77*** (4.931)
High Tangibility * Post		-26.59*** (6.411)	12.01** (4.783)	12.41** (4.846)		12.19** (4.805)
Low Quality * Post * High Tangibility				-39.08*** (8.023)		-37.81*** (8.059)
No. of Obs.	16437		35502	51939		51939
R squared	0.403		0.347	0.359		0.361
Firm Fixed Effects	Y		Y	Y		Y
Year Fixed Effects	Y		Y	Y		Y
Controls	Y		Y	N		Y

**Table IV. Impact of the collateral reform on zombie borrowing (evergreening)**

Panel A reports the results for the difference-in-difference specification in Equation 6 (columns 3–4) and the difference-in-difference-in-difference specification in Equation 8 (columns 5–6). Columns 1 and 2 show the results comparing the pre and post reform period. A zombie firm is one that receives subsidized credit. A firm is classified as a zombie if it satisfies all of the following (i) interest rates of the firm is below the minimum prime lending rate, (ii) interest coverage ratio (ICR) below 1, (iii) leverage (total external debt to total assets) is greater than 0.20, and (iv) for which change in debt was greater than zero. The dependent variable is secured borrowings in columns 1–4 in Panel A and B, and an indicator for whether a firm is zombie (columns 5–6 in Panel B). Post is an indicator equal to 1 if year is greater than 2002. Firm-level controls included are log of sales and EBITDA/assets. Baseline mean is calculated for the zombie (non-zombie) borrowers in the period before the reform in columns 1, 3, 4. All columns include firm fixed effects. Columns 2–6 in Panel A and columns 1–4 in column B also include year fixed effects. Panel B reports results for Equation 7. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level. Data is from Prowess for the period 1997-2007.

<b>Panel A: Dependent Variable - Change in Secured Debt</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
	Zombies	Non-Zombies	Secured		$\mathbb{1}_{zombie\ current}$	
	<i>(INR million)</i>		<i>(INR million)</i>			
Post	-27.63*** (5.241)	20.15*** (2.165)				
Zombie * Post			-47.07*** (5.688)	-43.02*** (5.824)	-0.0939*** (0.0110)	-0.0974*** (0.0109)
Baseline Mean	62.34	32.41	62.34	62.34	0.800	0.800
No. of Obs.	8791	43361	52152	52152	52152	52152
R squared	0.413	0.339	0.359	0.361	0.292	0.295
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Controls	N	N	N	Y	N	Y

<b>Panel B: Dependent Variable - Change in Secured Debt</b>				
	(1)	(2)	(3)	(4)
	Zombie	Non-zombie		
Zombie * Post			-22.40*** (7.281)	-19.49*** (7.292)
High Tangibility * Post		-32.46*** (9.827)	4.391 (4.252)	3.699 (4.288)
Zombie * Post * High Tangibility			-36.65*** (10.63)	-35.22*** (10.66)
No. of Obs.	8784	43155	51939	51939
R squared	0.418	0.348	0.358	0.360
Firm Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Controls	Y	Y	N	Y

**Table V. Impact of the collateral reform on capital expenditure**

Panel A reports results for the difference-in-difference specification in Equation 1 and Panel B reports results for the difference-in-difference-in-difference specification in Equation 2. The dependent variable is capital expenditure in a given year. Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets. Columns 1–2 (Panel A) include firm fixed effects. Columns 3–4 (Panel A) include firm fixed effects and year fixed effects. Baseline mean is calculated for the low quality borrowers in the pre-reform period for all columns except column 2 where the same is calculated for high quality borrowers. In Panel B, Column 1 shows the regression results for Equation 5 on the sub-sample of low quality borrowers. Column 2 shows the regression results for Equation 5 on the sub-sample of high quality borrowers. Columns 3 and 4 shows the regression results of Equation 2. Columns 1,2 and 4 in Panel B include the controls. All regressions include firm fixed effects and year fixed effects. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level. Data is from Prowess for the period 1997-2007.

**Panel A: Dependent Variable - Capital Expenditure**

	(1)	(2)	(3)	(4)
	Low Quality	High Quality		
	<i>(INR million)</i>		<i>(INR million)</i>	
Post	-11.24*** (3.991)	18.08*** (2.597)		
Low Quality Borrower * Post			-42.95*** (4.722)	-30.54*** (4.788)
Baseline Mean	59.81	78.02	59.81	59.81
No. of Obs.	16457	35695	52152	52152
R squared	0.556	0.637	0.617	0.622
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Controls	N	N	N	Y

**Panel B: Dependent Variable - Capital Expenditure**

	(1)	(2)	(3)	(4)
	Low Quality	High Quality		
	<i>(INR million)</i>		<i>(INR million)</i>	
Low Quality * Post			-29.77*** (5.666)	-20.38*** (5.781)
High Tangibility * Post	-10.85 (6.759)	8.534* (5.112)	9.108* (5.226)	9.024* (5.133)
Low Quality * Post * High Tangibility			-21.45** (8.583)	-20.68** (8.586)
No. of Obs.	14714	32700	47414	47414
R squared	0.560	0.644	0.621	0.625
Firm Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Controls	Y	Y	N	Y

**Table VI. Impact of the collateral reform on employment**

Panel A reports results for Equation 1 and Panel B reports results for Equation 2. The dependent variable is employment in a given year. Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets. Columns 1–2 (Panel A) include firm fixed effects. Columns 3–4 (Panel A) include firm fixed effects and year fixed effects. Baseline mean is calculated for the low quality borrowers in the pre-reform period for all columns except column 2 where the same is calculated for high quality borrowers. In Panel B, Column 1 shows the regression results for Equation 5 on the sub-sample of low quality borrowers. Column 2 shows the regression results for Equation 5 on the sub-sample of high quality borrowers. Columns 3 and 4 shows the regression results of Equation 2. Columns 1,2 and 4 in Panel B include the controls. All regressions include firm fixed effects and year fixed effects. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm Data is at the establishment level and from the Annual Survey of Industries (ASI).

<b>Panel A: Dependent Variable - Employment</b>				
	(1)	(2)	(3)	(4)
	Low Quality	High Quality		
	<i>(INR million)</i>		<i>(INR million)</i>	
Post	-47.15*** (6.104)	22.90*** (3.545)		
Low Quality * Post			-31.05*** (2.816)	-27.72*** (2.744)
Baseline Mean	306	312	306	306
No. of Obs.	30239	83185	113424	113424
R squared	0.908	0.923	0.919	0.921
Controls	N	N	N	Y
<b>Panel B: Dependent Variable - Employment</b>				
	(1)	(2)	(3)	(4)
	Low Quality	High Quality		
	<i>(INR million)</i>		<i>(INR million)</i>	
Low Quality * Post			-27.27*** (2.909)	-24.42*** (2.832)
High Tangibility * Post	-2.553 (6.230)	8.388** (3.647)	10.96*** (3.718)	9.064** (3.648)
Low Quality * Post * High Tangibility			-14.88** (7.466)	-12.95* (7.293)
No. of Obs.	30239	83185	113424	113424
R sq.	0.913	0.925	0.919	0.921
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Controls	N	Y	N	Y

**Table VII. Zombie Distortions: Secured borrowing, capital expenditure and employment in decongested industries**

In this table, we show the results for the zombie distortions specification in Equation 9. In Panel A, the dependent variable in columns 1 and 2 is the secured borrowings. The dependent variable in columns 3 and 4 in Panel A is capital expenditure. In Panel B, the dependent variable in columns 1 and 2 is number of employees. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets.  $\mathbb{1}_{Industry\ Zombie}$  is an indicator for whether a sector had above median percentage of zombies in the 2001. Baseline mean is calculated for the non-zombie borrowers in the pre-reform period. All regressions include firm fixed effects and year fixed effects. Even numbered columns also include controls. Standard errors are clustered at the firm level. The data is from Prowess in Panel A for the period 1997-2007 and from Annual Survey of Industries (ASI) in Panel B for the period 1999-2007.

<b>Panel A: Dependent Variable - Secured Borrowings and Capital Expenditure</b>				
	(1)	(2)	(3)	(4)
	Secured Debt		CapEx	
$\mathbb{1}_{High\ Sector\ Zombies} * Post$	-24.00*	-28.76**	-33.99***	-43.77***
	(13.91)	(13.79)	(12.86)	(12.62)
Post*Non-Zombie	16.46	9.447	13.42	-0.132
	(13.07)	(13.00)	(12.21)	(11.93)
Non-Zombie* $\mathbb{1}_{High\ Sector\ Zombies} * Post$	37.32**	40.66***	40.48***	47.43***
	(14.51)	(14.40)	(14.00)	(13.69)
Baseline Mean	62.34		71.84	
No. of Obs.	52152	52152	52152	52152
R sq.	0.359	0.362	0.617	0.622
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Controls	N	Y	N	Y

<b>Panel B: Dependent Variable - Employment</b>		
	(1)	(2)
$\mathbb{1}_{High\ Sector\ Zombies} * Post$	-20.97***	-19.91**
	(8.129)	(7.946)
Post*Non-Zombie	13.39	10.75
	(8.671)	(8.500)
Non-Zombie* $\mathbb{1}_{High\ Sector\ Zombies} * Post$	15.40*	15.64*
	(8.557)	(8.381)
Baseline Mean	306	306
No. of Obs.	113424	113424
R sq.	0.919	0.921
Firm FE	Y	Y
Year FE	Y	Y
Controls	N	Y

**Table VIII. Impact of the reform on profitability of firms**

Panel A reports results for Equation 1 and Panel B reports results for Equation 2. The dependent variable is operating margin defined as EBITDA (Earnings before interest, taxes, debt and ammortization) to sales in columns 1–3 and return on assets EBIT (Earnings before interest and taxes) in columns 4–6. Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. All columns include firm fixed effects. Columns 3 and 6 (Panel A) and all columns in Panel B also include year fixed effects. In Panel B, columns 1 and 4 shows the regression results for Equation 5 on the sub-sample of low quality borrowers. Columns 2 and 5 show the regression results for Equation 5 on the sub-sample of high quality borrowers. Columns 3 and 6 show the regression results of Equation 2. Columns 1,2 and 4 in Panel B include the controls. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level.

<b>Panel A: Profit</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
	Op. Margin = $\frac{EBITDA}{Sales}$			ROA = $\frac{EBIT}{Assets}$		
	Low Quality	High Quality		Low Quality	High Quality	
Post	6.619*** (0.840)	-0.0782 (0.331)		3.855*** (0.180)	-0.266*** (0.0903)	
Low Q. Borr. * Post			6.707*** (0.902)			4.139*** (0.201)
No. of Obs.	14441	31399	45840	14441	31399	45840
R squared	0.0551	0.0863	0.0686	0.0648	0.0643	0.0668
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

<b>Panel B: Diff-in-diff-in-diff</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
	Op. Margin = $\frac{EBITDA}{Sales}$			ROA = $\frac{EBIT}{Assets}$		
	Low Quality	High Quality		Low Quality	High Quality	
Low Quality * Post			4.275** (1.715)			3.642*** (0.343)
High Tangibility * Post	3.158* (1.902)	-0.550 (0.657)	-0.514 (0.659)	0.441 (0.385)	-0.307* (0.180)	-0.311* (0.180)
Low Quality * Post * High Tangibility			3.661* (2.010)			0.777* (0.423)
No. of Obs.	14426	31263	45689	14426	31263	45689
R squared	0.0559	0.0839	0.0672	0.0666	0.0703	0.0661
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Controls	Y	Y	N	Y	Y	N

**Table IX. Reallocation Outcomes: Marginal Productivity of Labor and Marginal Productivity of Capital**

The dependent variable in panel A is the log of the change in the share in capital of a firm to the capital in the firm's industry. The dependent variable in panel B is the log of the change in the share in employment of a factory to the employment in the industry which the factory is in. Marginal productivity of capital (MPK) is calculated as the log of the ratio of sales to capital. Marginal productivity of labor (MPL) is calculated as the log of the ratio of sales to labor. All regressions include industry-year fixed effects. Standard errors are clustered at the firm level. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level. The data is from Prowess for the period from 1997-2007 in Panel A. The data is from Annual Survey of Industries (ASI) for the period from 1997-2007 in Panel A.

<b>Panel A: Dependent variable - Log of the change in the share of firm capital</b>		
	(1)	(2)
MPK * Post	0.359*** (0.0359)	0.365*** (0.0392)
High Tangibility * Post		0.493*** (0.0753)
High Tangibility * MPL		-0.149** (0.0738)
MPK * Post * High Tangibility		0.151* (0.0773)
MPK	-0.604*** (0.0341)	-0.576*** (0.0356)
No. of Obs.	14910	14910
R squared	0.379	0.384
Industry * Year FE	Y	Y
Age controls	Y	Y
<b>Panel B: Dependent variable - Log of the change in the share of firm employment</b>		
	(1)	(2)
MPK * Post	0.0475*** (0.00949)	0.0289** (0.0122)
High Tangibility * Post		-1.087*** (0.251)
High Tangibility * MPL		0.0424*** (0.000303)
MPL * Post * High Tangibility		0.0577*** (0.0192)
MPL	-0.0541*** (0.000712)	-0.0856*** (0.000901)
No. of Obs.	19044	19044
R sq.	0.802	0.805
Industry * Year FE	Y	Y
Age controls	Y	Y

# Online Appendix

## A. Supplementary Analysis

### A.1. Bank Level Analysis

I also look at bank level exposure to low quality firms. The hypothesis is that banks with the highest exposure to low quality firms in the period before the SARFAESI should be the most affected by the SARFAESI and hence should show the biggest effect. I can link each firm to the primary (lead) bank or lender. I calculate the bank level exposure to low quality banks in the pre-crisis period. Then I look at the following regression.

$$y_{it} = \alpha_b + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \nu \times \mathbb{1}_{Post} \times \mathbb{1}_{(HighExp)} + \phi \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} \times \mathbb{1}_{(HighExp)} + \beta \times X_{it} + \epsilon_{ijt} \quad (13)$$

where  $i$  indexes firms,  $t$  indexes time,  $b$  indexes banks.  $\alpha_b$  and  $\gamma_t$  are bank and year fixed effects.  $\mathbb{1}_{(HighExp)} = 1$  for “High Exposure” firms, that is, above median exposure to low quality firms in the period before SARFAESI.  $\mathbb{1}_{Post} = 1$  for years when SARFAESI is in effect ( $\geq 2002$ ).  $\mathbb{1}_{(LowQ)} = 1$  for “Low Quality” firms, that is, firms with Interest Coverage Ratio below 1 in the pre-SARFAESI period.  $\phi$  is coefficient estimate of interest. Standard errors are clustered at the firm level.

To transparently examine the components of above triple-diff, I also look at the following specification separately for the low quality and high quality borrowers:

$$y_{it} = \alpha_b + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{HighExp} + \beta \times X_{it} + \epsilon_{ijt} \quad (14)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when SARFAESI is in effect ( $\geq 2002$ ). The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level. The coefficient of interest is  $\eta$ , which measures the difference, conditional on controls, in outcome variable between low quality and high quality firms, after the passage of the SARFAESI Act relative to before the SARFAESI Act.  $y_{it}$ , the dependent variable, is change in secured debt.

## A.2. Entry and Exit of Firms

Last, I study the effect of SARFAESI on entry and exit of firms. I hypothesize that industries with higher percentage of zombie firms should observe both higher births as well as higher deaths. Low quality firms which are not able to meet their debt commitments should wind-up and de-clutter the industry creating scope for new firms to enter.

First, I look at whether low quality borrowers were more likely to close following the SARFAESI. This is analogous to Equation 1:

$$\mathbb{1}_{Closure_{it}} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{Post} \times \mathbb{1}_{(LowQ)} + \epsilon_{ijt} \quad (15)$$

where  $i$  indexes firms,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are firm and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when SARFAESI is in effect ( $\geq 2002$ ).  $\mathbb{1}_{(LowQ)} = 1$  for “Low Quality” firms. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2002.  $\eta$  is estimate of interest. Standard errors are clustered at the firm level. The coefficient of interest is  $\eta$ , which measures the difference in outcome  $y$  between low quality and high quality borrowers after the passage of the SARFAESI Act relative to before the SARFAESI Act. The dependent variable  $\mathbb{1}_{Closure_{it}}$  is an indicator for whether a firm closed.

I then look at following regression specification:

$$y_{it} = \alpha_i + \gamma_t + \eta \times \mathbb{1}_{High\ Fraction\ Zombies} \times \mathbb{1}_{Post} + \beta \times X_{it} + \epsilon_{ijt} \quad (16)$$

where  $i$  indexes industry,  $t$  indexes time,  $\alpha_i$  and  $\gamma_t$  are industry and year fixed effects.  $\mathbb{1}_{Post} = 1$  for years when SARFAESI is in effect ( $\geq 2002$ ). The controls ( $X_{it}$ ) included are log of sales and EBITDA/Assets. Standard errors are clustered at the firm level.  $\mathbb{1}_{High\ Fraction\ Zombies}$  is an indicator for whether a sector had a high fraction of zombies in the pre-SARFAESI period. The coefficient of interest is  $\eta$ . The dependent variable is the total number of firms, birth of firms and death of firms.

## **A. Effect of the collateral reform on Entry and Exit of Firms**

In this section I study the effect of the reform on entry, exit and total number of firms within an industry. I hypothesize that industries with higher percentage of zombie firms should observe higher number of both births and deaths. I run the regression specification in Equation 16 with the dependent variables as total number of firms, births and deaths in an industry and report the results in Table A11. In Panel A of Table A11, we find that for industries with higher percentage of zombie firms before the reform, the total number of firms increased by 65 firms post reform (column 1). We also see an increase in births of new firms by 15 firms in industries with higher percentage of zombie firms prior to the act (column 2). However, such an increase in number of new firms might also be attributable to the fact that riskier firms were now able to access credit due to improved creditor rights. I do not find any significant impact on the number of increase in deaths in column 3 for industries with higher percentage of zombie firms. However, we suspect that winding up of a firm takes longer than creating a new firm and the effect on deaths of firms within an industry should be seen in a longer term. Consequently, in column 4 we extend our data till 2010 and find that deaths in these industries also increased by 8 firms post the reform.

### **A. Long Term Effects of the reform**

Next, we turn to the question on whether the collateral reform continues to have an effect? Indeed, we see that the reform continues to have an effect in the current period though popular rhetoric suggests otherwise. Figure A3, Panel B extends the analysis in Figure 1 to 2015. The number of firms with ICR less than 1 has been increasing since 2007. Similarly, the percentage of firms with negative profits has also been increasing since 2007. However, as Panel A shows the balance sheets of banks has also been steadily increasing. Thus, the reluctance of banks to pursue delinquent loans may be due to the deteriorating health of banks. Additionally, as discussed in Section II the interpretation and reinterpretation of the reform have rendered the

law less effective over time.

In Panel B of Table A11, I study the long term effect of the reform on new secured debts and new secured debt to asset of low quality firms. We now want to see the effect of the reform on all poor performing firms and classify a firm as low quality firm if the firm has interest coverage ratio of less than 1 in any of the three preceding years. To capture the effect for a longer run, we extend our data till 2010. In column 1, we find that a low quality firm reduced new borrowings by INR 95 million post the reform. After controlling for log sales and return on assets in column 2, the reduction in new secured borrowings by low quality firms increases to INR 153 million. In column 3 we find that the new debt to asset ratio fell by 2.5 percent for low quality firms post the reform. Similarly in column 4, we see that the new debt to asset ratio falls by 3.1 percent after controlling for log sales and return on assets. However we hypothesize that such large effects on debt is due to old debts of the firms and may not necessarily lead to such reduction in the longer run.

## B. Robustness

### A. Substituting into Trade Credit

Alok et al. (2016) show that post-SARFAESI, stronger creditor rights led to firms substituting away from secured formal credit to trade credit. We check whether low quality borrowers compensated for the reduction in secured debt by increasing trade credit. To check this we turn to the ASI data which has trade credit data (though it focuses exclusively on manufacturing firms). Low quality firms in this case is defined as firms with ratio less than 1 in 1999 or 2000 (data is not available before 1999). In Table A7 columns 1–2, we confirm our baseline hypothesis that low quality borrowers cut back on debt.<sup>16</sup> However, contrary to the hypothesis in Alok et al. (2016), the both formal and trade credit for low quality firms declined in the post-SARFAESI period. Thus, it wasn't that the low quality firms were able to substitute formal credit with trade credit and both trade credit and formal credit fell by 6 percent and 11 percent respectively.

### B. Alternate definition of quality

We also analyze the effect of SARFAESI on secured borrowings if the primary lender of a firm is a Non-Banking Financial Corporation (NBFC). We present the result in column 1 of Table A8 in Appendix. The variable *LawApplies* is a binary variable which takes the value 1 if the primary lender of a firm is bank and 0 if the primary lender is a Non-Banking Financial Corporation (NBFC). From column 1 we see that the secured borrowing of a firm increases by INR 14 million if the primary lender of the firm is a NBFC. However the secured borrowing of low quality firms fell by INR 32 million if the firm was a low quality borrower and the primary lender was a NBFC. We thus conclude that the effect of SARFAESI extends even to the firms borrowing from NBFCs. In column 2 of Table A8 we change the criteria and define a low quality borrower as a firm with ICR less than 1 in 2001 (year before implementation of SARFAESI). We find that our result is robust to the change in criteria of defining a low-quality firm.

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<sup>16</sup>The ASI data, however, does not separate out secured and unsecured debt.

## **C. Impact of DRT**

I now repeat the analysis by looking at the improvement in creditor rights through the establishment of the debt recovery tribunals in the 90's. In column 3 of Table A8 we see that consistent with our findings in Table III, secured borrowings of low quality firms declined after the passage of the DRT.

## **D. Logged Variables**

Lastly, we run the equation 1 with log of dependent variables and the present the result in Table A8. We find that our results are robust to such changes. From column 1 we see that the new secured borrowings of low quality firms fall by 70 percent after introduction of SARFAESI. After controlling for the firm size the effect reduces to 48 percent but stays significant. However, no such effect is observed on new unsecured debts as the act did not affect unsecured borrowings (column 4).

**Table A1. Variable Description**

The table below describes all the variables used in our main analysis.

Data Item	Variables Used	Source
Item 1	Current Portion of Secured Debt	Prowess
Item 2	Current portion of unsecured debt	Prowess
Item 3	Secured Debt (Secured by tangible assets)	Prowess
Item 4	Unsecured Debt (Not secured by tangible assets)	Prowess
Item 5	Number of employees	Prowess
Item 6	Short-term Borrowings	Prowess
Item 7	Long-term Borrowings	Prowess
Item 8	Total assets (Book Value of Assets)	Prowess
Item 9	Plant and Machinery	Prowess
Item 10	Land and Building	Prowess
Item 11	Capital Work in Progress	Prowess
Item 12	Other Fixed Assets	Prowess
Item 13	Cash and Bank Balance	Prowess
Item 14	Marketable Securities	Prowess
Item 15	Specific Assets= Item 9 + Item 12	Derived from Prowess
Item 16	Non-specific Assets = Item 10+ Item 13+ Item 14	Derived from Prowess
Item 17	Total Debt = Item 6+ Item 7 or item 3+Item 4	Derived from Prowess
Item 18	New Secured Borrowings = $\max(0, \text{Item 3} - (\text{lagged Item 3} - \text{Item 1}))$	Derived from Prowess
Item 19	New Unsecured Borrowings = $\max(0, \text{Item 4} - (\text{lagged Item 4} - \text{Item 2}))$	Derived from Prowess
Item 20	Gross Fixed Assets = Item 9 + Item 10 + Item 11 + Item 12	Derived from Prowess
Item 21	CapEx = $\max(0, \text{Item 20} - \text{Lagged Item 20})$	Derived from Prowess
Item 22	Tangibility = Specific assets / (Specific+Non-specific assets)	Derived from Prowess
Item 23	Interest Rate Expense	Prowess
Item 24	Prime Lending Rate for Long-term Loans	SBI
Item 25	Lending Rate for Short-term Loans	RBI/Prowess
Item 26	Interest Coverage Ratio (ICR) = EBIT/Interest Expense	Prowess
Item 27	Interest Expense	Prowess
Item 28	Interest Coverage Ratio (ICR) = EBIT/Interest Expense	Prowess
Item 29	Leverage = Total Debt/Total Assets	Prowess
Item 30	Tobin's Q = Market Value of Assets/Book Value of Assets	Derived from Prowess

**Table A2. Impact of Collateral Reform on Unsecured Borrowings**

Panel A reports results for difference-in-difference specification in Equation 1 and Panel B reports results for difference-in-difference-in-difference specification in Equation 2. The dependent variable is unsecured borrowings which is the change in unsecured debt in columns 1 to 4 (Panel A and Panel B) and the ratio of unsecured borrowings to total assets in columns 5 to 6. Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets. Columns 1–2 (Panel A) include firm fixed effects. Columns 3–4 (Panel A) include firm fixed effects and year fixed effects. Baseline mean is calculated for the low quality borrowers in the pre-reform period for all columns except column 2 where the same is calculated for high quality borrowers. In Panel B, Column 1 shows the regression results for the difference-in-difference specification in Equation 5 on the sub-sample of low quality borrowers. Column 2 shows the regression results for Equation 5 on the sub-sample of high quality borrowers. Columns 3 and 4 shows the regression results of Equation 2. Columns 1, 2 and 4 in Panel B include the controls. All regressions include firm fixed effects and year fixed effects. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level.

<b>Panel A: Dependent Variable - Change in Unsecured Debt</b>						
	(1)	(2)	(3)	(4)	(5)	(6)
	Low Quality	High Quality	Change in Unsecured Debt		<i>Change in Unsecured Debt</i>	
	<i>(INR million)</i>		<i>(INR million)</i>		<i>Assets</i>	
Post	2.141*** (0.271)	2.562*** (0.196)				
Low Quality Borrower * Post			-0.658** (0.332)	-0.473 (0.334)	-0.000228 (0.000264)	-0.000134 (0.000267)
Baseline Mean	0.700	1.130	0.700	0.700	.0007	.0007
No. of Obs.	15319	34720	50039	50039	43112	43112
R squared	0.410	0.435	0.432	0.433	0.434	0.434
Firm Fixed Effects	Y	Y	Y	Y	Y	Y
Year Fixed Effects	N	N	Y	Y	Y	Y
Controls	N	N	N	Y	N	Y

<b>Panel B: Dependent Variable - Change in Unsecured Debt</b>				
	(1)	(2)	(3)	(4)
	Low Quality	High Quality		
Low Quality * Post			-0.400 (0.592)	-0.0695 (0.592)
High Tangibility * Post		1.163* (0.667)	1.825*** (0.556)	1.856*** (0.558)
Low Quality * Post * High Tangibility			-0.777 (0.873)	-0.702 (0.870)
No. of Obs.	16437	35502	51939	51939
R squared	0.422	0.435	0.430	0.431
Firm Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Controls	Y	Y	N	Y

**Table A3. Real Outcomes: Impact of collateral law on Intensive Margin of capital expenditure**

Panel A reports results for the Equation 1 with the dependent variable as the amount of planned capital expenditure. Projects are classified as completed, under implementation and announced. The data is from CapexDx provided by CMIE for the period from 1997-2007. The sub-sample of firms in the Table III for which data exists in CapexDx is retained in this analysis. The dependent variable in columns 1 is the actual amount capital expenditure from Prowess. In columns 2–4 the dependent variable is the total planned capital expenditure for completed projects, announced projects and projects under implementation. In Panel B, we restrict to projects which are in non-core industries, that is, for which project industry is different from company industry. The dependent variable in columns 1 is the total planned capital expenditure for all projects, completed projects, announced projects and projects under implementation respectively. Baseline mean is calculated for the low quality borrowers in the pre-SARFAESI period for all columns except column 2 where the same is calculated for high quality borrowers. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. All regressions include firm fixed effects and year fixed effects.

**Panel A: By Project Implementation Status**

	(1)	(2)	(3)	(4)
	Total CapEx	Completed Projects	Announced Projects	Under Implementation
Low Quality Borrower * Post	-43.82*** (8.223)	-2.559*** (0.781)	-13.22*** (3.473)	-9.495*** (2.512)
No. of Obs.	26903	26903	26903	26903
R squared	0.614	0.177	0.271	0.284
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

**Panel B: For Non-Core Industries**

	(1)	(2)	(3)	(4)
	All non-core	Completed Projects	Announced Projects	Under Implementation
Low Quality Borrower * Post	-123.8** (51.04)	-282.6** (124.4)	49.90 (70.69)	-116.6* (62.86)
No. of Obs.	26903	26903	26903	26903
R squared	0.305	0.448	0.102	0.182
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

**Table A4. Real Outcomes: Employment across categories**

Panel A reports results for Equation 1 and Panel B reports results for Equation 2. The dependent variable is total number of employees (1–2), permanent employees (3–4), contract employees (5–6) and staff (7–8). Post is an indicator equal to 1 if year is greater than 2002. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets. All columns include firm and year fixed effects. All even numbered columns also include fixed effects. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. Standard errors are clustered at the firm level.

**Panel A: Employment**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Permanent		Contract		Staff	
Low Quality * Post	-31.05*** (2.816)	-27.72*** (2.744)	-2.389 (2.720)	-1.376 (2.713)	-4.510*** (1.555)	-3.587** (1.548)	-8.889*** (0.892)	-8.038*** (0.867)
No. of Obs.	113424	113424	113424	113424	113424	113424	113424	113424
R squared	0.919	0.921	0.747	0.748	0.762	0.763	0.921	0.923
Controls	N	Y	N	Y	N	Y	N	Y

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Panel B: Diff-in-diff-in-diff**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Permanent		Contract		Staff	
Low Quality * Post	-27.27*** (2.909)	-24.42*** (2.832)	-1.932 (2.567)	-1.065 (2.556)	-2.325 (1.514)	-1.543 (1.511)	-7.226*** (0.935)	-6.496*** (0.906)
High Tangibility * Post	10.96*** (3.718)	9.064** (3.648)	4.497 (3.587)	3.922 (3.580)	16.10*** (2.837)	15.58*** (2.824)	-0.391 (1.128)	-0.876 (1.113)
Low Quality * Post * High Tangibility	-14.88** (7.466)	-12.95* (7.293)	-2.153 (7.756)	-1.566 (7.741)	-9.686** (4.392)	-9.156** (4.371)	-5.974** (2.327)	-5.479** (2.284)
No. of Obs.	113424	113424	113424	113424	113424	113424	113424	113424
R sq.	0.919	0.921	0.747	0.748	0.763	0.764	0.921	0.923
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y	N	Y

**Table A5. Within Industry Variation**

In this table, we show the results for Equation 2. In Panel A, the dependent variable in columns 1 and 2 is the secured borrowings. The dependent variable in columns 3 and 4 in Panel A is capital expenditure. In Panel B, the dependent variable in columns 1 and 2 is number of employees. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Firm-level controls included are log of sales and EBITDA/assets.  $\mathbb{1}_{Industry\ Zombie}$  is an indicator for whether a sector had above median percentage of zombies in the 2001.Baseline mean is calculated for the non-zombie borrowers in the pre-SARFAESI period. All regressions include firm fixed effects and industry-year fixed effects. Even numbered columns also include controls. Standard errors are clustered at the firm level.

<b>Panel A: Secured Borrowings and CapEx</b>				
	(1)	(2)	(3)	(4)
	Secured Debt		CapEx	
Low Quality * Post	-33.97*** (4.545)	-28.08*** (4.583)	-30.15*** (5.300)	-18.83*** (5.327)
High Tangibility * Post	2.429 (5.826)	3.082 (5.790)	8.741 (6.747)	10.02 (6.604)
Low Quality * Post * High Tangibility	-26.53*** (9.519)	-26.51*** (9.543)	-27.46*** (10.29)	-27.67*** (10.22)
No. of Obs.	51939	51939	51939	51939
R squared	0.363	0.365	0.621	0.625
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y
Controls	N	Y	N	Y

<b>Panel B: Employment</b>		
	(1)	(2)
	All	Permanent
Low Quality * Post	-26.82*** (2.867)	-24.24*** (2.793)
High Tangibility * Post	11.11*** (3.689)	9.165** (3.620)
Low Quality * Post * High Tangibility	-14.96** (7.431)	-13.01* (7.260)
No. of Obs.	113424	113424
R sq.	0.919	0.922
Firm FE	Y	Y
Year FE	Y	Y
Controls	N	Y

**Table A6. Factory Closures**

This table reports results for factory closures using ASI data. The dependent variable is an indicator for whether a factory was closed in the given period. All regression include factor fixed effects and year fixed effects. Standard errors are clustered at the factory level.

	(1)	(2)
Low Quality * Post	0.0145* (0.00819)	
Negative ROA * Post		0.0222*** (0.00748)
No. of Obs.	27994	27994
R squared	0.408	0.408
Controls	N	N

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A7. Trade Credit and Formal Debt**

This table analysis the post-SARFESI effect on loans of low-quality borrowers. Low quality borrowers are defined as firms with interest coverage ratio less than 1 for the year 1999 or 2000. Variable Debt stands for total liabilities. Variable Tradecredit is defined as working sundry creditors while formal credit is defined as working overdraft. All data is obtained from the Annual Survey of Industries. All regressions include factory fixed effects and year fixed effects. We control for log sales in column 2, 4 and 6. Standard errors are clustered at the factory level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Debt)		Log(Trade Credit)		Log(Formal Credit)	
Low Quality*Post	-0.0526*** (0.0180)	-0.0642*** (0.0166)	-0.0678*** (0.0245)	-0.0631*** (0.0236)	-0.112*** (0.0313)	-0.113*** (0.0312)
No. of Obs.	212687	190395	202068	183174	150028	139223
R squared	0.953	0.961	0.917	0.925	0.904	0.906
Controls	N	Y	N	Y	N	Y

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table A8. Alternate definition of quality and DRT**

This table reports results for the Equation 1. The dependent variable is change in secured debt in columns 1 to 3. In column 1 we see the effect on secured debt of low quality borrowers if the primary lender to the firm is NBFC. The variable *LawApplies* is a binary variable which takes the value 1 if the primary lender of a firm is bank and 0 if the primary lender is a Non-Banking Financial Corporation (NBFC). In column 2 we re-define low quality firms as one which has Interest Coverage Ratio (ICR) less than 1 in the year 2001. In column 3 we see the effect of the Debt Recovery Tribunal Law (DRT) on low quality firms. The controls included are Tobin's Q, log of sales and return on assets. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered at the firm level. The data is from Prowess for the period from 1997-2007.

	(1)	(2)	(3)
	NBFCs	LQ-median	DRT
Low Quality * Post	-6.567 (5.671)		
Law Applies * Post	14.31*** (3.578)		
Low Quality * Post * Law Applies	-32.22*** (7.594)		
Low Quality Borrower (median) * Post		-111.9*** (28.58)	
Low Quality Borrower *Post			-17.67* (10.13)
No. of Obs.	29340	29340	25347
R sq.	0.333	0.0832	0.315
Firm FE	Y	Y	Y
Year FE	Y	Y	Y

**Table A9. Profitability with Logged Variables**

This table reports the results for the equation 1. The dependent variable in column 1 and 2 is the change in secured borrowings and in column 3 and 4 is the change in unsecured borrowings. Firm-level controls included are log of sales and EBITDA/assets. All regression include firm fixed effects and year fixed effects. Standard errors are clustered at the firm level.

	(1)	(2)	(3)	(4)
	New Secured Borrowings		New Unsecured Borrowings	
Low Quality Borrower * Post	-0.699*** (0.111)	-0.476*** (0.106)	-0.658** (0.332)	-0.473 (0.334)
No. of Obs.	22305	22305	50039	50039
R squared	0.671	0.680	0.432	0.433
Firm Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Controls	N	Y	N	Y

**Table A10. Bank Level Analysis**

This table reports the results for the Equation 13 and Equation 14. The dependent variable is the new long-term borrowing. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Bank-level exposure is measured as the number of low quality firms a bank was designated as the primary lender in 2000 or 2001 (year before SARFAESI was enacted). Low exposure refers to banks in the bottom quintile of exposure measure. Remaining are classified as high exposure. Each firm has one bank designated as the primary lender. When there are more than 2 primary lenders (less than 2 percent of entire sample) we randomly designate one bank as the prime lender. Column 1 includes only firms which have primary lender banks with low exposure and column 2 includes firms in which the primary lender banks has high exposure. Column 3 includes all firms. The remaining interaction (and uninteracted) terms have also been included though not shown. All regression include bank and year fixed effects. Standard errors are clustered at the firm level. Firm-level controls included are log of sales and EBITDA/assets.

	(1) Low Exposure	(2) High Exposure	(3) All
High Exposure * Low Quality			96.66*** (21.97)
Low Quality * Post	113.3*** (7.802)	-18.47*** (4.572)	94.97*** (19.59)
High Exposure * Post			-5.141 (7.732)
Low Quality * Post * High Exposure			-113.5*** (20.25)
No. of Obs.	354	17233	17587
R squared	0.383	0.433	0.432
Bank Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Controls	Y	Y	Y

**Table A11. Births, Deaths in industry and Long-term trends**

Panel A shows the result of the Equation 15. Panel B shows the result of the Equation 16 the impact of SARFAESI on the number of firms, births and deaths. Number of firms, births and deaths are calculated at the industry level from Prowess. If a firm enters the Prowess database, then it is recorded as a birth. If a firm drops out of the database it is recorded as a death. Number of firms is the total number of firms in the database. Numbers are aggregated to the 2-digit SIC industry code. The dependent variables are total number of firms (column 1), number of births (column 2) and number of deaths (column 3-4). Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001.  $\mathbb{1}_{Industry\ Zombie}$  in an indicator for whether a sector had above median percentage of zombies in the 2001. All regression include industry and year fixed effects. Standard errors are clustered at the industry level. The data is the period from 1997-2007 for columns 1-3 and 1997-2010 for column 4 in Panel A. In Panel C, we look at the long-term impact of SARFAESI. This table reports results for the Equation 1 but with a firm classified as low quality borrowers if the firm has interest coverage ratio of less than 1 in any of the three preceding years. The dependent variable in panel C is change in secured debt in columns 1 to 2 and change in secured debt to assets in columns 3 to 4. The controls included are log of sales and return on assets. All regressions include firm fixed effects and year fixed effects. Standard errors are clustered at the firm level.

<b>Panel A: Closures</b>			
	(1)	(2)	
	$\mathbb{1}_{Closure}(year \leq 2004)$	$\mathbb{1}_{Closure}(year \leq 2014)$	
Low Q. Borr. * Post	0.0341*** (0.00433)	0.0355*** (0.00401)	
No. of Obs.	47598	80093	
R squared	0.266	0.200	
Industry Fixed Effects	Y	Y	
Year Fixed Effects	Y	Y	

<b>Panel B: Number of Firms, Births and Deaths</b>			
	(1)	(2)	(3)
	Total Number	Births	Deaths
Ind. % Zombies*Post	101.1** (43.73)	9.238* (5.214)	20.16*** (7.368)
No. of Obs.	1216	1216	1216
R squared	0.872	0.667	0.538
Industry Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y

<b>Panel B: Long-term effect of SARFAESI</b>				
	(1)	(2)	(3)	(4)
	New Secured Borrowings		$\frac{New\ Secured\ Borrowings}{Assets}$	
Low Quality Borrower * Post	-39.80*** (4.379)	-26.88*** (4.444)	-0.0239*** (0.00138)	-0.0215*** (0.00139)
No. of Obs.	82545	82545	76177	76177
R squared	0.335	0.340	0.190	0.193
Firm Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Controls	N	Y	N	Y

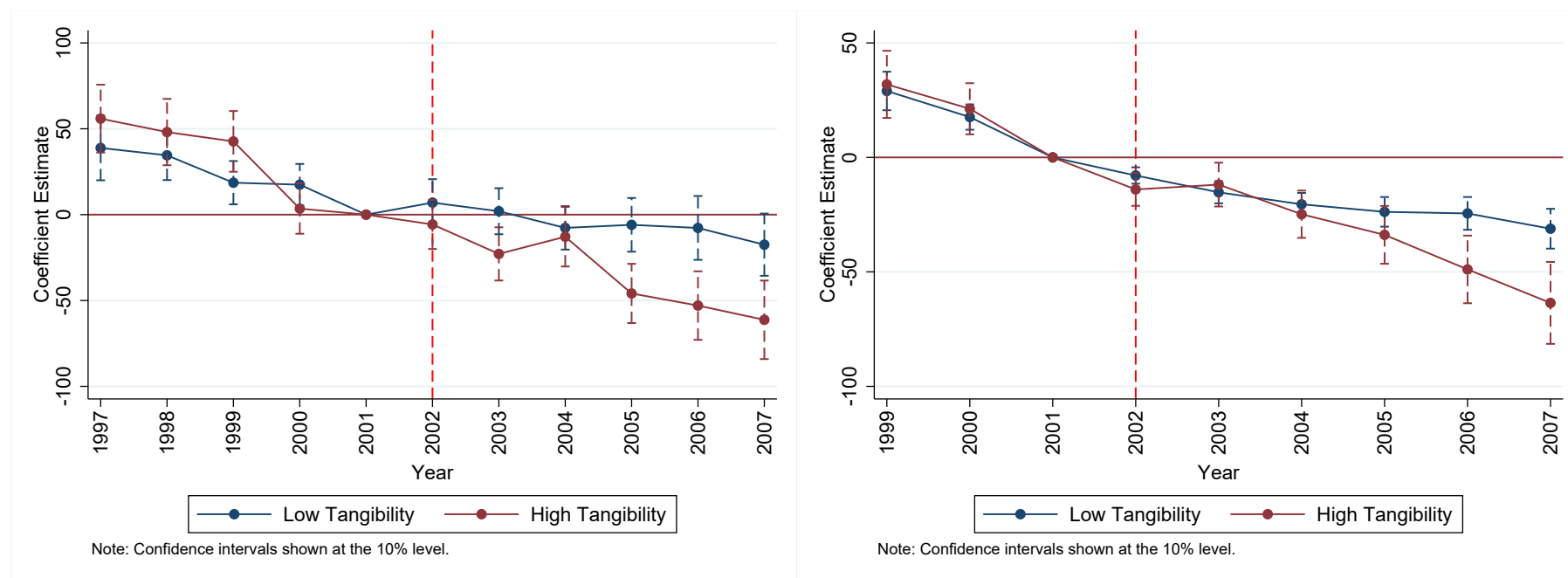
**Figure A1. Real Outcomes: CapEx and Employment**

Panel A shows capital expenditure and panel B shows number of employees. The graph on the left-hand-side shows the relationship between new borrowings and quality of borrower obtained from estimating the equation below separately for high tangibility and low tangibility firms.

$$y_{ijt} = \alpha_i + \gamma_t + \theta \times \mathbb{1}_{Post} + \delta \times \mathbb{1}_{(LowQ)} + \sum_{\tau} \eta_{\tau} \times (\mathbb{1}_{\tau} \times \mathbb{1}_{(LowQ)}) + \epsilon_{ijt}$$

where  $\tau$  ranges from 1996 to 2007,  $\mathbb{1}_{\tau} = 1$  if year is  $\tau$  and  $\eta_{\tau}$  is coefficient of interest. Bars show the 90% confidence intervals,  $\tau = 0$  is the year SARFAESI was announced, and all coefficients are normalized relative to  $\tau = -1$ . Robust standard errors are clustered at the firm level. In panel A the dependent variable is new secured borrowings. In panel B the dependent variable is new unsecured borrowings. Low quality borrowers are defined as firms with interest coverage ratio of less than 1 in 2001 and 2001. Tangibility measure is from Rajan and Zingales (1995) and is the ratio of specific assets to the total specific Assets plus non-specific assets. Specific assets is the sum of plant and machinery and other fixed assets. Non-specific assets is the sum of land and building; cash and bank balance; and marketable securities. Firms are classified as low (high) tangibility if the tangibility ratio in 2001 is below (above) median tangibility of all firms. The solid red line shows the coefficients for above median tangibility firms and the dashed blue line shows the coefficients for the above median firms.

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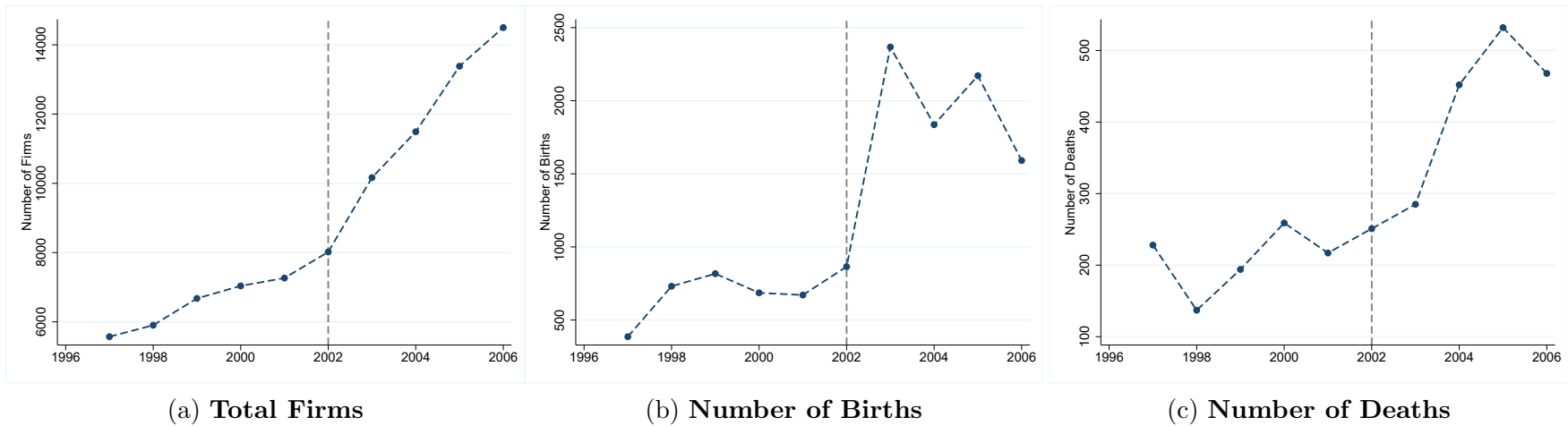


(a) CapEx

(b) Employment

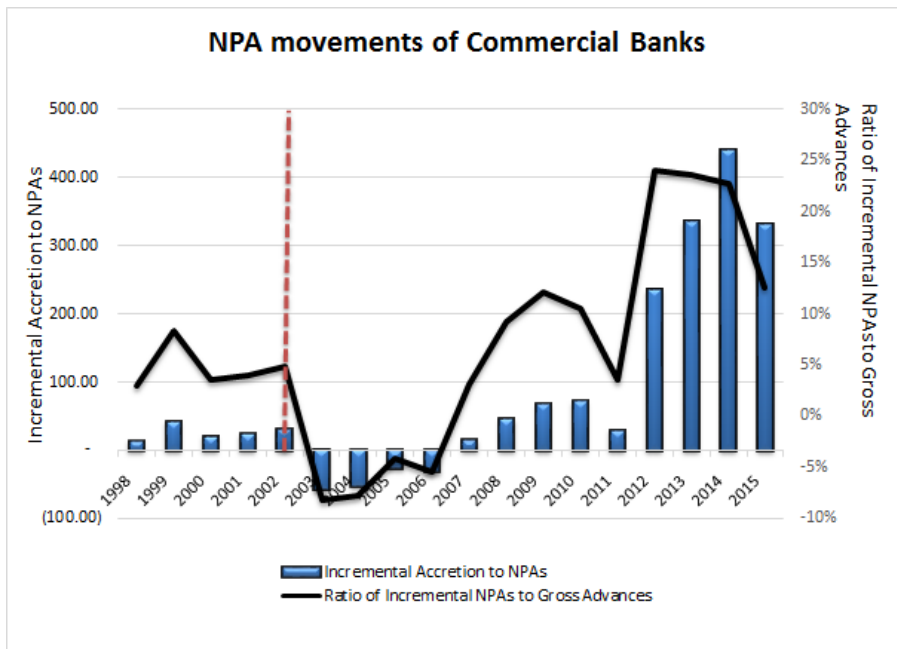
**Figure A2. Misallocation of Resources: Births, Deaths and total number of Firms**

The graphs below plot the total number of firms (panel a), number of births (panel b) and the number of deaths (panel c). Data is from Prowess. Total number of firms firms for which data is available in Prowess. A firm is classified under “births” if it did not exist in the previous year and under “death” if data is not available in the following year.

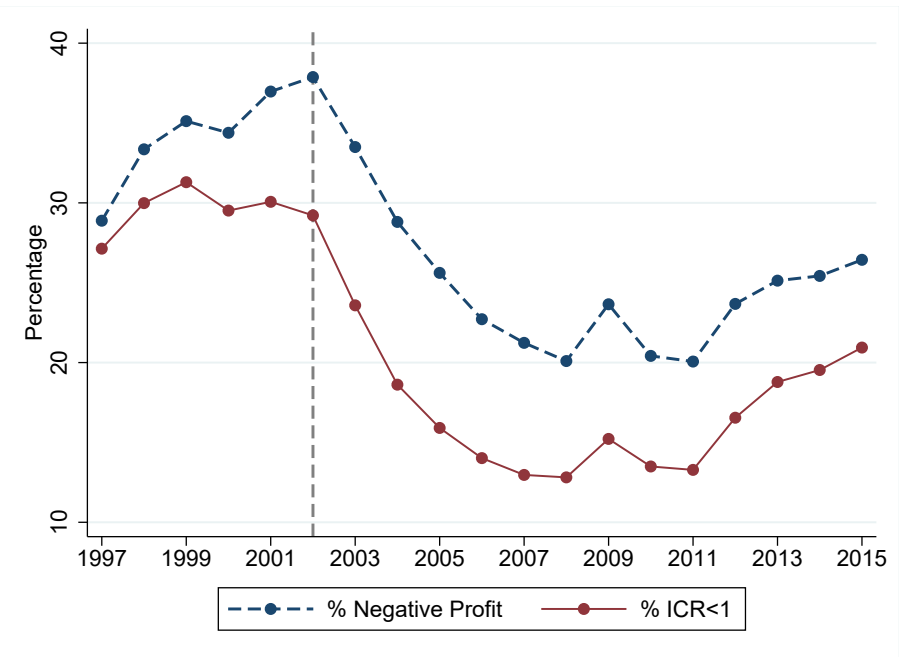


**Figure A3. Incremental NPAs: Evolution over time**

The figure below shows the incremental additions in non-performing assets (NPAs) and the ratio of incremental NPAs to gross advances. Data is from the Reserve bank of India and collected from IndiaStat. Data is at the annual level and as of March of each year. Data us for the period 1998 to 2015.



(a) NPA movements



(b) Aggregate health of firms