Unearthing Zombies:

Regulatory Intervention To Aid Legal Reform*

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Abstract

Poor bankruptcy laws can result in entrenched systems of evergreening in developing countries. We exploit, as a natural experiment, the introduction of a new bankruptcy law in India and examine likelihood of loans being classified as distressed, a precursor to starting bankruptcy proceedings. We find that the bankruptcy law had only a limited impact on banks classifying loans as delinquent, and the impact was particularly muted for weaker banks. A subsequent regulatory intervention implemented by the Reserve Bank of India removed lender discretion in recognizing loans as distressed and in initiating subsequent bankruptcy proceedings. The regulatory intervention resulted in a 10 percent increase in recognition of distressed assets and effects were *more* pronounced in weaker banks. As a result, credit was reallocated away from distressed firms and towards investment-grade firms. Overall, our results suggest that bank health is an important determinant of the effectiveness of bankruptcy reform and regulatory intervention can successfully overcome poor enforcement arising from a weakly capitalized banking sector.

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1 Introduction

It has long been established that financial frictions, and in particular weak creditor protections, can inhibit economic development.[1]. Do significant improvements to creditor rights necessarily boost growth in developing countries? We study this question in the context of India, where there has been a rise in delinquent borrowers in the post-Great Recession period (Acharya (2017)). There is concern not only about delinquency, however, but the risk that a number of these borrowers have become "zombies", otherwise insolvent borrowers, sustained by perpetual extensions of credit and tying up financial and human capital along the way Caballero et al. (2008). India modernized and unified its bankruptcy system in 2016. Policymakers and economists speculated that this would change the credit culture in India, potentially even reducing zombies lending. [2]

We study whether strengthening creditor protections can correct for such misallocation of credit. Specifically, we focus on the recognition of delinquent borrowers as non-performing assets (NPAs), which ensures that banks comply with capital requirements and allows macroprudential authorities to gauge risk. We exploit two events, one is the passage of the Insolvency and Bankruptcy Code (IBC) which was implemented in August 2016 and significantly improved creditor rights. The second event is the subsequent set of rules circulated by the Reserve Bank of India (RBI) on February 12th 2018 that placed time limits on the resolution of stressed assets and removed lender discretion in what loans could be classified as delinquent. We study the impact of the two events on banks recognizing distressed loans as NPAs, a first step in beginning bankruptcy proceedings.

Using unique regulatory bank-firm matched data, we show that the introduction of the IBC had only a limited impact on firms recognizing distressed borrowers as NPAs. Effects were particularly muted for banks with low capitalization. We interpret this as evidence that some banks were induced by stronger creditor rights to report delinquent borrowers that would subsequently be referred to insolvency court; however, a greater number of banks were still bound by other frictions that precluded full NPA disclosure. The first set of results suggest that bank health can be an important determinant of the effectiveness of bankruptcy reform. The second set of results show that the NPA recognition for distressed borrowers was larger following the February 12th circular compared to the IBC. The circular was directly applicable to all accounts over Rs. 20 billion exposure, although the RBI announced

[1] La Porta et al. (1997, 1998); Levine (1998, 1999); Beck and Levine (2005); Djankov and Shleifer (2005)

[2] See https://www.livemint.com/Opinion/SLXuEEZ1KKHNzl87ortb5N/Changing-the-culture-of-corporate-credit.html

that it would soon be extended to borrowers with over Rs. 1 billion in exposure. We use this Rs. 1 billion size threshold in a triple difference specification and show that NPA recognition increased by 10 percent. Importantly, the positive effects were more pronounced in weaker banks. The second set of results show that regulatory intervention which takes away lender discretion in recognition of bad loans can undo some of the agency problems associated with weak enforcement of bankruptcy laws arising due to an entrenched banking system.

We use a proprietary regulatory panel dataset maintained by the RBI on bank-firm linked data at the quarterly frequency consisting of over nearly 100,000 observations. We start by identifying firms as distressed or zombies if they ever had an interest coverage ratio (ICR)[3] less than 1 in the four year period prior to the bankruptcy reform. We find that banks were only 1.8 percent more likely to recognize firms as delinquent (NPA) post the bankruptcy reform. We control for borrower, bank, time and industry-time fixed effects. Results are similar for the intensive margin where we see a 13 percent increase in volume of NPAs of distressed borrowers.

We next examine the heterogeneity in impact of the bankruptcy reform across bank health and across ownership structure. Importantly, the effect of the bankruptcy reform on recognition of NPAs was driven by the stronger banks and there was almost no impact on the weaker banks. We hypothesize that provisioning requirements for NPAs makes banks unwilling to recognize bad loans. We also find that state-owned banks were also less likely to recognize distressed firms as NPAs. Possibly, this is due to the political economy problems associated with state-owned banks. In the global context, state-owned banks have traditionally been associated with higher incidences of corrupt or cronystic transactions. These set of results highlight how agency problems and a weak banking sector can decrease the positive impact of bankruptcy reforms.

Next, we move on to look at the impact of the February 12th 2017 regulatory intervention (also referred to as the regulatory reform). Banks were 6 percent more likely to recognize distressed borrowers as NPA post the regulatory reform. This is nearly 3 times the magnitude observed after the bankruptcy reform. Note, the regulatory reform removed all lender discretion as to whether banks could recognize loans as delinquent and subsequently start bankruptcy proceedings. We find that impact of the regulatory reform was concentrated in the weakest banks. This is in contrast to the bankruptcy reform where the bankruptcy reform had almost no effect for the weakest banks. We

[3]Interest coverage ratio is measured as the ratio of earnings before interest and taxes (EBIT) to interest expense. It measures the ability of a firm to service its debt. An ICR less than 1 says that a firm is not able to service its debt expense from its current profits.

also find no differential effect for state-owned banks. At the outset, the regulatory reform did seem to overcome the agency problems and political economy problems associated with a weak banking sector dominated by state-owned banks.

To establish causality, we exploit the size threshold targeted by the regulatory reform in a triple-difference specification. Essentially we compare whether zombie or distressed firms more likely to be recognized as NPAs following the reform for firms above the size threshold (treated) versus those below the threshold (control). First we show using event study plots that the parallel trends assumption cannot be rejected. Our estimates show that distressed borrowers above the size threshold were 4.5 percent more likely to be recognized as distressed post the regulatory reform. On the intensive margin, this corresponds to a 36 percent increase in the volume of NPAs.

Our results till now focused on the distressed borrowers. While several quarters is admittedly too short a period to evaluate the full general equilibrium effects, we nonetheless make an early attempt at gauging the reallocative effect of the NPA intervention. We examine whether credit was reallocated to better borrowers. We show that investment grade firms saw a 5.3 percent increase in loans post the regulatory reform. Results are an even higher 7.4 percent when we include borrower-time fixed effects. Additionally, we find that this reallocation of credit was driven by the industries which had a high share of distressed borrowers. This result is analogous to Caballero et al. (2008) who find that the non-zombies in zombie dominated industries suffered the most. Analogously, the regulatory reform targeted the distressed firms and as a result previously distressed industries should see a higher credit reallocation to good firms as in our setting.

Our paper makes several contributions. While improvement in creditor rights in bankruptcy can alleviate financial frictions, particularly for developing countries, *de jure* bankruptcy laws can differ significantly from *de facto* bankruptcy laws (La Porta et al. (1997)). Prior literature has found that judicial delay arising from congested bankruptcy courts (Ponticelli and Alecnar (2018)) and political influence (Li and Ponticelli (2019)) can weaken the impact of bankruptcy reforms. In contrast, we show that a weakly capitalized banking system can *also* lead to weak enforcement of bankruptcy reforms, essentially rendering the reforms ineffective. Importantly, we show that the regulatory reform removed lender discretion in loan resolution once a borrower defaulted, was effective in overcoming some of weak enforcement due to the agency problems associated with a weak banking sector. This is in contrast to Li and Ponticelli (2019) who find that experienced judges liquidated state-owned firms controlled by local (but not central) governments after the bankruptcy reform in China, thus overcom-

ing only some of the political economy problems associated with liquidations. Removing all lender discretion, as in our setting, as to whom to pursue under bankruptcy possibly overcomes many of the political economy problems associated with bankruptcy liquidations.

Our unique regulatory panel data on bank-borrower relationships allows us to pinpoint the impact of the February 12th circular on NPA reporting and precisely estimate follow-on reallocation effects. We are one of only several empirical papers that analyze the means by which countries recover from NPA crises. A particular problem in the emerging market context is the problem of "evergreening" of loans wherein banks are loathe to recognize bad loans on their books and continue lending to otherwise insolvent borrowers (zombies) at subsidized rates. This arises either due to risk capital provisioning requirements, due to cronyisn, due to political economy problems, or due to the fear of criminal penalties imposed on lenders which are triggered upon recognizing loan a non-performing (Banerjee et al. (2004)). Zombie lending can exert negative externalities by inhibiting the process of creative destruction on investment and employment of healthier borrowers as observed in Japan in the 1990s (Caballero et al. (2008)). Improving creditor rights can reduce zombie lending by removing the hold-up problem associated with weak creditor rights and reallocating credit and resources to the good firms in the economy (Kulkarni (2018)). However, our paper shows that even increasing creditor rights may not be enough to see these positive spillover effects when the banking system is entrenched and hence creditor rights are poorly enforced. Specifically, we show that removing all lender discretion in whether a bank pursues liquidations can force banks to cut credit to zombie borrowers which then has spillover effects on the good borrowers by allowing banks to reallocate credit to these firms.

Related literature: This paper relates to three main strands of literature. First is the large literature on creditor rights which has found that better creditor rights can increase borrower access to credit (La Porta et al. (1997), La Porta et al. (1998)). Recent papers have emphasized that, to be effective, creditor rights need to be enforced in a timely manner. Costs associated with judicial delay (Ponticelli and Alecnar (2018)) and weak resolution of contract disputes (Jappelli et al. (2005)) can limit borrower access to credit. Our paper emphasizes how weak enforcement can arise from a weakly capitalized banking sector and how removing lender discretion in whom to pursue for liquidations can improve enforcement. Our paper also builds on a body of research that has evaluated the impact of credit market reforms in India (Visaria (2009); Vig (2013); Kulkarni (2018); Lilienfeld-Toal et al. (2012))

Second, our paper is related to the large and growing literature on zombie lending. Caballero

et al. (2008), in their seminal paper focusing on Japan in the 1990s, show that a proliferation of zombies can inhibit the process of creative destruction, reducing overall profits and discouraging the entry of good firms. Fukuda and Nakamura (2011), however, argue that the private restructuring efforts were often successful in lifting firms out of zombie status.[4] Peek and Rosengren (2005) attribute the higher restructuring to government complicity and lax oversight to the costliness of bank bailouts and political pressure to limit firm closures.[5] An increase in zombie lending and the resulting negative spillovers due to zombie congestion has been observed in other developed economies such as Italy and Spain have also experienced drag from zombie firms (McGowan et al. (2017); Albertazzi and Marchetti (2010)). More recently, however, zombies have become increasingly associated with developing economies and state-owned banks. Tan; Shen and Chen (2017) highlight the inefficiencies in lending practices in China, particularly by state-owned banks.

Because of the specific institutional and political factors that contribute to zombie lending, it is difficult to approach solutions strictly from a mechanism design perspective. Bruche and Llobet (2013) suggest that the problem can be addressed by subsidizing loan modification or facilitating asset buybacks. Zombies in their model are generated by risk shifting incentives. Using data from OECD countries, Andrews and Petroulakis (2019) estimate that poor bank health is responsible for approximately one third of the impact that zombies have on capital misallocation. They emphasize the importance of reorganization-friendly insolvency regimes combined with policies that support bank health in combating zombie lending. This is consistent with our finding that a weakly capitalized banking sector did mute the positive impact of the bankruptcy reform. As opposed to recapitalization of banks, we show that a well formulated regulatory reform can also be successful in encouraging the process of creative destruction.

The rest of this paper is organized as follows: Section 2 provides a summary of the institutional details relevant to the February 12th circular. Section 3 describes our data sources while Section 4 presents our empirical strategy. Results are described in Section 5. Section 7 concludes.

[4] It is worth noting two important features that make Japan's recovery a special case, however. First, its zombie loan glut was instigated by a sudden and severe financial crisis, and the problem eventually dissipated once macroeconomic conditions recovered in the mid-2000s. Second, although the Japanese government exerts a significant amount of control over the banking sector, it does not retain outright ownership over large banks.

[5] See Sekine et al. (2003); Caballero et al. (2008); Ahearne and Shinada (2005); Fukao and Ug Kwon (2006); Nishimura et al. (2005) , and Kim (2004) for other papers focsuing on Japan in the 1990s.

2 Institutional Background

Since the early 1990s, when it implemented a number of policy measures aimed at economic liberalization, India has made significant strides in financial market development. Despite its many advances, however, India still differs from most developed economies in certain key aspects of its financial system, particularly those pertaining to credit markets. This section provides a brief background of India's lending practices as well as the evolution of its insolvency system.

2.1 Lending Practices

Following an economic crisis in 1991, the newly-elected Prime Minister P. V. Narasimha Rao recruited Manmohan Singh as Minister of Finance to aid in the liberalization of the country's economy. One of the key elements of their agenda was to promote competition in the banking sector, which had previously been dominated by state-owned banks whose lending policies were largely dictated by the government. In order to encourage the entry of private banks, public sector banks were deregulated and a unified set of prudential norms were established to ensure a level playing field. These norms included capital provisioning standards that depended, among other factors, on loan quality.

Although private banks have steadily been gaining market share, public sector banks still retain close to 70% of all Indian banking assets as of 2018. Despite the objective of promoting competition in the banking sector, the government still monitors new banks closely and enforces control over which borrowers are eligible for loans. The implicit government backing of public sector banks also confers an advantage in attracting deposits.

Public sector banks, while nominally independent owing to the structural changes of the Rao government, still attract criticism for operating inefficiently. Banerjee et al. (2004) argue that public sector banks underlend, due in part to inflexible lending policies. In addition, they show that anti-corruption laws subject individual loan officers to extreme personal downside risk, but fixed promotional practices limit personal upside. As a result, loan officers are not properly incentivized in their loan choices. Acharya and Subramanian (2016) also fault hiring standards at public sector banks for lower human capital. They characterize public sector banks as massive in size and, as a result, slow-moving.

Bank lending is the primary source of debt financing in India, as debt markets have been slow to develop relative to equity markets. According to an RBI report, the corporate bond to GDP ratio in India is only 17% as of 2018, compared with 123% in the U.S. Indian firms also rely heavily on trade credit which, together with unpaid wages, is collectively referred to as operational credit. As we dis-

cuss in the next section, bondholders and operational creditors have been relatively disenfranchised compared to banks until the bankruptcy reforms that took place in 2016.

2.2 Insolvency Rules Prior to 2016

Before the passage of the Insolvency and Bankruptcy Code (IBC) in 2016, corporate insolvency in India was characterized by a fragmented system of governing authorities with rules that applied to a differential set of firms and, at times, favored banks over other creditors. Specialized restructuring courts were established in 1956 under the Companies Act, which designated National Company Law Tribunals (NCLTs) to oversee insolvency cases, among other corporate affairs. Because secured creditors at the time did not have the power to foreclose in the event of default, and NCLTs were subject to political pressures to preserve jobs, the system under the Companies Act was viewed as management-friendly.

Stemming from prolonged weakness in the industrial sector, the Sick Industrial Companies Act (also known as the Special Provisions Act) was passed in 1985. This created a new adjudicating authority, the Board for Industrial and Financial Reconstruction (BIFR), to resolve financial distress. This process was only available to industrial firms, however, and because the law was passed with job-preserving objectives in mind, the BIFR was known to be as friendly to management, if not more friendly, than the NCLTs.

Restructuring cases under the NCLT and BIFR took notoriously long to resolve. The average BIFR case lasted for nearly 6 years Sengupta et al. (2016). In order to speed asset sales, new legislation was passed in 1993 that created specialized Debt Recovery Tribunals that were not required to follow civil procedures to which the NCLTs were bound. The same institutional challenges that plagued the NCLTs however, namely a lack of resources, led to delays at the tribunals as well. Banks were also the only creditors that were allowed to use these tribunals to recover from distressed debtors.

In an attempt to strengthen secured creditor rights, India passed the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act in 2002. This empowered banks to foreclose on properties. The SARFAESI Act also facilitated the formation of specialized intermediaries, known as Asset Reconstruction Companies, that were designed to help manage the asset reallocation process. The SARFAESI Act was not successful in generating high recovery rates for banks, however. An RBI report from 2004 cited recovery rates of less than 9% for public sector banks under the system designed by the SARFAESI Act.

The RBI also exerts significant control over distressed asset resolution procedures, in part because it dictates provisioning requirements for banks. In 2008, the RBI put forward a set of guidelines to dictate private debt work-outs.[6] Designed for large distressed borrowers, this work-out mechanism facilitated negotiations that would bring debt loads to manageable levels. In exchange for participating in the negotiation process, the RBI relaxed provisioning requirements for banks participating in these work-outs. In 2015, a modified work-out scheme was proposed that encouraged debt-for-equity swaps and granted banks the power to replace management in certain circumstances.

The piece-meal introduction of various insolvency regimes resulted in a web of uncoordinated procedural alternatives. Although some restructuring mechanisms were supposed to replace old and ineffective procedures, the older systems usually stayed in place. This meant that firms could exploit ambiguities and engage in forum shopping, which led to a significant amount of litigation. In addition, even with several alternatives in place, there was still no process that would allow all creditors to participate in a unified structured bargaining process.

2.3 The IBC and Insolvency Rules After 2016

In 2016, the government implemented the IBC, which was a sweeping overhaul of the bankruptcy system. The new code repealed, replaced, or clarified all of the prior insolvency systems. Although the NCLT remains the adjudicating authority under the IBC, the BIFR was done away with, and debt recovery tribunals were assigned to handle individual and unincorporated insolvency cases. The private work-out schemes promoted by the RBI were abolished. The powers of foreclosure granted to secured creditors under the SARFAESI Act remain in place, although an automatic stay applies if a company is admitted to proceedings under the IBC.

Insolvency rules under the IBC are markedly less friendly towards management than previous regimes. Anyone can initiate insolvency proceedings, and by the end of 2017, most cases were referred by operational creditors. A case may be dismissed before it is admitted to the NCLT, but once it is admitted, an interim resolution professional takes possession of the firm's assets. The professional's first main task is to form a committee of creditors, representing both operational and financial creditors, who then have the option of replacing the interim professional with a permanent trustee. This trustee solicits and vets applicants for the submission of resolution plans, and those applicants may be existing parties or outside prospective buyers.[7] Once resolution plans are submitted, the creditors'

[6] These mechanisms were actually established in 2001, but it was not until 2008 that the guidelines were effectively clarified

[7] Rules about who can submit plans have been in flux since the implementation of the IBC. In particular, previous man-

committee selects a plan by a vote of at least 75%. If a plan is not selected, liquidation procedures commence. This entire process, after admission to the NCLT, is supposed to be resolved within 180 days, although extensions can be made to 270 days.[8]

The IBC was a solution to one problem, namely, the lack of a unified and effective insolvency regime. It still did not solve some of the political and institutional factors that contributed to the NPA crisis, however. For example, banks and loan officers fearing personal consequences arising from the referral of distressed borrowers to the IBC still had incentives to continue evergreening. And, to the extent that bankers may have structured quid pro quo arrangements with under performing borrowers, the rules of the IBC could have further disincentivized the reporting of NPA accounts. Thus, in conjunction with the IBC, the RBI assumed the task of policing non-compliant *lenders* that were either concealing NPAs or delaying insolvency proceedings.

The RBI began the process of identifying the largest distressed accounts in 2015 with the Asset Quality Review. It conducted its own assessment of the creditworthiness of the country's largest borrowers and focused on companies that were reported as NPA by some banks but not others. Equipped with this information, it took action on both underperforming borrowers and lenders in the years following the passage of the IBC. Starting in 2017, the RBI instructed banks to refer several rounds of borrowers to commence insolvency proceedings.[9] On the lending side, the RBI put several banks under close watch according to what was known as the Prompt Corrective Framework.

The Asset Quality Review and its resulting disciplinary actions were primarily targeted towards the largest non-performing borrowers in the economy. The NPA problem was pervasive, however. In order to facilitate adherence to prudential norms and a time bound resolution of stressed assets in the banking system, the RBI issued a circular on February 12th, 2018 instructing banks to begin curing defaults as soon as the default takes place, i.e. within one day. It also mandated that lenders begin formal insolvency proceedings under the IBC if a borrower is delinquent for 180 days. The Feb. 12th circular was directly applicable to all accounts involving over Rs. 20 billion, although the RBI announced that it would soon be extended the directive to borrowers with over Rs. 1 billion in exposure.[10]

agement (known as promoters) were initially free to submit plans, although these rights have since been curtailed.

[8]Because certain rules are still being challenged, however, most large cases initially referred to the NCLT under the IBC have taken over 270 days to resolve.

[9]The first of these rounds took place in June 2017. 12 borrowers were referred to the NCLT: Bhushan Steel, Bhushan Power & Steel, Essar Steel, Jaypee Infratech, Lanco Infratech, Monnet Ispat & Energy, Jyoti Structures, Electrosteel Steels, Amtek Auto, Era Infra Engineering, Alok Industries, and ABG Shipyard. While the first round of referrals was highly publicized, the identities of firms referred in ensuing rounds were not disclosed.

[10]Rs. 1 billion is approximately 14.6 million USD as of June 30th, 2019.

The Feb. 12th circular was largely unancipated by both market participants and most regulators. Unlike many of its other initiatives, the RBI did not lauch a discussion paper or invite suggestions from the public.[11] Several petitioners, including manufacturing and energy producers, responded by challenging the legality of the circular in the courts. On April 2nd, 2019, the Supreme Court ruled against the RBI and struck down the circular on the grounds that the RBI does not derive such issuance powers from Section 35A of the Banking Regulation Act of 1949. Two months later, however, the RBI issued a revised circular that called for banks to begin curing defaults within 30 days. As of this writing, the revised circular is in effect.

3 Data and Summary Statistics

3.1 Data Sources

The analysis in this paper relies on a sample constructed from matching a database of firm financial information to an administrative database of bank lending relationships.

CMIE Prowess: We obtain accounting and stock market data from the Prowess database of the Centre for Monitoring Indian Economy (CMIE). The database includes annual balance sheet and income data as well as daily data on stock prices. It also provides a wealth of descriptive information such as age, place of incorporation and industry codes for covered entities. Prowess covers 30,101 unique firms, both listed and unlisted, over the period of our study with about 25,000 firms covered every year. The database has been used in a number of prior studies of Indian corporations (Bertrand et al., 2002; Lilienfeld-Toal et al., 2012; Vig, 2013; Gopalan et al., 2016).

We use Prowess to obtain key firm level statistics such as firm capital expenditures, cash flow, sales, profits and wages. From Prowess, we also obtain the interest coverage ratio (ICR), defined as the ratio of earnings before interest and taxes to annual interest expenses. Consistent with the prior literature on distressed borrowers, we consider firms to be "distressed" if their ICR is less than 1 for any year in the 4 year window between 2012 and 2015.

CRILC: Detailed data on bank-firm lending relationships comes from the Central Repository of Information on Large Credits (CRILC), a confidential supervisory database maintained by the RBI. Starting June 2014, all commercial banks operating in India were mandated to provide quarterly returns

[11] Anecdotally, even upper-ranking officials in charge of banking regulation were unaware of the circular.

for any borrower whose aggregate lending from the bank exceeded Rs. 50 million.[12] Every quarter, for borrowers above the threshold, banks report the total exposure of the borrower and its asset quality at the end of the quarter. Information is also provided on the borrower's external credit rating[13] (including the rating agency providing the rating), and the borrower's industry of operation. Importantly, CRILC reports a unique borrower ID permitting the matching of borrowers across banks in the same quarter, as well as across quarters. This permits us to track borrower relationships across multiple lenders over time. CRILC has over 100,000 bank-borrower observations per quarter for the 20 quarters between June 2014 and March 2019. The number of unique borrowers over this period exceeds 100,000. To the best of our knowledge, ours is one of the first academic projects to use the CRILC database.

3.2 Sample Selection

Starting March 2018, CRILC provides, for select borrowers, the Company Identification Number (CIN), a unique identifier provided to all registered companies in India. Since Prowess also has the CIN for all firms in that database, we use the CIN code to match borrowers across the two databases. Of the 30,000 unique borrowers in CRILC for whom a CIN code is available, we are successful in obtaining perfect matches to Prowess for 12,252 borrowers. This matched sample is what we use in all our subsequent analysis. Figure A1 shows the quarterly trends in the share of borrowers and exposures accounted for by borrowers common to CRILC and Prowess. We note that while the borrowers common to CRILC and Prowess account for only 30 percent of the borrowers in CRILC (and declining over time), they amount to 70 percent of the exposures (stable over time). Thus, while the majority of the borrowers in CRILC cannot be matched to Prowess, the majority of the large borrowers in CRILC are, as seen from the high share of exposures which are accounted for by the matched borrowers. Figure A2 shows that our matched sample of borrowers also accounts for the majority of the NPAs in the CRILC database. The quarterly trends in overall gross NPA (in terms of exposures) in the CRILC system and that for the matched sample of CRILC-Prowess borrowers track each other closely over time. This gives us confidence that our matched sample is sufficiently representative of the larger borrowers in the CRILC database and also cover a large share of amount of the non-peforming borrowers.

Table 1 shows summary statistics for some key variables in the matched CRILC-Prowess sample

[12] CRILC does not have information on individual loans of borrowers but has information aggregated across loans of large borrowers.

[13] While credit ratings are assigned to each loan undertaken by the borrower, banks aggregates this and reports to CRILC the worst rating for each borrower across all loans undertaken.

of bank-borrower relationships. 53% of credit exposures in the sample are greater than INR 1 billion. A startling 46% of the relationships involve a borrower who had an ICR below 1 at some point during the 2012-2015 period. The median firm has relationships with 5 banks. Since the sample only includes relationships with an exposure greater than INR 50 million, this is a lower bound on the actual number of relationships. Almost 21% of the loans ultimately end up as non-performing i.e. the borrowers is over 90 days overdue on a repayment.

3.3 Reporting of Asset Quality

Asset quality is classified into two main categories: Standard, whereby a borrower is currently in good standing and has not missed any scheduled repayments; and non-performing (NPA), whereby a borrower has not made any payments towards the interest or the principal in the past 90 days (approximately 1 quarter) or more. A borrower is classified as non-performing or NPA in the database if it is classified by the bank as an NPA on even a single loan in the portfolio.[14] Once a bank classifies a borrower as NPA, the designation extends to the entire credit exposure the bank has towards that borrower.

Within the Standard category, borrowers are classified as "special mention" if they are between 0 and 90 days overdue on scheduled repayments. Thus, a borrower is classified as SMA0 (Special Mention Account-0) if it has not made any payments towards the interest or the principal between 0 and 30 days. Similarly, borrowers classified as SMA1 and SMA2 are those who have not made any repayments between 30 and 60, and 60 and 90 days. Effectively therefore, the SMA2 category immediately precedes a borrower being classified as NPA.

While banks report a borrower's gross credit exposure and asset quality at the end of each quarter, the CRILC , until February 2018, mandated banks to report any fresh slippage of a borrower to the SMA2 category at the end of every fortnight. Borrowers who were overdue in excess of 60 days (but not yet NPA) were thus reported on a fortnightly basis and the system sent out a flash warning to all other lenders exposed to the borrower (in excess of Rs. 50 million) that the borrower was overdue in excess of 60 days.

Effective February 2018, the New Framework for the Resolution of Stressed Assets (subsequently referred to as the February 12 circular or "treatment") revised this and mandated the reporting of slippage to SMA0 on a weekly basis. Thus, between February 2018 and March 2019, lenders were

[14]However, if a borrower is an NPA of a certain bank, other banks transacting with the borrower are not obligated to declare it as an NPA until the borrower is 90 days overdue with respect to their loans.

mandated to report, within a week, any borrower who was even a single day overdue. Thus, while the classification for NPAs remained unaltered (overdue in excess of 90 days) under the February 12 circular, banks were now forced to recognize defaults on an immediate basis. The reporting frequency of the CRILC data was also increased to monthly instead of quarterly. For the purposes of our paper, we aggregate all weekly, fortnightly and monthly reporting to the level of the quarter by assigning borrowers to the worst asset quality reported during the quarter. Thus, a borrower which is reported as Standard at the end of the quarter but was reported as SMA2 during some week in the quarter is considered to be SMA2 at the end of the quarter.

3.4 Descriptive Analysis

We provide some simple descriptive trends to motivate our empirical strategy. Figure 1 shows the share of distressed borrowers within the CRILC database, both as a share of total borrowers and exposures. The figure shows a steady decline in the share of distressed borrowers, both in terms of number of borrowers, and the share of exposures accounted by them. Thus, while 30 percent of all exposures of large borrowers between 2014 and 2016 were accounted for by distressed borrowers, this has been falling steadily since and has dropped below 25 percent in March 2019. As the share of distressed borrowers in the system is significantly lower than the share of distressed exposures, it reflects that borrowers classified as distressed in CRILC are primarily borrowers with large exposures.

Figure 2 computes the gross NPA (GNPA) ratio within the subset of distressed borrowers, both as a share of borrowers and as a share of exposures.[15] While there has been a secular increase in the GNPA ratio for distressed borrowers in this entire period, there are two sharp jumps in the trends. The first is between 2015 and 2016, coinciding with the AQR, which was the first regulatory intervention undertaken by RBI after the inception of the CRILC database. The second is between December 2017 and March 2018, coinciding with the introduction of the February 12 circular (red dashed line), where the gross NPA ratio in terms of exposures jumps by almost 5 percentage points in the space of 1 quarter. Again, there is a divergence between the gross NPA ratio computed in terms of exposures and the number of borrowers, emphasizing that large distressed borrowers have a higher propensity of slipping to the NPA category.

Figure 3 compares the quarterly trends in average exposures (in 2011 rupees) across distressed and non-distressed borrowers. We see that distressed borrowers are significantly larger than non-

[15]This is defined as total number (exposures) of borrowers who are NPA, divided by the total number (exposure) of borrowers in the system.

distressed borrowers with the average exposure of the former exceeding Rs. 1 billion across the entire period. However, there has been a steady rise in the average exposure of non-distressed borrowers since March 2018, coinciding with the introduction of the February 12 circular (red dashed line).

To summarize, these descriptive trends provide us with 3 takeaways – first, while distressed borrowers are significantly larger in size than non-distressed borrowers, their exposures as a share of all large borrowers is declining. Second, the declining share of exposures to distressed borrowers has been accompanied by an increase in the average exposure size of non-distressed borrowers, particularly after the February 12 circular. Finally, there has been a spurt in the GNPA ratio for distressed borrowers during periods of regulatory intervention by the central bank - both post AQR and the February 12 circular. The descriptive evidence thereby suggests that regulatory interventions are able to induce banks to recognize distressed borrowers as NPAs, while reallocating credit towards non-distressed borrowers. The remainder of the paper attempts to rigorously confirm these descriptive patterns using a difference-in-difference framework.

4 Empirical Strategy

We structure our empirical analysis in two stages. We first test how the bankruptcy reform (IBC) and regulatory intervention (February 12 circular) separately impact borrowers' asset quality. Subsequently, we test how these two events changed banks' lending behavior, particularly towards creditworthy borrowers.

4.1 Baseline Effect on Asset Quality

To test how the bankruptcy reform and regulatory intervention affected the recognition of asset quality, we employ a standard difference-in-differences research design. The treatment is alternately the passage of the IBC and the February 12 circular. To identify a treated group, we recognize that both the bankruptcy reform and the regulatory intervention would be much more likely to impact "zombie" borrowers i.e. borrowers already in a distressed state. We define the treatment group as the set of borrowers who had an interest coverage ratio (ICR) of less than 1 at least once between 2012 and 2015. Table 1 shows that about 46% of bank-borrower relationships in our sample involve a borrower with an ICR<1 i.e. a treated borrowed. The remaining borrowers in our matched sample make up the control group. Specifically, we estimate an equation of the form:

$$Y_{ijbt} = \alpha_i + \gamma_{jt} + \phi_b + \beta_1 Post_t \times Treat_{ijt} + \eta \mathbf{X}_{ijt} + \epsilon_{ijbt} \tag{1}$$

In the above equation, the outcome variable Y is (i) a dummy equaling 1 if the asset quality of firm i, operating in industry j and transacting with bank b, turns NPA in quarter t, and 0 otherwise; or (ii) the amount of NPA exposure that firm i, operating in industry j and transacting with bank b, has in quarter t.

Post is a dummy equaling 1 for all quarters following the treatment, and 0 otherwise. *Treat* takes the value 1 for our definition of "zombie" borrowers i.e. borrowers with an ICR<1 at least once between 2012 and 2015, and 0 otherwise. The coefficient of interest, β_1, is the average treatment effect in the quarters following treatment. It estimates the differential impact of our treatments on distressed and non-distressed borrowers relative to the time prior to the treatment

α and ϕ denote firm and bank fixed effects while γ is an industry-time fixed effect with t representing the quarter-year. $\mathbf{X}$ is a vector of firm-specific time-varying characteristics. We include here the firm's initial exposure and credit rating as reported by the bank in CRILC, interacted with a time trend, along with the firm's average interest coverage ratio in the pre-CRILC period (2012-15), also interacted with a time trend.

4.2 Causal Effect of Regulatory Intervention on Asset Quality

Utilizing size thresholds specified in the regulatory intervention of February 12, we causally test how the intervention affected the reporting of asset quality. As outlined before, the February 12 circular altered the frequency of CRILC reporting from quarterly to monthly and also introduced the weekly reporting of fresh slippages into the SMA0 category. Along with that, it clearly outlined for banks steps for the referral of delinquent borrowers to the IBC for resolution of such stressed assets. The resolution process applied immediately to the largest borrowers whose exposures exceeded Rs. 20 billion. However, the circular also included an information intervention in the form of a declaration that they would soon be coming out with similar steps for the referral and resolution of delinquent borrowers with exposures between Rs. 1 and Rs. 20 billion.

Exploiting this size-based differential treatment in the circular, we employ a triple difference approach wherein we further interact the DID term in equation 1 with an indicator for borrower size. Specifically, we estimate an equation of the form:

$$Y_{ijbt} = \alpha_{it} + \phi_b + \beta_1 Post_t \times Treat_{ijt} + \beta_2 Post_t \times Treat_{ijt} \times Large_{ijbt} + \epsilon_{ijbt} \tag{2}$$

In the above equation, the outcome variable Y is (i) a dummy equaling 1 if the asset quality of

firm i, operating in industry j and transacting with bank b, turns NPA in quarter t, and 0 otherwise; or (ii) the amount of NPA exposure that firm i, operating in industry j and transacting with bank b, has in quarter t.

Post is a dummy equaling 1 for all quarters following the treatment, and 0 otherwise. *Treat* takes the value 1 for our definition of "zombie" borrowers i.e. borrowers with an ICR<1 at least once between 2012 and 2015, and 0 otherwise. *Large* is a dummy equaling 1 if the borrower i's exposures in bank b exceeds INR 1 billion in quarter t. The coefficient of interest, β_2, is the average treatment effect in the quarters following treatment.

The inclusion of the dummy for borrower exposure size allows us to sharpen our identification by including firm-time fixed effects, denoted by α. Hence, the effect we measure is based on a within-borrower comparison. It tells us how asset quality recognition for the *same* borrower in the same quarter differs based on whether the exposure is above or below INR 1 billion.

The identifying assumption for a causal interpretation of β_2 is that a borrower's likelihood of turning NPA would have varied identically above and below the exposure threshold of Rs. 1 billion in the absence of the treatment.

To verify our identifying assumption, we use a distributed lag specification and assess the quarterly impact of the circular across distressed borrowers in the 4 quarters before and after the circular. We estimate the following specification:

$$Y_{ijbt} = \alpha_i + \gamma_{jt} + \phi_b + \sum_{q=-4}^{4} \beta_q Large_{ijbt} * D_{Mar18+q} + \eta \mathbf{X}_{ijt} + \epsilon_{ijbt} \tag{3}$$

D above is a dummy indicating the quarter of interest, with the reference period being March 2018, when the February 12 circular was introduced. β_q estimates the average quarterly impact of the circular on borrowers with exposures exceeding Rs. 1 billion, within a 4 quarter window on either side of the circular's introduction. If the changes in the asset quality of large borrowers with exposures exceeding Rs. 1 billion is solely due to the introduction of the February 12 circular, we would expect $\beta_q = 0$ for $-4 \leq q \leq -2$. The reference period is taken to be the December 2017 quarter, immediately preceding the March 2018 quarter.

5 Results

We now present the results of our analysis. We first look at the impact of the bankruptcy reform and identify which banks opted to pursue delinquent borrowers. We examine possible channels through

which the impact of the bankruptcy reform was more muted. Next, we move on to the impact of the regulatory reform and examine whether the regulatory reform was able to fix some of the agency problems arising out of a weak banking sector. We finally conclude by examining the reallocation of credit to healthier firms and the spillover impact on industries that witnessed the greatest decongestion of zombie borrowers.

5.1 Impact of the bankruptcy reform on recognition of distressed assets

We first start by examining the direct impact of the bankruptcy reform on whether zombie firms were recognized as distressed (NPAs) following the bankruptcy reform.

First we examine the impact on the extensive margin, that is, were banks more likely to recognize zombie firms as delinquent following the bankruptcy reform. Table A4 shows the results using the regression specification in equation 1 with the dependent variable as an indicator for whether a firm is recognized as an NPA. In column 2 we see that a zombie firm was only 2.5 percent more likely to be recognized as an NPA post the bankruptcy reform. The regression controls for firm fixed effects and time fixed effects. On adding bank and time fixed effects, the point estimate drops to 1.8 percent. Next, we look at the impact on the quantity of NPAs. Table 2, columns 5-6 repeat the regression specification in equation 1 with the dependent variable as a log of total rupee value of NPAs. Column 6 shows that the volume of NPAs increased by 13 percent. Adding bank and industry-time fixed effects shows that the NPAs increased by 9 percent. At the outset, the bankruptcy reform did seem to have an immediate effect.

5.1.1 Examining selection effects of the bankruptcy reform across bank health

We next turn to the impact of the bankruptcy reform across bank health. First we look at the heterogeneity of the impact of the bankruptcy reform for stressed banks. We define a bank as stressed if the average bank capital adequacy ratio, also called Capital to Risk (Weighted) Assets Ratio (CRAR), between 2009 to 2014 is in the bottom quartile. We use banks' average CRAR in the 2009-14 period as a proxy for bank capital. CRAR is banks' capital, scaled by its risk-weighted assets.

In Table 3, we show the estimates for equation 1 with the DID term interacted with bank CRAR to get the triple difference term of interest. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of zombie firm and the indicator for post the bankruptcy reform, we see that a firm was 2.4 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results

we saw in Table A4. However, when we examine whether bank health determined which firms were more likely to be recognized as delinquent, we find that stressed banks were 2.6 percent less likely to recognize zombie firms as delinquent relative to non-stressed banks. Adding up these two coefficients shows that there was almost no impact on whether a zombie firm was recognized as delinquent (NPA) post the bankruptcy reform.

What might be driving the limited impact of the bankruptcy reform on NPA recognition for weaker banks? One potential explanation is banks' provisioning abilities. For referral to bankruptcy, banks first need to recognize borrowers as NPA, which in turn requires banks to provision for such borrowers. If banks however are capital constrained, it would be harder for them to create the required provisioning for fresh NPAs, creating a disincentive for provisioning. Thus, agency problems arising from the weak capitalization of the banking sector diminishes or even undoes the positive effect of improved creditor rights on zombie lending that prior literature has focused on (Kulkarni (2018) and Li and Ponticelli (2019)).

5.1.2 Examining selection effects of the bankruptcy reform across state versus private ownership

Next we examine the impact of the regulatory reform for state-owned versus private sector banks. In Table 4, we show the estimates for equation 1 with the DID term interacted with a dummy for state-owned banks to get the triple difference term of interest. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of a zombie firm and the indicator for post the bankruptcy reform, we see that a bank was 2.9 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results we saw in Table A4. However, when we examine whether Public Sector banks were less likely to recognize zombie firms as delinquent, we find that PSBs were only 1.4 percent less likely to recognize zombie firms as delinquent relative to privately owned banks, though the point estimates are not statistically significant.

Effects are more pronounced when we look at the intensive margin. The interaction coefficient between whether a firm was a zombie borrower prior to the reform and the indicator for post reform in Column 6 shows that post the bankruptcy reform there was a 34 percent increase in volume of NPAs of zombie firms post the collateral reform. However, the triple interaction term indicates that Public Sector Banks saw a 13 percent decline in volume of NPAs of zombie firms.

We hypothesize that the muted effects of state-owned banks are due to the political economy

problems associated with state-owned banks. These effects could also be due to the “lazy banking" hypothesis wherein the incentive structure of bankers make them unwilling to recognize zombie firms as NPAs.

5.2 Impact of the regulatory reform on recognition of distressed firms

We now turn to the impact of the regulatory reform and examine whether the agency problems arising from a weak banking sector and state-owned banks were addressed by the new reform.

5.2.1 Pre-trends in impact of the regulatory intervention

Before turning to the formal regressions, we examine the immediate impact of the regulatory reform using an event study analysis. We begin with the distributed lag model outlined in equation 3 and identify the quarterly average treatment effect on borrowers' asset quality. On the basis of our discussion in Section 2.3, we believe the February 12 circular can have 4 possible interventions. First, the circular mandated that all restructured borrowers would now have to classified as NPAs and any upgradation of large restructured borrowers (exposures in excess of Rs. 1 billion) in response to timely repayments would need an independent credit evaluation of investment grade or better. Thus, we would expect the circular to increase NPA recognition amongst large borrowers who were previously restructured. We would expect this to be most pronounced amongst ex-ante distressed borrowers with exposures in excess of Rs. 1 billion for whom the central bank would be issuing new guidelines (as claimed in the circular) for referral to the IBC and resolution and for whom upgradation to the Standard category would require independent credit evaluations. Second, if large borrowers were strategically defaulting to the SMA2 category as there was no cost for borrowers or banks in the period prior to the circular, we would expect the circular's direction to recognize defaults immediately and create resolution plans would reduce the incidence of strategic defaults and a reduction in borrowers in the SMA2 and SMA0 categories. Specifically, we expect “separating equilibrium” in this case - borrowers with the ability to pay would upgrade themselves and move out of the SMA2/SMA0 categories to the Standard category while borrowers who don't have the ability to pay would be recognized as NPAs.[16]

We test these hypotheses using the distributed lag specification. The outcome in each instance is a dummy, equaling 1 for the respective asset category. All specifications include borrower, industry-

[16]We are grateful to Dr. Urjit Patel for drawing our attention to the possibility of a separating equilibrium during his tenure as governor of the central bank.

time and bank fixed effects, along with borrower-specific time-varying covariates. The sample is restricted to 9 quarters between March 2017 and March 2019, providing 4 pre-treatment and 5 post-treatment observations. The reference period is the quarter ending in December 2017, one quarter prior to the treatment. Standard errors are clustered at the firm-bank level and the vertical lines represent 95 percent confidence intervals.

Figure 4 identifies the average quarterly impact of the treatment on NPA recognition for all borrowers. Figure 4A records a sharp increase in the likelihood of borrowers recognized as NPAs in the first three quarters of the post-treatment period. This is accompanied by a sharp decline in the likelihood of borrowers being reported as SMA2 (Figure 4B) in the post-treatment period, and this persists for the entire post-treatment period. This is accompanied by an increase in the likelihood of borrowers being in the Standard category (Figure 4C). The figures therefore provide evidence in support of both our hypothesis: strategic defaulters without the ability to pay - who were previously in the SMA2 category - are recognized as NPAs; strategic defaulters with the ability to pay move to the Standard category. This leads to a sustained decline in the likelihood of borrowers with exposures in excess of Rs. 1 billion (who are targeted by the treatment) being in the SMA2 category, and corresponding increases in the likelihood of these borrowers being in either of the NPA or Standard categories, based on their respectively ability to pay. Importantly, Figure 4 also validates our difference-in-difference identification strategy by confirming the lack of differential pre-trends in outcomes. Of the 9 pre-treatment coefficients, none are statistically significant at the 95 percent level of confidence and only 1 is significant at the 10 percent confidence level.

Figures 5 and 6 disaggregate our sample by distressed and non-distressed borrowers. As hypothesized in Section 2, we would expect the circular's effects to be concentrated amongst ex-ante distressed borrowers. This is supported by the average quarterly treatment effects identified in Figures 5 and 6 where we see that the treatment's impacts, both in terms of a higher likelihood of NPA and Standard, and a lower likelihood of being SMA2 is concentrated amongst ex-ante distressed borrowers. The treatment on the other hand has almost no impact on the asset quality of non-distressed borrowers. This assuages concerns that our difference-in-difference strategy might be driven by an aggregate trend in large borrowers' asset quality which is correlated with the timing of the treatment. If this was so, we would expect non-distressed borrowers to also exhibit trends in asset quality comparable to ex-ante distressed borrowers.

5.2.2 Average treatment effect of the regulatory reform on NPA recognition

Having established that the parallel trends assumption is satisfied, we now proceed to identifying the average treatment effect of the February 12 circular on distressed borrowers. Before turning to the more well-identified specification, we first start by examining the direct impact of the regulatory reform on NPA recognition.

First we examine the impact on the extensive margin, that is, were banks more likely to recognize zombie firms as delinquent following the bankruptcy reform. Table A4 shows the results using the regression specification in equation 1 with the dependent variable as an indicator for whether a firm is recognized as an NPA. In column 1, we see that a zombie firm was only 10 percent more likely to be recognized as an NPA post the bankruptcy reform. The regression controls for firm fixed effects and time fixed effects. This is nearly 4 times the effect we observed for the bankruptcy reform.

On adding bank and time fixed effects to the baseline specification, the point estimate drops to 6 percent, nearly 3 times as high as the impact post the bankruptcy reform. Next, we examine the extensive margin and look at the impact on the quantity of NPAs. Table 2, columns 5-6 repeat the regression specification in equation 1 with the dependent variable as an log of total rupee value of NPAs. Column 5 shows that the volume of NPAs increased by 52 percent. Adding bank and industry-time fixed effects shows that the NPAs increased by 30 percent. The magnitude of the effects of the regulatory reform seems to be much almost 3 times as high as the impact of the bankruptcy reform. We now turn to whether the regulatory reform was successful in fixing some of the agency problems arising from a weak banking sector and state-ownership of banks.

5.2.3 Examining impact of the regulatory reform across bank health

In Table 3, we show the estimates for equation 1 with the DID term interacted with bank CRAR to get the triple difference term of interest. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of zombie firm and the indicator for post the bankruptcy reform in column 1, we see that a firm was 2.1 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results we saw in Table A4. However, there was no differential impact for the stressed banks relative to the non-stressed banks. This is in contrast to the bankruptcy reform where we observed a much lower impact for the stressed banks. In column 3, we run a horse race regression including

both the bankruptcy reform and the regulatory reform. Effects are consistent with what we observed previously wherein the bankruptcy reform was more muted for stressed banks whereas there was no differential impact of the regulatory reform.

Effects are very similar when we look at the intensive margin. The interaction coefficient between whether a firm was a zombie borrower prior to the reform and the indicator for post reform in Column 4 shows that post the bankruptcy reform there was a 31 percent increase in volume of NPAs of zombie firms post the collateral reform. However, the triple interaction term indicates that there was no differential impact across bank health.

5.2.4 Examining the impact of the regulatory reform for state versus private sector banks

We next turn to the impact of the bankruptcy reform across bank health. In Table 4, we show the estimates for equation 1 with the DID term interacted with a dummy for state-owned banks to get the triple difference term of interest. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of zombie firm and the indicator for post the bankruptcy reform, we see that a firm was 6.1 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results we saw in Table A4. State-owned banks were no less likely to recognize zombie firms as delinquent. In column 3, we also include the effect due to the bankruptcy reform and find consistent results. While the regulatory reform had similar effects on both state-owned as well as private sector banks. the bankruptcy reform had a more muted impact on state-owned firms.

Effects are more similar when we look at the intensive margin. The interaction coefficient between whether a firm was a zombie borrower prior to the reform and the indicator for post reform in Column 4 shows that post the bankruptcy reform there was a 29 percent increase in volume of NPAs of zombie firms post the regulatory reform.There was no differential impact on state-owned banks. In column 6, we include both the bankruptcy reform and the regulatory reform. As before, we see that there was no differential effect for state-owned banks for the regulatory reform. However, effects were muted for state-owned banks.

5.2.5 Moving towards causality: Exploiting the size threshold and within-firm variation

Now we move towards providing causal estimates of the baseline specification. As Section 4 shows, we exploit the size threshold above which the regulatory reform had more of an impact.

Table 5 shows the results of the specification in Equation 2. Columns 1–3 shows the impact of the circular on the likelihood of distressed borrowers being recognized as NPA. Recall that the unit of observation is borrower-bank and a borrower is considered to be distressed if its ICR was less than 1 in at least 1 year between 2012 and 2015. The cross-sectional variation in treatment intensity is based on whether the exposure of borrowers in a bank exceed INR 1 billion. The February 12^{th} circular explicitly mentioned that the central bank would soon be issuing fresh guidelines for the referral of such borrowers (akin to those for borrowers with exposures in excess of Rs. 20 billion). If lenders consider the central bank's policy pronouncement to be credible, we would expect them to act against such borrowers in anticipation of the new guidelines The outcome of interest equals 1 if the borrower is declared as an NPA by a bank in the quarter of interest. Standard errors are clustered by firm-bank, which is the level at which the treatment is applied.

All columns include borrower, bank, time and industry-time fixed effects while columns Column 1 shows that the probability of a distressed firm being recognized as an NPA increased by 4 percent post the regulatory reform. This effect was almost twice as high for borrowers with a 4 percent relative increase in probability of recognizing a firm as an NPA, suggesting that the treatment induced by the February 12 circular caused a two-fold increase in the likelihood of borrowers with exposures in excess of Rs. 1 billion being recognized as NPA.

Column 3 also includes the effect driven by the bankruptcy reform. As before, distressed firms were 5 percent more likely to be recognized as NPAs following the regulatory reform and the effect was twice as high (10 percent) for the firms above the Rs. 1 billion exposure threshold. Note, the treatment's impact on ex-ante distressed borrowers also extended to those which were under the Rs. 1 billion exposure threshold as seen from the positive and significant coefficient on the interaction between borrowers with ICR less than 1 and the post-treatment indicator.

Effects are similar when we look at the extensive margin. Column 4 shows that distressed firms were 12 percent more likely to be recognized as NPAs post the regulatory reform. The effects were 31 percent higher for the firms above the Rs. 1 billion exposure threshold. Thus, the large effects on the intensive margin (overall almost a four-fold increase) indicating the large effects of the regulatory reform especially for the larger firms where agency problems are likely to be more acute.

In column 6 we also include the interaction terms for the bankruptcy reform as it allows us to more transparently compare the effects for the two events. Consistent with the results in column 4, we find that the regulatory reform resulted in an 18 percent increase in volume of zombie loans that

were recognized as NPAs. the effect was 36 percent higher for firms above the size threshold. We find that there was a 14 percent increase in recognizing distressed firms as NPA after the bankruptcy reform. Surprisingly, the effect was 16 percent higher for the firms above the size threshold.

The inclusion of borrower-time fixed effects in Table 6 reduces the magnitudes of the coefficients of interest but the coefficients remain qualitatively comparable and also statistically significant. Focusing on the results in column 1, we see that the treatment caused a 2 percentage point increase in the likelihood of ex-ante distressed borrowers with exposures in excess of INR 1 billion becoming NPA. There is, however, no distressed borrowers below the size threshold.

Collectively, the results in Table 5 and Table6 provide the following two takeaways. First, based on a conservative estimate, the treatment induced by the February 12 circular caused a 1 percentage point increase in the likelihood of ex-ante distressed borrowers to be recognized as NPA. This estimate is based on the restrictive specification using borrower-time fixed effects which controls for time-varying shocks affecting borrowers' repayment abilities. Second, the treatment had no impact on the likelihood of non-distressed borrowers being recognized as NPA. The results are consistent with the quarterly treatment effects discussed in Figures 5 and 6 and alleviates any concern that our results are generated by a secular trend in the declining quality of large borrowers which is correlated with the timing of the February 12 circular.

Table A1 (Appendix) shows the impact of the circular on borrowers' likelihood of being classified as SMA2 and Standard. All the specifications include borrower, industry-time and bank fixed effects and we only consider borrowers to be "Standard" if they do not fall in any of the SMA categories (and not NPA). Comparing the coefficients in columns (1) and (2), we see that the treatment reduced the likelihood of large borrowers being in the SMA2 category and this was concentrated amongst ex-ante distressed borrowers as seen from the negative coefficient on the triple interaction.

The reduction in borrowers' likelihood of being in the SMA2 category can be driven through two distinct channels: first, if large distressed borrowers recognized as NPA by banks post-treatment had a higher likelihood of being SMA2 in the pre-treatment period, we would expect a mechanical reduction in the likelihood of ex-ante large borrowers to be SMA2 in the post-treatment period. Alternatively, the reduction in borrowers being SMA2 can also be driven by a reduction in strategic default amongst large borrowers. This is due to the circular's mandate to banks to recognize defaults with immediate effect and create resolution plans for each default. Thus, post-treatment, it is no longer cost less for banks to allow borrowers to remain in the SMA2 category (while not slipping to NPA). Hence, banks

could be nudging borrowers who have the ability to pay to upgrade themselves to the Standard category.

To isolate the latter effect, we restrict our sample to borrowers who have never been recognized as NPA across the CRILC system between the March 2015 and March 2019. We test whether the treatment caused a reduction in their likelihood of remaining in the SMA2 category. As these are borrowers who have not been recognized as NPAs (at least till March 2019), any reduction in their likelihood of being SMA2 in response to the treatment would suggest that the treatment also had an impact in reducing the incidence of strategic default amongst borrowers with the ability to pay. The positive and significant coefficient on the triple interaction term in column (4) provides support for the explanation that the treatment also caused a reduction in strategic default amongst large ex-ante distressed borrowers. Thus, the overall reduction in the likelihood of ex-ante distressed borrowers being classified in the SMA2 category is driven by both forces: a mechanical reduction due to a section of these borrowers being recognized as NPA; accompanied by a reduction in the incidence of strategic default for borrowers who have never been classified as NPA (possibly those with the ability to pay). Columns (5) and (6) indicate that the treatment improved the likelihood of large borrowers being reported in the Standard category, particularly for small (exposures under Rs. 1 billion) ex-ante distressed borrowers.

5.2.6 Comparing the Impact of the February 12 Circular and the IBC

The IBC was adopted in December 2016 and was already in force when the February 12 circular was implemented. Banks also had started referring borrowers to the IBC starting 2017, including some under directions from the RBI. In this regard, a potential concern with the current empirical framework is that it might be detecting the "legislative effect" of the IBC, and erroneously attributing it to the regulatory intervention enacted by the February 12 circular. To rule out this concern, we define a post-IBC dummy which equals 1 for the 5 quarters between December 2016 and December 2017 when the IBC alone was in place and interact it with the indicator for ex-ante distressed borrowers and the indicator for borrowers with exposures in excess of Rs. 1 billion. We subsequently re-estimate specification (2) after including these interaction variables. If the February 12 circular was only picking up the impact of the IBC, we would expect the triple interaction of the IBC dummy, the treatment indicator and the indicator for ex-ante distressed borrowers to be positive and significant.

We test this hypothesis in column (1) of Table 7. The results identify a positive but noisy effect (significant at the 15 percent level) of the triple interaction using the IBC dummy but a positive and

precisely estimated triple interaction coefficient using the February 12 circular dummy. Importantly, we can reject the equality of the two triple interaction coefficients with a confidence of 99 percent. The results indicate that while the February 12 circular had a strong positive impact on the likelihood of large ex-ante distressed borrowers being recognized as NPAs, the impact of the IBC on the same group is much diminished.

One possible explanation for the reduced effect of the IBC is that it might have occurred with a lag. This would be true if banks took time to respond to the provisions in the IBC and only started to consistently refer borrowers after February 2018; the IBC effect would then be indistinguishable from that of the February 12 circular. This explanation however seems unlikely when we look at the coefficient estimating the interaction between the indicator for ex-ante distressed borrowers and the post February 12 (IBC) period. Recall that this coefficient estimates the likelihood of *small* (below Rs. 1 billion) ex-ante distressed borrowers being recognized as NPAs in the post February 12 (IBC) period. This coefficient is positive and significant for both the post-February 12 and post-IBC interactions and the coefficients are statistically indistinguishable from one another.

The evidence from column (1) of Table 7 thereby suggests that banks were equally likely to recognize relatively small distressed borrowers as NPAs under the post-IBC and post-February 12 period. However, banks were recognizing large (in excess of Rs. 1 billion) ex-ante distressed borrowers as NPAs only post the introduction of the February 12 circular, and not the IBC. This rules out concerns that banks might simply be responding to the IBC with a lag – if it were so, we would have estimated no impact of the IBC on the recognition of relatively small distressed borrowers.

What might be driving the limited impact of the IBC on NPA recognition, relative to the February 12 circular? One potential explanation is banks' provisioning abilities. For referral to the IBC, banks first need to recognize borrowers as NPA, which in turns requires banks to provision for such borrowers. If banks however are capital constrained, it would be harder for them to create the required provisioning for fresh NPAs, creating a disincentive for provisioning. If this explanation is correct, we would expect the February 12 circular (IBC) to have the most (least) impact on NPA recognition in banks with low capital. To test this hypothesis, columns (2)-(4) of Table 7 restimates the specification in column (1) after splitting our sample by banks' level of capital in the 2009-14 period.

We use banks' average CRAR in the 2009-14 period as a proxy for bank capital. CRAR is banks' capital, scaled by its risk-weighted assets. Column (2) compares the impact of the IBC and February 12 circular on NPA recognition for banks falling in the lowest quartile of CRAR while column (3)

performs the same comparison for banks falling in the top quartile of CRAR. Column (4) restricts the sample to the middle two quartiles. If our hypothesis is correct, we would expect the February 12 circular to have the highest impact for banks in the bottom quartile of CRAR (column (2)).

The results are consistent with this hypothesis. In column (2), the triple interaction is positive and statistically significant only in the post February 12 period while the triple interaction coefficient with the IBC dummy is small and insignificant. Thus, for banks with the lowest levels of capital, the introduction of the IBC had no impact on the recognition of large distressed borrowers as NPA, but the February 12 circular had a large and significant impact. This trend disappears in column (3) when the sample is restricted to banks in the top quartile of CRAR. Neither the February 12 circular, nor the IBC has any effect on NPA recognition for these banks. For banks in the middle quartile of CRAR (column (4)), we discern a pattern similar to column (1); the triple interaction coefficient is positive and significant in both instances (at the 10 percent level for the IBC) indicating that NPA recognition for large ex-ante distressed borrowers was higher in both the post-IBC and post-February 12 circular period. However, the impact of the February 12 circular on NPA recognition is significantly higher (the difference in the coefficients is significant at the 95 percent), implying that it was more effective in NPA recognition within this group of banks.

In summary, the results in Table 7 highlight the critical role played by the February 12 circular in NPA recognition. Indeed, it can be argued that the circular by laying down clear guidelines to banks regarding the referral of stressed assets enabled the appropriate usage of the IBC by banks. The results in this regard underlines the need for regulatory interventions to rid banks' balance sheets of distressed borrowers in economies with under-capitalized banks, who might be unwilling to recognize stressed assets in order to avoid provisioning costs. Legislative interventions in such environments might require complementary regulatory interventions to aid the effective utilization of existing laws.

5.3 Impact of regulatory reform on reallocation of credit

The results on borrowers' asset quality showed that the February 12 circular increased the likelihood of ex-ante distressed borrowers with exposures exceeding Rs. 1 billion being classified as NPA. The treatment thereby was successful in inducing banks to recognize large distressed borrowers as NPA. There was also a corresponding reduction in strategic default amongst distressed borrowers with exposures in excess of Rs. 1 billion as seen from a reduction in the likelihood of being in the SMA2 category. We now identify whether the treatment also led to an improved allocation of credit. We

proceed along the following lines: we first verify that the treatment led to a reduction in credit owed by distressed borrowers with exposures in excess of Rs. 1 billion. Next we test whether there is a reallocation of bank credit towards creditworthy borrowers. Finally, we test whether the reallocation of credit occurs in sectors which had relatively higher exposures to distressed borrowers. It is worth noting that the data does not permit us to identify fresh credit outlays; in this regard, our outcome of interest in these specifications is total outstanding credit. Columns (1)-(3) include borrower, industry-time and bank fixed effects while columns (4)-(6) employ our restrictive specification using borrower-time and bank fixed effects. Standard errors in both sets of specifications are clustered by firm-bank. As the outcome variable is measured in logs, we can interpret the coefficients as percentage changes.

The difference-in-difference estimate of the circular on credit for large borrowers is positive and significant across both sets of specifications (columns (1) and (3) of Table 8): exposures for large borrowers (exposures in excess of Rs. 1 billion) increases by 7 percent in the post-treatment period. However, as seen from columns (2) and (4), this is true only for non-distressed borrowers. Expectedly, the triple interaction coefficient is negative and statistically significant. Using borrower-time fixed effects which control for the time-varying borrower-level shocks to credit demand, the exposure of ex-ante distressed borrowers with exposures in excess of Rs. 1 billion drops by almost 10 percent in the post-treatment period. Taken along with the results in Table 5, the empirical evidence supports an explanation that the treatment forced banks to recognize ex-ante distressed borrowers as NPA, which subsequently reduced the credit issued to them.

Having established that the circular reduced the exposure size of distressed borrowers with exposures in excess of Rs. 1 billion, we now test whether there was a corresponding increase in exposures for creditworthy borrowers. We determine a borrower's creditworthiness based on the borrower's external credit rating. Borrowers rated in the investment grade categories – between AAA and BBB – are deemed to be creditworthy. The *Investment Grade* dummy equals 1 for such borrowers are 0 otherwise, while the *Unrated* dummy denote borrowers lacking a credit rating. The reference group there are borrowers rated below investment grade (BB-D).

The results are shown in columns (3) and (6) of Table 8. Focusing on column (6) which includes borrower-time fixed effects, we see first that the treatment had no impact on the exposures of borrowers rated below investment grade: the coefficient is positive but relatively small and not statistically significant. In contrast, large investment grade borrowers see a 8 percent rise in exposures in the post-treatment period. There is also a 7 percent increase in exposures of unrated large borrowers in this

period.

5.4 Spillover effects of the regulatory reform

Table 9 explores whether there is any sectoral reallocation of credit. We disaggregate our sample into borrowers operating in industries with a relatively high and low exposure to distressed borrowers. This is based on the share of exposures within each industry to distressed borrowers. Thus, industries with a relatively high (low) exposure to distressed borrowers are those where the share of exposures to distressed borrowers exceeds (is below) the median share of industry-level exposures to distressed borrowers in March 2015. Our primary question of interest is whether banks reallocate credit to creditworthy borrowers in industries with ex-ante higher exposure to distressed borrowers. The results in Table 9 supports this hypothesis. Column (1) shows that the treatment causes an increases in exposures of ex-ante non-distressed large borrowers (exposures in excess of Rs. 1 billion) in industries with a low share of distressed borrowers. For ex-ante distressed borrowers in these industries however, there is a reduction in exposures, as expected. Unexpectedly though, we do not identify a similar result upon restricting the sample solely to industries with a relatively higher share distressed borrowers: while the difference-in-difference coefficient is positive, suggesting an increase in exposure to large non-distressed borrowers, the triple interaction coefficient is relatively small and not significant.

Columns (3) and (4) estimate the same specification but test for differential treatment effects across borrowers' creditworthiness. In column (4), we see a positive coefficient on the triple interaction term, suggesting that the treatment causes an increase in exposures to large investment grade borrowers in industries with an ex-ante high share of distressed borrowers. There is no corresponding effect on large borrowers with a non-investment grade rating in such industries, although we do find a relatively smaller increase in exposures for large unrated borrowers. In contrast, column (3) indicates an across-the-board increase in exposures for large borrowers, irrespective of their credit rating. The difference-in-difference coefficient implies that the coefficient increased the exposures of non-investment grade large borrowers by 9 percent. The interaction with the dummy for investment grade and unrated borrowers is positive but not statistically significant, ruling out differential treatment effects for such borrowers.

Summarizing from the results in Tables 8 and 9, we can infer that the treatment did result in a reallocation of credit towards creditworthy and unrated large borrowers, and resulted in a reduction in exposures of ex-ante distressed borrowers. The increase in exposures of creditworthy large borrow-

ers were concentrated in industries which had a previously higher exposure to distressed borrowers. The results therefore are consistent with the explanation that banks were more cautious in selecting borrowers while extending credit to industries in which firms had a higher propensity of being distressed.

6 Results

We now present the results of our analysis. We first look at the impact of the IBC and the February 12th circular in a simple DiD framework. We then examine possible channels through which the reforms operated. Next, we test the robustness of our results by exploiting a treatment cut-off and saturating the model with borrower-time fixed effects. We finally conclude by examining the reallocation of credit to healthier firms and the spillover impact on industries that witnessed the greatest decongestion of zombie borrowers.

6.1 Impact of the reforms on the recognition of non-performing assets

We start by examining the direct impact of the bankruptcy reform on whether zombie firms were recognized as distressed (NPAs) following the bankruptcy reform.

First we examine the impact on the extensive margin, that is, were banks more likely to recognize zombie firms as delinquent following the bankruptcy reform. Table A4 shows the results using the regression specification in equation 1 with the dependent variable as an indicator for whether a firm is recognized as an NPA. In column 2 we see that a zombie firm was only 2.5 percent more likely to be recognized as an NPA post the bankruptcy reform. The regression controls for firm fixed effects and time fixed effects. On adding bank and time fixed effects, the point estimate drops to 1.8 percent. Next, we look at the impact on the quantity of NPAs. Table 2, columns 5-6 repeat the regression specification in equation 1 with the dependent variable as the log of total rupee value of NPAs. Column 6 shows that the volume of NPAs increased by 13 percent. Adding bank and industry-time fixed effects shows that the NPAs increased by 9 percent. At the outset, the bankruptcy reform did seem to have an immediate effect.

The February 12th circular had a stronger effect, however. In column 1, we see that a zombie firm was only 10 percent more likely to be recognized as an NPA post the recognition mandate. The regression controls for firm fixed effects and time fixed effects. This is four times the effect we observed for the bankruptcy reform.

On adding bank and time fixed effects to the baseline specification, the point estimate drops to

6 percent, still nearly 3 times as high as the impact post the bankruptcy reform. Next, we examine the extensive margin and look at the impact on the quantity of NPAs. Column 5 shows that the volume of NPAs increased by 52 percent. Adding bank and industry-time fixed effects shows that the NPAs increased by 30 percent. The magnitude of the effects of the regulatory reform seems to be much almost 3 times as high as the impact of the bankruptcy reform. We now turn to whether the regulatory reform was successful in fixing some of the agency problems arising from a weak banking sector and state-ownership of banks.

6.1.1 Examining selection effects across bank health

We next turn to the impact of the bankruptcy and regulatory reforms across bank health. First we look at the heterogeneity of the impact of the bankruptcy reform for stressed banks. We define a bank as stressed if the average bank capital adequacy ratio, also called Capital to Risk (Weighted) Assets Ratio (CRAR), between 2009 to 2014 is in the bottom quartile. We use banks' average CRAR in the 2009-14 period as a proxy for bank capital. CRAR is banks' capital, scaled by its risk-weighted assets.

In Table 3, we show the estimates for equation 1 with the DID term interacted with bank CRAR to get a triple difference. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of zombie firm and the indicator for post the bankruptcy reform, we see that a firm was 2.4 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results we saw in Table A4. However, when we examine whether bank health determined which firms were more likely to be recognized as delinquent, we find that stressed banks were 2.6 percent less likely to recognize zombie firms as delinquent relative to non-stressed banks. Adding up these two coefficients shows that there was almost no impact on whether a zombie firm was recognized as delinquent (NPA) post the bankruptcy reform.

What might be driving the limited impact of the bankruptcy reform on NPA recognition for weaker banks? One potential explanation is banks' provisioning abilities. For referral to bankruptcy, banks first need to recognize borrowers as NPA, which in turn requires banks to provision for such borrowers. If banks however are capital constrained, it would be harder for them to create the required provisioning for fresh NPAs, creating a disincentive for provisioning. Thus, agency problems arising from the weak capitalization of the banking sector diminishes or even undoes the positive effect of improved creditor rights on zombie lending that prior literature has focused on (Kulkarni (2018) and

Li and Ponticelli (2019)).

6.1.2 Examining selection effects of the bankruptcy reform across state versus private ownership

Next we examine the impact of the regulatory reform for state-owned versus private sector banks. In Table 4, we show the estimates for equation 1 with the DID term interacted with a dummy for state-owned banks to get a triple difference. First we look at the extensive margin with the dependent variable as whether a bank recognizes a firm as delinquent. On looking at the interaction coefficient of a zombie firm and the indicator for post the bankruptcy reform, we see that a bank was 2.9 percent more likely to recognize a firm as delinquent following the bankruptcy reform. This is similar to the results we saw in Table A4. However, when we examine whether Public Sector banks were less likely to recognize zombie firms as delinquent, we find that PSBs were only 1.4 percent less likely to recognize zombie firms as delinquent relative to privately owned banks, though the point estimates are not statistically significant.

Effects are more pronounced when we look at the intensive margin. The interaction coefficient between whether a firm was a zombie borrower prior to the reform and the indicator for post reform in Column 5 shows that post the bankruptcy reform there was a 34 percent increase in volume of NPAs of zombie firms post the collateral reform. However, the triple interaction term indicates that Public Sector Banks saw a 13 percent decline in volume of NPAs of zombie firms.

We hypothesize that the muted effects of state-owned banks are due to the political economy problems associated with state-owned banks. These effects could also be due to the “lazy banking" hypothesis wherein the incentive structure of bankers make them unwilling to recognize zombie firms as NPAs.

6.2 Moving towards causality: Exploiting the size threshold and within-firm variation

Before turning to the formal regressions, we examine the immediate impact of the regulatory reform using an event study analysis. We test the hypothesis that the February 12th circular improved NPA recognition by using the distributed lag specification. The outcome in each panel is a dummy, equaling 1 for the respective asset category: NPA, SMA2, SMA2 but never NPA, and Standard. All specifications include borrower, industry-time and bank fixed effects, along with borrower-specific time-varying covariates. The sample is restricted to 9 quarters between March 2017 and March 2019, providing 4 pre-treatment and 5 post-treatment observations. The reference period is the quarter ending in December 2017, one quarter prior to the treatment. Standard errors are clustered at the firm-bank

level and the vertical lines represent 95 percent confidence intervals.

Figure 4 identifies the average quarterly impact of the treatment on NPA recognition for all borrowers. Figure 4A records a sharp increase in the likelihood of borrowers recognized as NPAs in the first three quarters of the post-treatment period. It is also worth noting that there is an accompanying decline in the likelihood of borrowers being reported as SMA2 (Figure 4B) in the post-treatment period, and this persists for the entire post-treatment period as well as an increase in the likelihood of borrowers being in the Standard category (Figure 4C). Importantly, Figure 4 also validates our difference-in-difference identification strategy by confirming the lack of differential pre-trends in outcomes. Of the 9 pre-treatment coefficients, none are statistically significant at the 95 percent level of confidence and only 1 is significant at the 10 percent confidence level.

Figures 5 and 6 disaggregate our sample by distressed and non-distressed borrowers. As hypothesized in Section 2, we would expect the circular's effects to be concentrated amongst ex-ante distressed borrowers. This is supported by the average quarterly treatment effects identified in Figures 5 and 6 where we see that the treatment's impact is concentrated among ex-ante distressed borrowers. The treatment on the other hand has almost no impact on the asset quality of non-distressed borrowers. This assuages concerns that our difference-in-difference strategy might be driven by an aggregate trend in large borrowers' asset quality which is correlated with the timing of the treatment. If this was so, we would expect non-distressed borrowers to also exhibit trends in asset quality comparable to ex-ante distressed borrowers.

Having established that the parallel trends assumption is satisfied, we now we move towards providing causal estimates of the baseline specification. As Section 4 shows, we exploit the size threshold above which the regulatory reform had more of an impact. Table 5 shows the results of the specification in Equation 2. Columns 1–3 shows the impact of the circular on the likelihood of distressed borrowers being recognized as NPA. Recall that the unit of observation is borrower-bank and a borrower is considered to be distressed if its ICR was less than 1 in at least 1 year between 2012 and 2015. The cross-sectional variation in treatment intensity is based on whether the exposure of borrowers in a bank exceed Rs. 1 billion. The February 12th circular explicitly mentioned that the central bank would soon be issuing fresh guidelines for the referral of such borrowers (akin to those for borrowers with exposures in excess of Rs. 20 billion). If lenders consider the central bank's policy pronouncement to be credible, we would expect them to act against such borrowers in anticipation of the new guidelines The outcome of interest equals 1 if the borrower is declared as an NPA by a bank in the quarter

of interest. Standard errors are clustered by firm-bank, which is the level at which the treatment is applied.

All columns include borrower, bank, time and industry-time fixed effects while columns Column 1 shows that the probability of a distressed firm being recognized as an NPA increased by 4 percent post the regulatory reform. This effect was almost twice as high for borrowers with a 4 percent relative increase in probability of recognizing a firm as an NPA, suggesting that the treatment induced by the February 12 circular caused a two-fold increase in the likelihood of borrowers with exposures in excess of Rs. 1 billion being recognized as NPA.

Column 3 also includes the effect driven by the bankruptcy reform. As before, distressed firms were 5 percent more likely to be recognized as NPAs following the regulatory reform and the effect was twice as high (10 percent) for the firms above the Rs. 1 billion exposure threshold. Note, the treatment's impact on ex-ante distressed borrowers also extended to those which were under the Rs. 1 billion exposure threshold as seen from the positive and significant coefficient on the interaction between borrowers with ICR less than 1 and the post-treatment indicator.

Effects are similar when we look at the extensive margin. Column 4 shows that distressed firms were 12 percent more likely to be recognized as NPAs post the regulatory reform. The effects were 31 percent higher for the firms above the Rs. 1 billion exposure threshold. Thus, the large effects on the intensive margin (overall almost a four-fold increase) indicating the large effects of the regulatory reform especially for the larger firms where agency problems are likely to be more acute.

In column 6 we also include the interaction terms for the bankruptcy reform as it allows us to more transparently compare the effects for the two events. Consistent with the results in column 4, we find that the regulatory reform resulted in an 18 percent increase in volume of zombie loans that were recognized as NPAs. the effect was 36 percent higher for firms above the size threshold. We find that there was a 14 percent increase in recognizing distressed firms as NPA after the bankruptcy reform. Surprisingly, the effect was 16 percent higher for the firms above the size threshold.

The inclusion of borrower-time fixed effects in Table 6 reduces the magnitudes of the coefficients of interest but the coefficients remain qualitatively comparable and also statistically significant. Focusing on the results in column 1, we see that the treatment caused a 2 percentage point increase in the likelihood of ex-ante distressed borrowers with exposures in excess of Rs. 1 billion becoming NPA. There is, however, no distressed borrowers below the size threshold.

Collectively, the results in Table 5 and Table6 provide the following two takeaways. First, based

on a conservative estimate, the treatment induced by the February 12 circular caused a 1 percentage point increase in the likelihood of ex-ante distressed borrowers to be recognized as NPA. This estimate is based on the restrictive specification using borrower-time fixed effects which controls for time-varying shocks affecting borrowers' repayment abilities. Second, the treatment had no impact on the likelihood of non-distressed borrowers being recognized as NPA. The results are consistent with the quarterly treatment effects discussed in Figures 5 and 6 and alleviates any concern that our results are generated by a secular trend in the declining quality of large borrowers which is correlated with the timing of the February 12 circular.

6.3 Impact of regulatory reform on reallocation of credit

The results on borrowers' asset quality showed that the February 12 circular increased the likelihood of ex-ante distressed borrowers with exposures exceeding Rs. 1 billion being classified as NPA. The treatment thereby was successful in inducing banks to recognize large distressed borrowers as NPA. There was also a corresponding reduction in strategic default amongst distressed borrowers with exposures in excess of Rs. 1 billion as seen from a reduction in the likelihood of being in the SMA2 category. We now identify whether the treatment also led to an improved allocation of credit. We proceed along the following lines: we first verify that the treatment led to a reduction in credit owed by distressed borrowers with exposures in excess of Rs. 1 billion. Next we test whether there is a reallocation of bank credit towards creditworthy borrowers. Finally, we test whether the reallocation of credit occurs in sectors which had relatively higher exposures to distressed borrowers. It is worth noting that the data does not permit us to identify fresh credit outlays; in this regard, our outcome of interest in these specifications is total outstanding credit. Columns (1)-(3) include borrower, industry-time and bank fixed effects while columns (4)-(6) employ our restrictive specification using borrower-time and bank fixed effects. Standard errors in both sets of specifications are clustered by firm-bank. As the outcome variable is measured in logs, we can interpret the coefficients as percentage changes.

The difference-in-difference estimate of the circular on credit for large borrowers is positive and significant across both sets of specifications (columns (1) and (3) of Table 8): exposures for large borrowers (exposures in excess of Rs. 1 billion) increases by 7 percent in the post-treatment period. However, as seen from columns (2) and (4), this is true only for non-distressed borrowers. Expectedly, the triple interaction coefficient is negative and statistically significant. Using borrower-time fixed effects which control for the time-varying borrower-level shocks to credit demand, the exposure of

ex-ante distressed borrowers with exposures in excess of Rs. 1 billion drops by almost 10 percent in the post-treatment period. Taken along with the results in Table 5, the empirical evidence supports an explanation that the treatment forced banks to recognize ex-ante distressed borrowers as NPA, which subsequently reduced the credit issued to them.

Having established that the circular reduced the exposure size of distressed borrowers with exposures in excess of Rs. 1 billion, we now test whether there was a corresponding increase in exposures for creditworthy borrowers. We determine a borrower's creditworthiness based on the borrower's external credit rating. Borrowers rated in the investment grade categories – between AAA and BBB – are deemed to be creditworthy. The *Investment Grade* dummy equals 1 for such borrowers are 0 otherwise, while the *Unrated* dummy denote borrowers lacking a credit rating. The reference group there are borrowers rated below investment grade (BB-D).

The results are shown in columns (3) and (6) of Table 8. Focusing on column (6) which includes borrower-time fixed effects, we see first that the treatment had no impact on the exposures of borrowers rated below investment grade: the coefficient is positive but relatively small and not statistically significant. In contrast, large investment grade borrowers see a 8 percent rise in exposures in the post-treatment period. There is also a 7 percent increase in exposures of unrated large borrowers in this period.

6.4 Spillover effects of the regulatory reform

Table 9 explores whether there is any sectoral reallocation of credit. We disaggregate our sample into borrowers operating in industries with a relatively high and low exposure to distressed borrowers. This is based on the share of exposures within each industry to distressed borrowers. Thus, industries with a relatively high (low) exposure to distressed borrowers are those where the share of exposures to distressed borrowers exceeds (is below) the median share of industry-level exposures to distressed borrowers in March 2015. Our primary question of interest is whether banks reallocate credit to creditworthy borrowers in industries with ex-ante higher exposure to distressed borrowers. The results in Table 9 supports this hypothesis. Column (1) shows that the treatment causes an increases in exposures of ex-ante non-distressed large borrowers (exposures in excess of Rs. 1 billion) in industries with a low share of distressed borrowers. For ex-ante distressed borrowers in these industries however, there is a reduction in exposures, as expected. Unexpectedly though, we do not identify a similar result upon restricting the sample solely to industries with a relatively higher share distressed bor-

rowers: while the difference-in-difference coefficient is positive, suggesting an increase in exposure to large non-distressed borrowers, the triple interaction coefficient is relatively small and not significant.

Columns (3) and (4) estimate the same specification but test for differential treatment effects across borrowers' creditworthiness. In column (4), we see a positive coefficient on the triple interaction term, suggesting that the treatment causes an increase in exposures to large investment grade borrowers in industries with an ex-ante high share of distressed borrowers. There is no corresponding effect on large borrowers with a non-investment grade rating in such industries, although we do find a relatively smaller increase in exposures for large unrated borrowers. In contrast, column (3) indicates an across-the-board increase in exposures for large borrowers, irrespective of their credit rating. The difference-in-difference coefficient implies that the coefficient increased the exposures of non-investment grade large borrowers by 9 percent. The interaction with the dummy for investment grade and unrated borrowers is positive but not statistically significant, ruling out differential treatment effects for such borrowers.

Summarizing from the results in Tables 8 and 9, we can infer that the treatment did result in a reallocation of credit towards creditworthy and unrated large borrowers, and resulted in a reduction in exposures of ex-ante distressed borrowers. The increase in exposures of creditworthy large borrowers were concentrated in industries which had a previously higher exposure to distressed borrowers. The results therefore are consistent with the explanation that banks were more cautious in selecting borrowers while extending credit to industries in which firms had a higher propensity of being distressed.

7 Conclusion

Zombie borrowers continue to inhibit economic growth across the developing world. Our paper examines two mechanisms that may be used to combat zombies through NPA recognition: an improvement in creditor rights and a disclosure mandate. We should that both interventions improve NPA recognition, although effects vary by lender. In particular, banks that are poorly-capitalized or run by the government are less likely to be induced by "soft" incentives such as creditor protections to report all NPAs. To establish the causal effect of the February 12th circular, we employ an identification strategy that exploits a size threshold in the applicability of the mandate. We also use a within-bank estimator to show that NPA recognition is not driven by time-varying borrower characteristics. Our findings are consistent with the existence of multiple frictions, both financial and institutional, that

give rise to the problem of zombie borrowing.

References

Acharya, V. (2017). The Unfinished Agenda: Restoring Public Sector Bank Health in India. Remarks delivered during the 8th R.K. Talwar Memorial Lecture organized by the Indian Institute of Banking and Finance.

Acharya, V. V. and Subramanian, K. V. (2016). *State Intervention in Banking: The Relative Health of Indian Public Sector and Private Sector Banks*, pages 195–230. Springer India.

Ahearne, A. G. and Shinada, N. (2005). Zombie firms and economic stagnation in Japan. *International Economics and Economic Policy*, 2:363–381.

Albertazzi, U. and Marchetti, D. J. (2010). Credit supply, flight to quality and evergreening: an analysis of bank-firm relationships after Lehman. Temi di discussione (Economic working papers) 756, Bank of Italy, Economic Research and International Relations Area.

Andrews, D. and Petroulakis, F. (2019). Breaking the Shackles: Zombie Firms, Weak Banks and Depressed Restructuring in Europe. *ECB Working Paper No. 2240*.

Banerjee, A. V., Cole, S., and Duflo, E. (2004). Banking reform in India. *India Policy Forum*, 1(1):277–332.

Beck, Thorsten, A. D.-K. and Levine, R. (2005). Law and Firms' Access to Finance. *American Law and Economics Review*, 7:211–252.

Bertrand, M., Mehta, P., and Mullainathan, S. (2002). Ferreting Out Tunneling: An Application to Indian Business Groups. *The Quarterly Journal of Economics*, 117:121–148.

Bruche, M. and Llobet, G. (2013). Preventing Zombie Lending. *The Review of Financial Studies*, 27:923–956.

Caballero, R. J., Hoshi, T., and Kashyap, A. K. (2008). Zombie Lending and Depressed Restructuring in Japan. *American Economic Review*, 98:1943–77.

Djankov, Simeon, C. M. and Shleifer, A. (2005). Private Credit in 129 Countries. *Journal of Financial Economics*, 33:341–368.

Fukao, K. and Ug Kwon, H. (2006). Why Did Japan's TFP Growth Slow Down In The Lost Decade? An Empirical Analysis Based On Firm-Level Data Of Manufacturing Firms. *The Japanese Economic Review*, 57(2):195–228.

Fukuda, S.-i. and Nakamura, J.-i. (2011). Why Did 'Zombie' Firms Recover in Japan? *The World Economy*, 34(7):1124–1137.

Gopalan, R., Mukherjee, A., and Singh, M. (2016). Do Debt Contract Enforcement Costs Affect Financing and Asset Structure? *The Review of Financial Studies*, 29:2774–2813.

Jappelli, T., Pagano, M., and Bianco, M. (2005). Courts and banks: Effects of judicial enforcement on credit markets. *Journal of Money, Credit and Banking*, 37:223–244.

Kim, S.-J. (2004). Macro effects of corporate restructuring in Japan. *IMF Staff Papers*, 51(3):457–492.

Kulkarni, N. (2018). Creditor Rights and Allocative Distortions – Evidence from India. *Working Paper*.

La Porta, R., de Silanes, F. L., Shleifer, A., and Vishny, R. W. (1997). Legal Determinants of External Finance. *Journal of Finance*, 52:1131–1150.

La Porta, R., de Silanes, F. L., Shleifer, A., and Vishny, R. W. (1998). Law and Finance. *Journal of Political Economy*, 106:1113–1155.

Levine, R. (1998). The Legal Environment, Banks, and Long-Run Economic Growth. *Journal of Money, Credit, and Banking*, 30:596–613.

Levine, R. (1999). Law, Finance, and Economic Growth. *Journal of Financial Intermediation*, 8:8–35.

Li, B. and Ponticelli, J. (2019). Going Bankrupt in China. *Working Paper*.

Lilienfeld-Toal, U. v., Mookherjee, D., and Visaria, S. (2012). The Distributive Impact of Reforms in Credit Enforcement: Evidence From Indian Debt Recovery Tribunals. *Econometrica*, 80:497–558.

McGowan, M. A., Andrews, D., and Millot, V. (2017). Insolvency regimes, zombie firms and capital reallocation. *OECD Working Paper*, (1399).

Nishimura, K. G., Nakajima, T., and Kiyota, K. (2005). Does the natural selection mechanism still work in severe recessions?: Examination of the Japanese economy in the 1990s. *Journal of Economic Behavior & Organization*, 58:53–78.

Peek, J. and Rosengren, E. S. (2005). Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan. *American Economic Review*, 95:1144–1166.

Ponticelli, J. and Alecnar, L. S. (2018). Court Enforcement, Bank Loans, and Firm Investment: Evidence from a Bankruptcy Reform in Brazil. *The Quarterly Journal of Economics*, 131:1365–1413.

Sekine, T., Kobayashi, K., and Saita, Y. (2003). Forbearance Lending: The Case of Japanese Firms. *Monetary and Economic Studies*, 21(2):69–92.

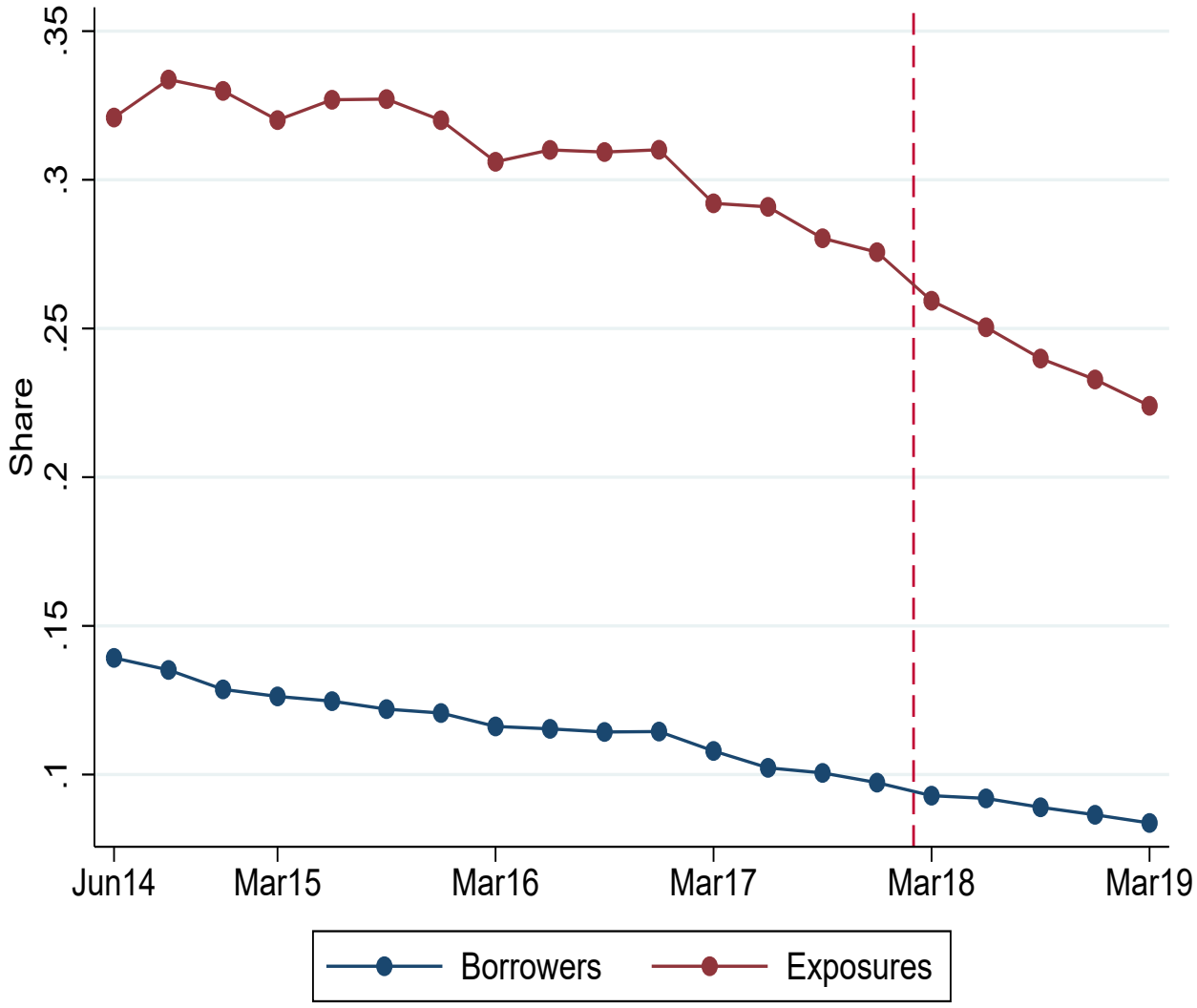
Sengupta, R., Sharma, A., and Thomas, S. (2016). Evolution of the insolvency framework for non financial firms in India. *IGIDR Working Paper*.

Shen, G. and Chen, B. (2017). Zombie firms and over-capacity in chinese manufacturing. *China Economic Review*, 44:327 – 342.

Vig, V. (2013). Access to Collateral and Corporate Debt Structure: Evidence from a Natural Experiment. *The Journal of Finance*, 68:881–928.

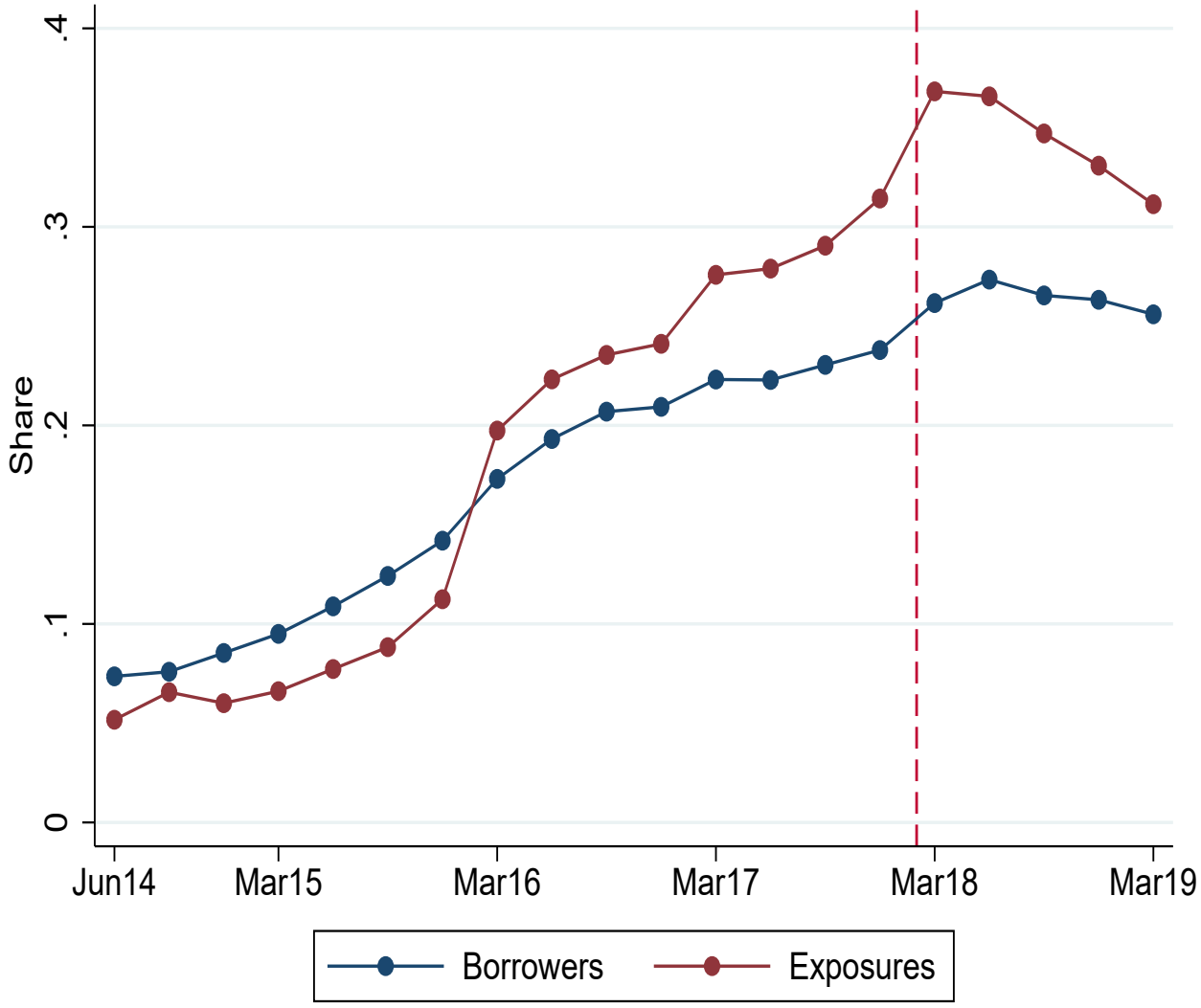
Visaria, S. (2009). Legal Reform and Loan Repayment: The Microeconomic Impact of Debt Recovery Tribunals in India. *American Economic Journal: Applied Economics*, 1:59–81.

Figure 1: Distressed Borrowers as a Share of Aggregate Exposures to Large Borrowers



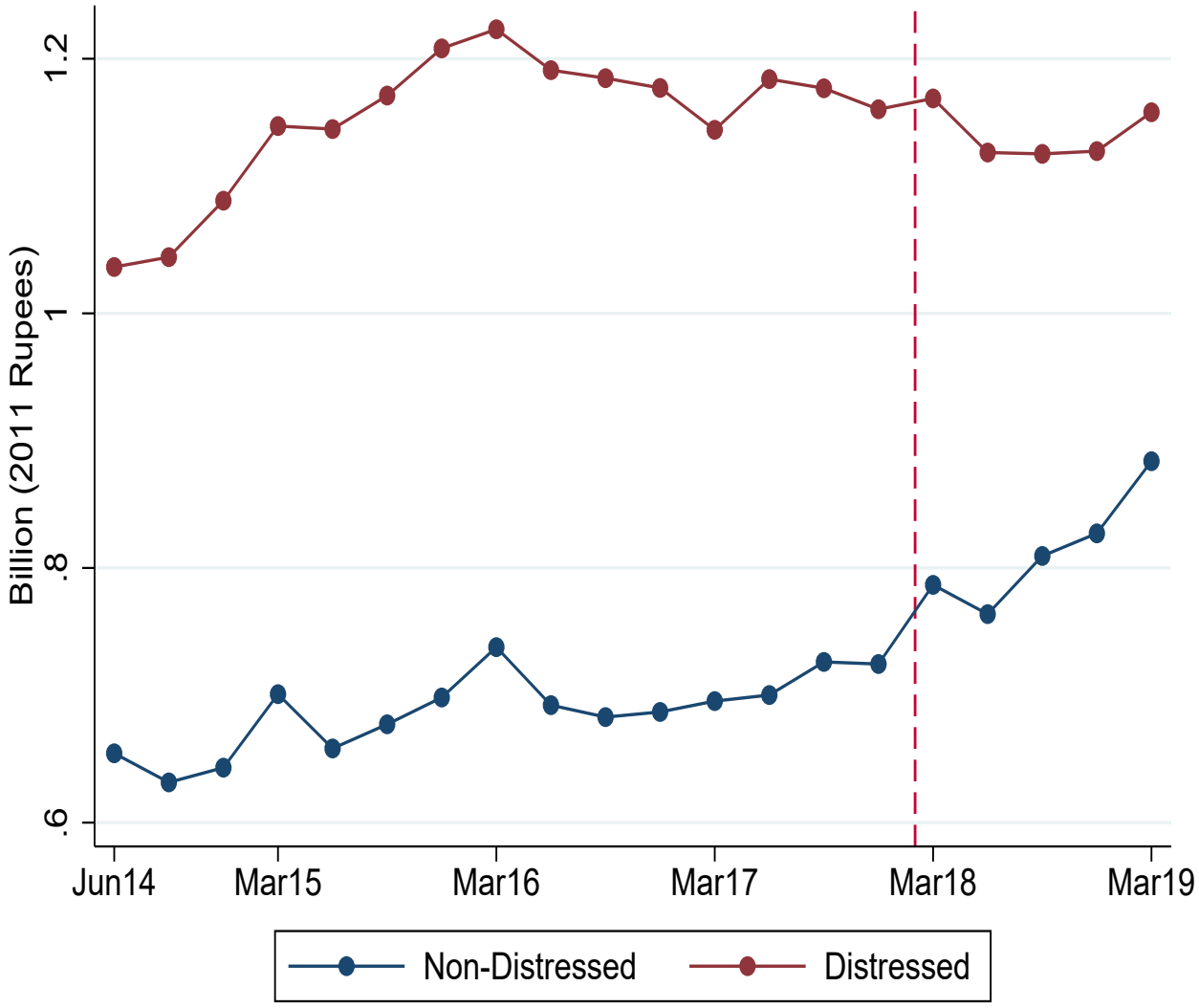
This figure plots the quarterly trends in the share of distressed borrowers within the CRILC database. A borrower is considered to be a distressed borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. The red dashed line denotes the introduction of the February 12 circular.

Figure 2: Gross NPA Ratio of Distressed Borrowers



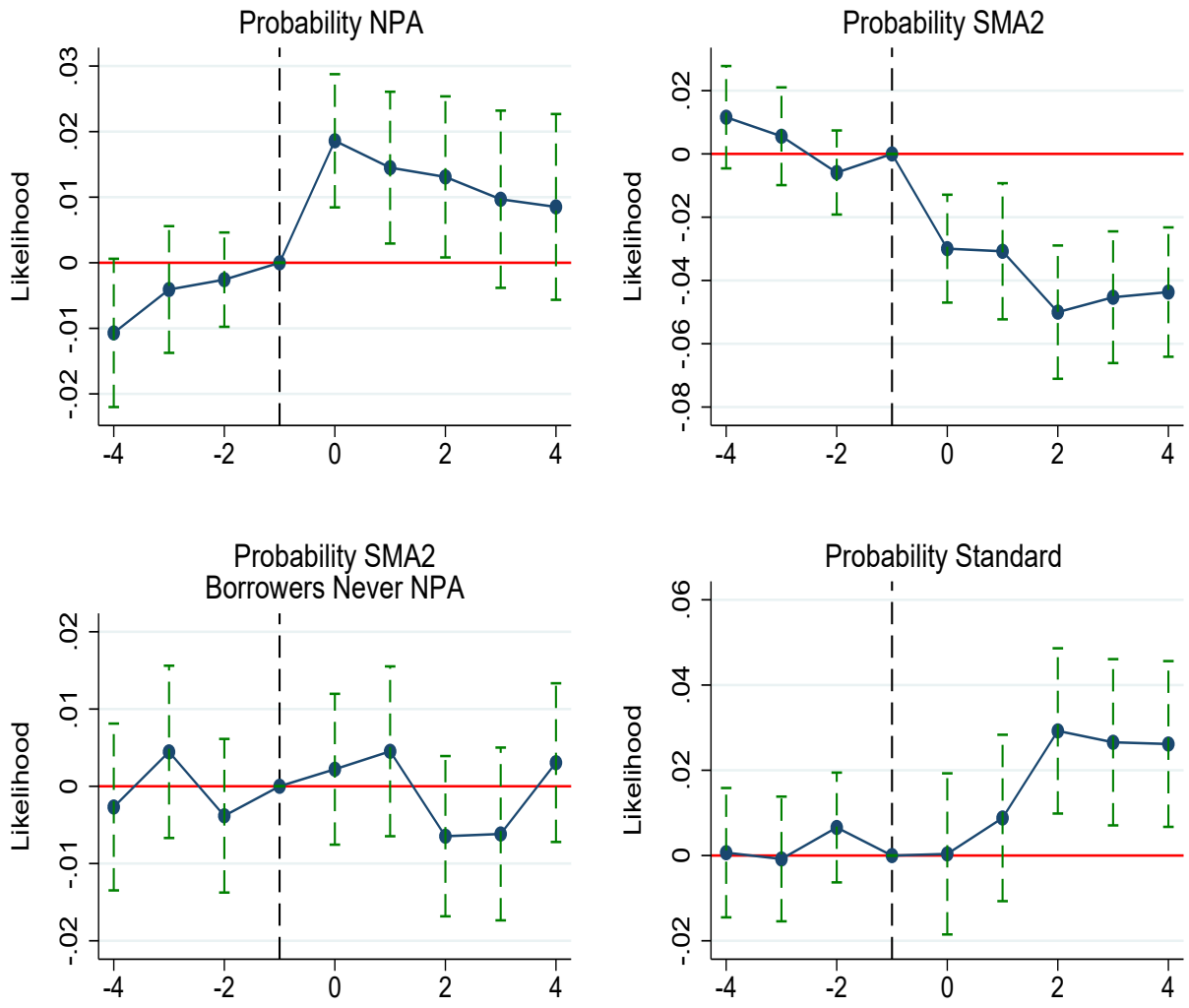
This figure plots the quarterly trends in the gross NPA ratio for distressed borrowers in terms of borrowers and exposures. A borrower is considered to be a distressed borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. The red dashed line denotes the introduction of the February 12 circular.

Figure 3: Average Exposure Size of Distressed and Non-Distressed Borrowers



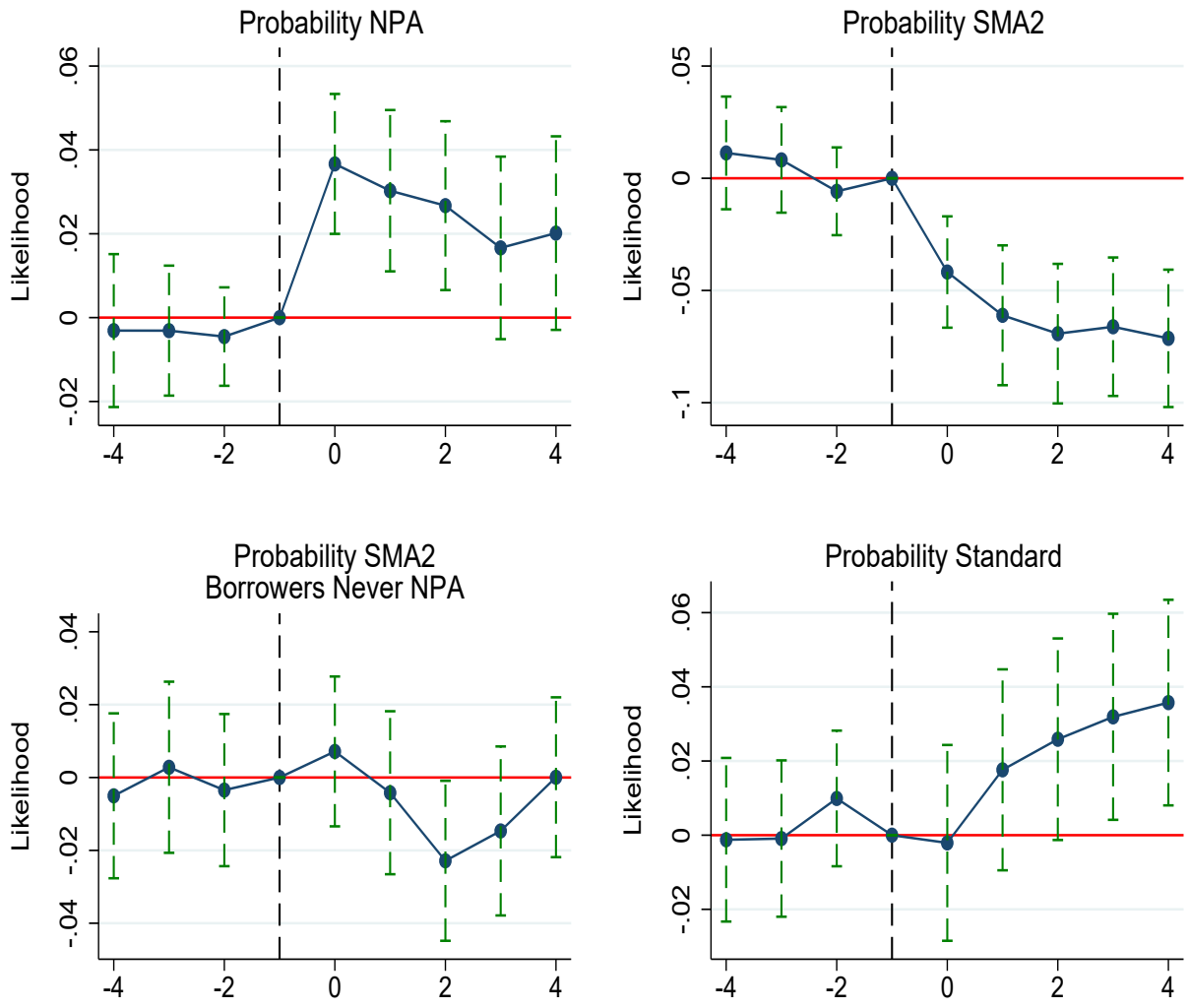
This figure plots the quarterly trends in the average exposure size of distressed and non-distressed borrowers. A borrower is considered to be a distressed borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. The red dashed line denotes the introduction of the February 12 circular.

Figure 4: Impact of the regulatory reform on large borrowers



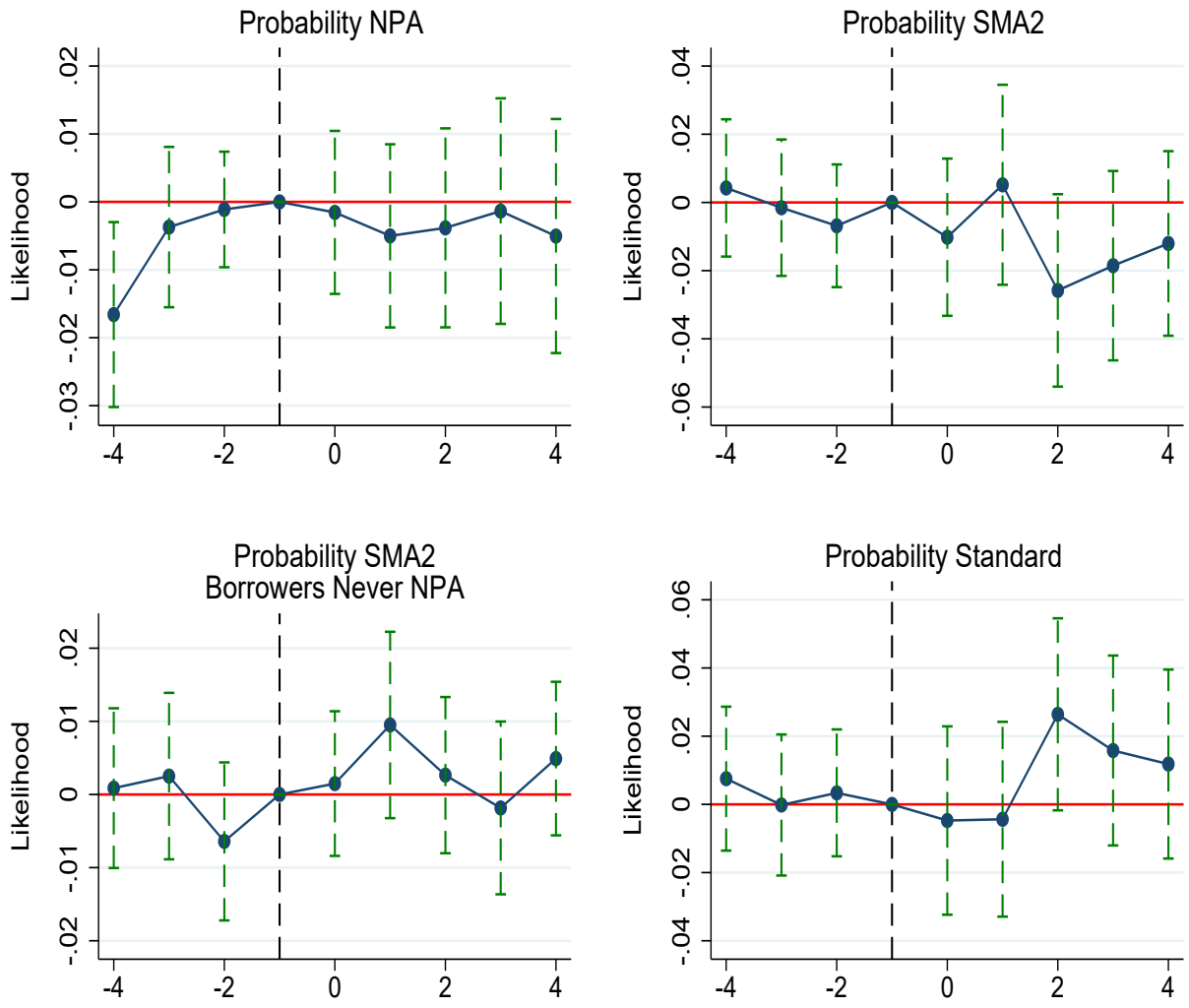
This figure plots the monthly average treatment effect of the February 12 circular for borrowers with exposures in excess of Rs. 1 billion. The unit of observation is borrower-bank. The x-axis reflects quarters relative to the policy. The reference period is the quarter ending in December 2017, immediately preceding the introduction of the circular. The vertical lines reflect 95 percent confidence intervals. The outcome of interest in each instance is a dummy equaling 1 if the borrower falls in the mentioned asset category that quarter. Borrower, industry-time and bank fixed effects, in addition to borrower-specific time-varying covariates are included. Sample is restricted to 9 quarters - March 2017-March 2019.

Figure 5: Impact of the regulatory reform on large distressed borrowers



This figure plots the monthly average treatment effect of the February 12 circular for borrowers with exposures in excess of Rs. 1 billion. The unit of observation is borrower-bank. The x-axis reflects quarters relative to the policy. The reference period is the quarter ending in December 2017, immediately preceding the introduction of the circular. The vertical lines reflect 95 percent confidence intervals. The outcome of interest in each instance is a dummy equaling 1 if the borrower falls in the mentioned asset category that quarter. Borrower, industry-time and bank fixed effects, in addition to borrower-specific time-varying covariates are included. Sample is restricted to 9 quarters - March 2017-March 2019 and distressed borrowers only. A borrower is considered to be a distressed borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. Standard errors are clustered by firm-bank.

Figure 6: Impact of the regulatory reform on large non-distressed borrowers



This figure plots the monthly average treatment effect of the February 12 circular for borrowers with exposures in excess of Rs. 1 billion. The unit of observation is borrower-bank. The x-axis reflects quarters relative to the policy. The reference period is the quarter ending in December 2017, immediately preceding the introduction of the circular. The vertical lines reflect 95 percent confidence intervals. The outcome of interest in each instance is a dummy equaling 1 if the borrower falls in the mentioned asset category that quarter. Borrower, industry-time and bank fixed effects, in addition to borrower-specific time-varying covariates are included. Sample is restricted to 9 quarters - March 2017-March 2019 and non-distressed borrowers only. A borrower is considered to be a distressed borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. Standard errors are clustered by firm-bank.

Table 1: Summary Statistics

This table shows summary statistics for key variables in the matched CRILC-Prowess sample. *Pr(Exp > 1 Billion)* refers to the probability of borrowers having exposures greater than Rs. 1 Billion (in 2011 Rupees), *ICR<1* refers to the borrower's Interest Coverage Ratio being less than 1, *Total Bank Relationships* refers to the number of banks each borrower has a lending relationship with, *Exposures* refers to the amount of borrowers' exposures, *Pr(NPA)* refers to the probability of a borrower being recognized as an NPA and *NPA Exposures* refers to the amount of NPA exposures.

	N	Mean	SD	P10	P50	P90
Pr(Exp $>$ 1 Billion)	155375	.53	.50	0	1	1
ICR $<$ 1	155375	.46	.50	0	0	1
Total Bank Relationships	155375	7.45	7.06	1	5	18
Exposures	155375	213.38	460.28	34.92	93.52	439.62
Pr(NPA)	155375	.21	.40	0	0	1
NPA Exposures	155375	35.65	179.19	0	0	88.02

Table 2: Impact of bankruptcy reform and regulatory intervention on NPA recognition

This table shows the baseline effect of the IBC and the Feb 12 circular on the likelihood of a borrower being recognized as a Non-Performing Asset (NPA), and the amount of the NPA.The unit of observation is bank-borrower. The outcome of interest in columns (1)-(4) is a dummy equaling 1 if the borrower is reported as an NPA by the bank and in Columns (5)-(8), it is the logged amount of the loan being recognized as an NPA. The unit of observation is bank-borrower and a borrower is considered to be a zombie borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015.*Post Feb12* is a dummy equaling 1 for all quarters post December 2017 and *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017. Columns (1), (2), (5) and (6) include firm and time fixed effects and columns (3), (4), (7) and (8) include firm, time, bank and 2-digit industry fixed effects along with the full range of time varying covariates. Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	1_{NPA}				Log (NPA)			
Ever ICR $<$ 1*Post Feb 12	0.102***		0.060***		0.524***		0.301***	
	(0.007)		(0.007)		(0.034)		(0.035)	
Ever ICR $<$ 1*Post IBC		0.025***		0.018***		0.128***		0.087***
		(0.005)		(0.005)		(0.023)		(0.023)
No. of Obs.	143497	143497	143497	143497	143497	143497	143497	143497
R squared	0.66	0.66	0.69	0.68	0.63	0.63	0.66	0.66
Firm-FE	Y	Y	Y	Y	Y	Y	Y	Y
Time-FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	N	N	Y	Y	N	N	Y	Y
Industry-Time FE	N	N	Y	Y	N	N	Y	Y
Covariates	N	N	Y	Y	N	N	Y	Y

Table 3: Bank health and heteregoneity in impact of bankruptcy reform and regulatory intervention

This table compares the impact of the February 12 circular and the IBC, where the outcome of interest in columns (1)-(3) is a dummy equaling 1 if the borrower is reported as a Non-Performing Asset (NPA) by the bank, and in columns (4)-(6), it is the logged amount of the loan being recognized as an NPA. The unit of observation is bank-borrower. A borrower is considered to be a zombie borrower if its *ICR* (Interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Post Feb12* is a dummy equaling 1 for all quarters post December 2017 and *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017. *CRAR Q1* refers to banks in the bottom quartile of CRAR. Quartiles of CRAR are based on the average bank CRAR between 2009 and 2014. All specifications include time varying bank covariates, and borrower, 2-digit industry time, and bank fixed effects Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:		1_{NPA}			Log (NPA)	
Ever ICR $<$ 1*Post Feb12	0.060***		0.082***	0.306***		0.415***
	(0.008)		(0.009)	(0.039)		(0.045)
Post Feb12*CRAR Q1	0.021**		0.029**	0.094**		0.132**
	(0.010)		(0.012)	(0.046)		(0.054)
ICR $<$ 1*CRAR Q1	0.001	0.005	0.013	-0.031	-0.010	0.037
	(0.007)	(0.006)	(0.009)	(0.035)	(0.029)	(0.045)
ICR $<$ 1*CRAR Q1*Post Feb12	-0.004		-0.017	-0.036		-0.108
	(0.016)		(0.018)	(0.080)		(0.090)
Ever ICR $<$ 1*Post IBC		0.024***	0.057***		0.118***	0.286***
		(0.005)	(0.007)		(0.025)	(0.033)
Post IBC*CRAR Q1		0.009	0.022**		0.039	0.098**
		(0.007)	(0.009)		(0.032)	(0.041)
ICR $<$ 1*CRAR Q1*Post IBC		-0.026**	-0.035***		-0.143***	-0.197***
		(0.011)	(0.013)		(0.053)	(0.063)
No. of Obs.	143497	143497	143497	143497	143497	143497
R squared	0.69	0.68	0.69	0.66	0.66	0.66
Dep. Var. Mean		0.12	0.08	14.87	18.57	10.32
Industry-Time FE	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Borrower-FE	Y	Y	Y	Y	Y	Y

Table 4: State versus private ownership and heterogeneity in impact of bankruptcy reform and regulatory intervention

This table compares the heterogenous impact of the February 12 circular and the IBC across Public Sector Banks (PSBs) and Private Sector Banks. The outcome of interest in columns (1)-(3) is a dummy equaling 1 if the borrower is reported as a Non-Performing Asset (NPA) by the bank and in columns (4)-(6), it is the logged amount of the loan being recognized as an NPA. The unit of observation is bank-borrower. A borrower is considered to be a zombie borrower if its *ICR* (Interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Post Feb12* is a dummy equaling 1 for all quarters post December 2017; *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017 and *PSB* is a dummy equalling 1 if the bank is a Public Sector Bank. All specifications include time varying bank covariates,and borrower, 2-digit industry time, and bank fixed effects. Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:		1_{NPA}			Log (NPA)	
Ever ICR $<$ 1*Post Feb12	0.061***		0.093***	0.285***		0.431***
	(0.012)		(0.015)	(0.057)		(0.071)
Post Feb12*PSB	0.057***		0.073***	0.247***		0.312***
	(0.008)		(0.010)	(0.036)		(0.045)
ICR $<$ 1*PSB	0.013	0.010	0.028***	0.122***	0.113***	0.182***
	(0.008)	(0.007)	(0.010)	(0.041)	(0.036)	(0.052)
ICR $<$ 1*PSB*Post Feb12	-0.002		-0.019	0.017		-0.050
	(0.014)		(0.017)	(0.069)		(0.083)
Ever ICR $<$ 1*Post IBC		0.029***	0.075***		0.128***	0.341***
		(0.008)	(0.011)		(0.039)	(0.055)
PSB*Post IBC		-0.003	0.035***		-0.026	0.138***
		(0.005)	(0.007)		(0.024)	(0.034)
ICR $<$ 1*PSB*Post IBC		-0.014	-0.033**		-0.052	-0.124**
		(0.010)	(0.013)		(0.047)	(0.062)
No. of Obs.	143497	143497	143497	143497	143497	143497
R squared	0.69	0.68	0.69	0.66	0.66	0.66
Dep. Var. Mean		0.05	0.03	6.32	7.42	4.09
Industry-Time FE	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Borrower-FE	Y	Y	Y	Y	Y	Y

Table 5: Exploiting the size threshold to examine causal impact of the regulatory intervention on NPA recognition

This table shows the baseline effect of the IBC and the Feb 12 circular using a triple difference specification. The unit of observation is bank-borrower. The outcome of interest in columns (1)-(3) is a dummy equaling 1 if the borrower is reported as a Non-Performing Asset (NPA) by the bank and in Columns (4)-(6), it is the logged amount of the loan being recognized as an NPA. A borrower is considered to be a zombie borrower if its *ICR* (Interest Coverage Ratio) has been less than 1 in any year between 2012 and 2015.*Exp > 1* is a dummy equalling 1 if the exposure of a borrower is greater than 1 billion, *Post Feb12* is a dummy equaling 1 for all quarters post December 2017 and *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017. All specifications include time varying bank covariates, and 2-digit industry-time, bank and borrower. Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:		1_{NPA}			Log (NPA)	
Exp $>$ 1	-0.001	0.002	-0.000	0.015	0.075***	-0.034
	(0.004)	(0.004)	(0.006)	(0.023)	(0.021)	(0.028)
Exp $>$ 1 *Post Feb12	0.010		0.010	0.222***		0.278***
	(0.008)		(0.009)	(0.038)		(0.045)
Ever ICR $<$ 1*Post Feb12	0.038***		0.054***	0.123***		0.181***
	(0.010)		(0.011)	(0.039)		(0.046)
Ever ICR $<$ 1*Exp $>$ 1	-0.010	0.000	-0.017**	0.143***	0.203***	0.089**
	(0.007)	(0.006)	(0.008)	(0.034)	(0.031)	(0.041)
Ever ICR $<$ 1*Exp $>$ 1*Post Feb12	0.039***		0.045***	0.305***		0.360***
	(0.013)		(0.015)	(0.062)		(0.071)
Exp $>$ 1 *Post IBC		-0.002	0.001		0.033	0.147***
		(0.005)	(0.007)		(0.026)	(0.033)
Ever ICR $<$ 1*Post IBC		0.019***	0.041***		0.060**	0.144***
		(0.007)	(0.009)		(0.027)	(0.035)
Ever ICR $<$ 1*Exp $>$ 1*Post IBC		-0.001	0.016		0.046	0.163***
		(0.009)	(0.011)		(0.042)	(0.052)
No. of Obs.	143497	143497	143497	143497	143497	143497
R squared	0.69	0.68	0.69	0.67	0.66	0.67
Dep. Var. Mean		0.15	0.11	6.70	7.68	5.47
Industry-Time FE	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Borrower-FE	Y	Y	Y	Y	Y	Y

Table 6: Exploiting the size threshold and within-firm variation to examine the causal impact of the bankruptcy reform and regulatory intervention on NPA recognition

This table shows the baseline effect of the IBC and the February 12 circular using a triple difference specification, with a focus on borrowers that have more than one banking relationship. The unit of observation is bank-borrower. The outcome of interest in columns (1)-(3) is a dummy equaling 1 if the borrower is reported as a Non-Performing Asset (NPA) by the bank and in Columns (4)-(6), it is the logged amount of the loan being recognized as an NPA. A borrower is considered to be a zombie borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Exp > 1* is a dummy equalling 1 if the exposure of a borrower is greater than 1 billion, *Post Feb12* is a dummy equaling 1 for all quarters post December 2017 and *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017. All specifications include time varying bank covariates, and 2-digit industry-time, bank, borrower and an additional borrower-time fixed effects. Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:		1_{NPA}			Log (NPA)	
Exp $>$ 1	0.001	0.002	0.001	0.029	0.077***	-0.022
	(0.004)	(0.003)	(0.005)	(0.022)	(0.019)	(0.024)
Exp $>$ 1 *Post Feb12	0.002		0.003	0.186***		0.237***
	(0.005)		(0.006)	(0.028)		(0.032)
Ever ICR $<$ 1*Exp $>$ 1	-0.010	-0.008	-0.018**	0.149***	0.157***	0.084**
	(0.007)	(0.006)	(0.008)	(0.036)	(0.032)	(0.040)
Ever ICR $<$ 1*Exp $>$ 1*Post Feb12	0.022**		0.029***	0.208***		0.273***
	(0.009)		(0.011)	(0.051)		(0.060)
Exp $>$ 1*Post IBC		0.000	0.002		0.047*	0.143***
		(0.006)	(0.006)		(0.028)	(0.033)
Ever ICR $<$ 1*Exp $>$ 1*Post IBC		0.014	0.023**		0.144***	0.215***
		(0.010)	(0.011)		(0.049)	(0.057)
No. of Obs.	97220	97220	97220	97220	97220	97220
R squared	0.88	0.88	0.88	0.86	0.86	0.86
Dep. Var. Mean		0.18	0.10	7.74	9.53	5.68
Industry-Time FE	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Borrower-FE	Y	Y	Y	Y	Y	Y
Borrower-Time FE	Y	Y	Y	Y	Y	Y

Table 7: Heterogeneity in the impact of the bankruptcy reform and regulatory reform across bank health

This table compares the impact of the February 12 circular and the IBC on the likelihood of borrowers being recognized as NPA. The unit of observation is bank-borrower. The outcome of interest in each instance is a dummy equaling 1 if the borrower is reported as an NPA by the bank. A borrower is considered to be a zombie borrower if its *ICR* (Interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Post Feb12* is a dummy equaling 1 for all quarters post December 2017; *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017. Column (2) restricts the sample to borrowers lending from banks in the bottom quartile of CRAR; column (3) restricts the sample to borrowers lending from banks in the top quartile of CRAR; column (4) restricts the sample to borrowers lending from banks in the middle two quartiles of CRAR. Quartiles of CRAR are based on the average bank CRAR between 2009 and 2014. All specifications include time varying bank covariates, and borrower, 2-digit industry-time, and bank fixed effects. Standard errors are clustered by firm bank.

	(1)	(2)	(3)	(4)
			Pr(NPA = 1)	
	All Banks	CRAR <25pc	CRAR >75pc	CRAR 25-75pc
Exp $>$ 1 *Post Feb12	.0024	-.0215	-.0014	.0142
	(.0091)	(.0243)	(.0168)	(.0143)
Ever ICR $<$ 1*Post Feb12	.0692***	.0205	.0865***	.0671***
	(.0113)	(.0288)	(.0251)	(.0166)
Ever ICR $<$ 1*Exp $>$ 1*Post Feb12	.0338***	.1019***	.0313	.0551***
	(.0144)	(.0359)	(.0322)	(.0212)
Exp $>$ 1 *Post IBC	.0039	-.0114	.0015	.0071
	(.0070)	(.0195)	(.0120)	(.0108)
Ever ICR $<$ 1*Post IBC	.0468***	.0101	.0786***	.0379***
	(.0086)	(.0217)	(.0196)	(.0124)
Ever ICR $<$ 1*Exp $>$ 1*Post IBC	.0144	.0168	.0037	.0264*
	(.0108)	(.0262)	(.0248)	(.0156)
Observations	140027	27973	26096	74743
R^2	.69	.73	.67	.69
Dependent Variable Mean	.21	.21	.21	.21
Industry-Time FE	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Borrower-FE	Y	Y	Y	Y

Table 8: Credit reallocation to high rated firms

	(1)	(2)	(3)	(4)	(5)	(6)
	Exposures (Log)					
	Borrower FE			Borrower-Time FE		
Exp $>$ 1	1.0548***	1.0459***	1.0419***	1.0878***	1.1026***	1.0367***
	(.0100)	(.0141)	(.0168)	(.0151)	(.0215)	(.0255)
Exp $>$ 1 *Post Feb12	.0798***	.0999***	.0393**	.0739***	.1212***	.0231
	(.0084)	(.0124)	(.0163)	(.0161)	(.0247)	(.0273)
Ever ICR $<$ 1*Post		.0002			.0000	
		(.0107)			(.)	
Ever ICR $<$ 1*Exp $>$ 1		.0158			-.0263	
		(.0195)			(.0290)	
Ever ICR $<$ 1*Exp $>$ 1*Post		-.0381**			-.0976***	
		(.0167)			(.0318)	
Investment Grade			-.0639***			-.1201***
			(.0119)			(.0230)
Unrated			-.0604***			-.0934***
			(.0107)			(.0211)
Post Feb12*Investment Grade			.0093			-.0465
			(.0137)			(.0327)
Post Feb12*Unrated			.0251*			-.0025
			(.0132)			(.0277)
Exp $>$ 1*Investment Grade			.0226			.0775***
			(.0186)			(.0294)
Exp $>$ 1*Unrated			.0066			.0503*
			(.0186)			(.0302)
Exp $>$ 1*Post Feb12*Investment Grade			.0528**			.0739**
			(.0210)			(.0369)
Exp $>$ 1*Post Feb12*Unrated			.0451**			.0613*
			(.0220)			(.0371)
Observations	138299	138299	96079	62923	62923	46354
R^2	.86	.86	.86	.86	.86	.86
Dependent Variable Mean	53.32	52.99	53.27	57.36	57.98	58.26
Industry-Time FE	Y	Y	Y	N	N	N
Bank FE	Y	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	N	N	N
Time FE	Y	Y	Y	N	N	N
Borrower-Time	N	N	N	Y	Y	Y

This table shows the impact of the February 12 circular on borrowers' exposures. The unit of observation is bank-borrower. The outcome of interest in each instance is the logged quarterly exposure of the borrower from the bank (in 2011 Rupees). A borrower is considered to be a zombie borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. Investment grade refers to borrowers being rated between AAA and BBB; unrated borrowers are those who don't have a rating. Columns (1)-(3) include borrower and time fixed effects, columns (3)-(6) include borrower-time fixed effects. All specifications include borrower-specific time varying covariates and bank fixed effects. Columns (1)-(3) also include 2-digit industry-time fixed effects. The sample in columns (4)-(6) is restricted to borrowers who transact with at least 3 banks in each quarter. Standard errors are clustered by firm bank.

Table 9: Spillover effects due to zombie decongestion in industries

	(1)	(2)	(3)	(4)
	Exposures (Log)			
	Non-Distressed Industry	Distressed Industry	Non-Distressed Industry	Distressed Industry
Exp $>$ 1	1.0899***	.9704***	1.0434***	1.0326***
	(.0180)	(.0213)	(.0314)	(.0198)
Exp $>$ 1 *Post Feb12	.1471***	.0862***	.0934***	.0233
	(.0170)	(.0174)	(.0313)	(.0185)
Ever ICR $<$ 1*Post	-.0048	-.0182		
	(.0178)	(.0127)		
Ever ICR $<$ 1*Exp $>$ 1	-.0302	.0818***		
	(.0303)	(.0266)		
Ever ICR $<$ 1*Exp $>$ 1*Post	-.0776***	-.0152		
	(.0288)	(.0216)		
Investment Grade			-.0850***	-.0518***
			(.0184)	(.0152)
Unrated			-.0612***	-.0643***
			(.0175)	(.0131)
Post Feb12*Investment Grade			.0747***	.0034
			(.0227)	(.0170)
Post Feb12*Unrated			.0777***	.0169
			(.0228)	(.0162)
Exp $>$ 1*Investment Grade			.0776**	-.0329
			(.0335)	(.0227)
Exp $>$ 1*Unrated			-.0286	.0182
			(.0347)	(.0219)
Exp $>$ 1*Post Feb12*Investment Grade			.0198	.0761***
			(.0363)	(.0261)
Exp $>$ 1*Post Feb12*Unrated			.0489	.0455*
			(.0384)	(.0271)
Observations	54754	83545	54754	83545
R^2	.79	.79	.79	.79
Dependent Variable Mean	217.10	199.52	217.10	199.52
Borrower FE	Y	Y	N	N
Time FE	Y	Y	N	N
Borrower-Time	N	N	Y	Y
Industry-Time FE	Y	Y	N	N
Bank FE	Y	Y	Y	Y

This table shows the impact of the February 12 circular on borrowers' exposures across industries with ex-ante high and low exposures to distressed borrowers. The unit of observation is bank-borrower. The outcome of interest in each instance is the logged quarterly exposure of the borrower from the bank (in 2011 Rupees). An industry is considered to be a distressed industry if its share of exposures to distressed borrowers exceeds that of the median industry in March 2015. A borrower is considered to be a zombie borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. Investment grade refers to borrowers being rated between AAA and BBB; unrated borrowers are those who don't have a rating. Columns (1)-(2) include borrower and time fixed effects, columns (3)-(4) include borrower-time fixed effects. All specifications include borrower-specific time varying covariates and bank fixed effects. Columns (1)-(2) also include 2-digit industry-time fixed effects. The sample in columns (3)-(4) is restricted to borrowers who transact with at least 3 banks in each quarter. Standard errors are clustered by firm bank.

Unearthing Zombies: Regulatory Intervention To Aid Legal Reform

Online Appendix

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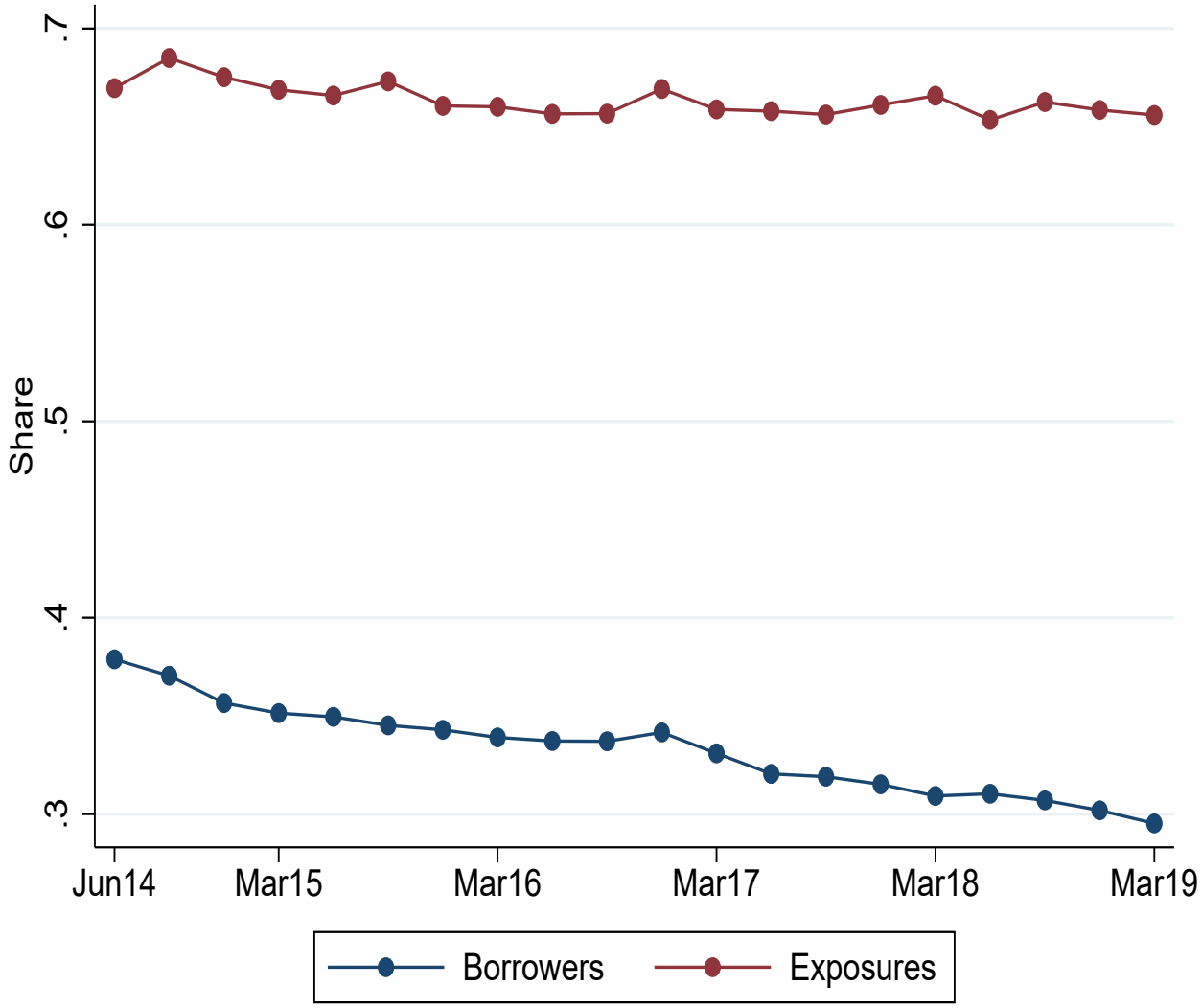
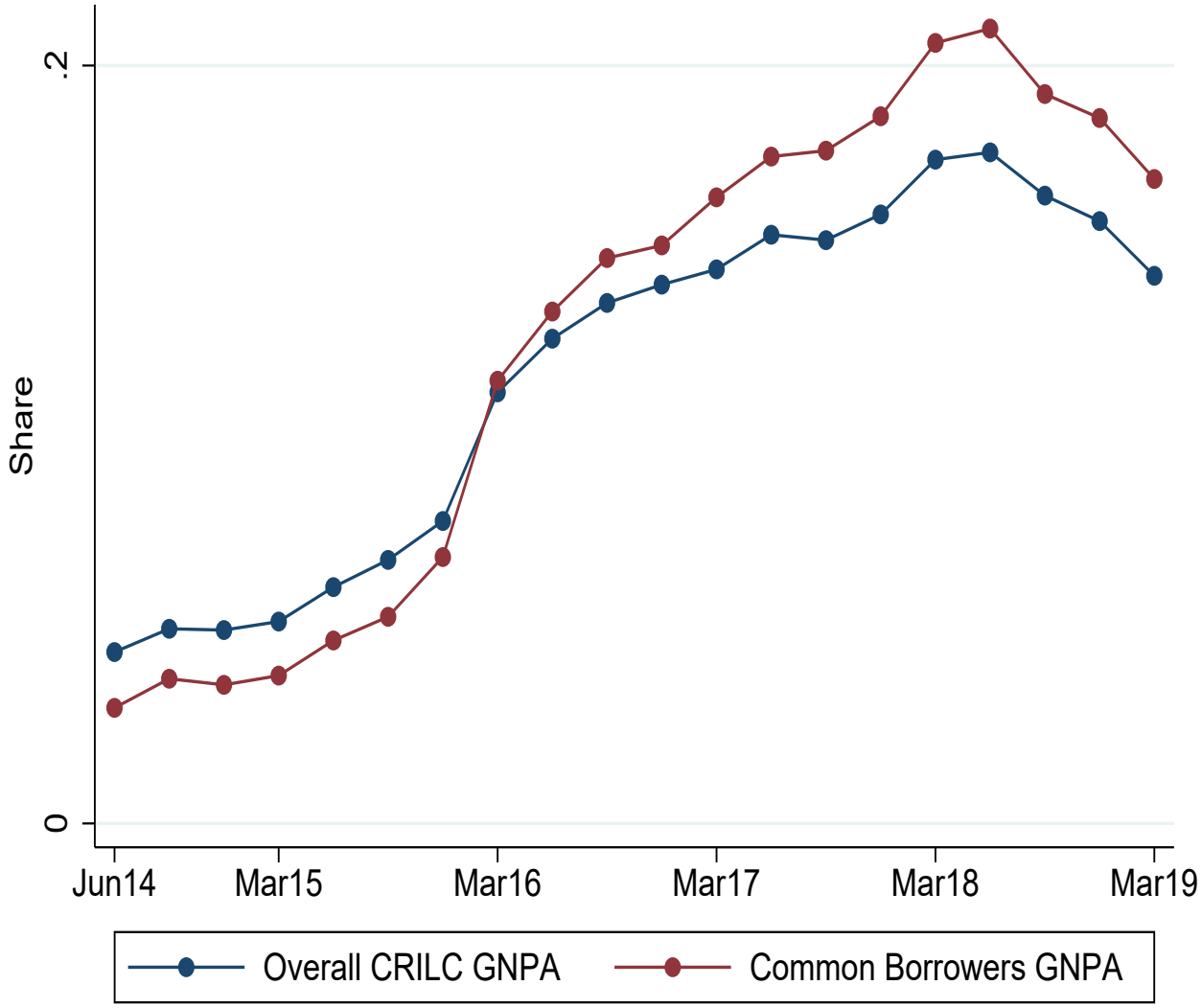
Figure A1: Borrowers Common to CRILC and Prowess as a Share of Total CRILC Borrowers and Exposures



This figure plots the quarterly trends in the fraction of borrowers common to both CRILC and Prowess and the share of exposures accounted by them, relative to the total outstanding exposures in CRILC.

Figure A2: Gross NPA Ratio Amongst Large Borrowers and Borrowers Common to CRILC and Prowess



This figure compares the quarterly trends in the gross NPA ratios for all CRILC borrowers, vis-a-vis borrowers common to both CRILC and Prowess.

Table A1: Regulatory Interventions and Borrower Asset Quality: Differential Treatment Effects Across Distressed Borrowers

	(1)	(2)	(3)	(4)	(5)	(6)
	Likelihood of Borrower Being					
	SMA2	SMA2	SMA2 Never NPA	SMA2 Never NPA	Standard	Standard
Exp $>$ 1	.0244***	.0107***	.0055***	.0021	-.0298***	-.0301***
	(.0030)	(.0032)	(.0018)	(.0017)	(.0036)	(.0048)
Exp $>$ 1 *Post Feb12	-.0322***	-.0055	-.0012	.0051	.0178***	.0124
	(.0043)	(.0045)	(.0030)	(.0031)	(.0064)	(.0089)
Ever ICR $<$ 1*Post Feb12		-.0417***		.0040		.0310***
		(.0063)		(.0063)		(.0101)
Ever ICR $<$ 1*Exp $>$ 1		.0229***		.0087**		.0018
		(.0056)		(.0040)		(.0069)
Ever ICR $<$ 1*Exp $>$ 1*Post Feb12		-.0465***		-.0159**		.0078
		(.0084)		(.0071)		(.0126)
Observations	140027	140027	80574	80574	140027	140027
R^2	.30	.30	.34	.34	.62	.62
Dependent Variable Mean	.08	.08	.03	.03	.76	.74

This table shows the impact of the February 12 circular on the likelihood of borrowers being in the SMA2 and Standard categories, and being in the SMA2 category if they have never been recognized as an NPA. The unit of observation is bank-borrower. The outcome of interest in columns (1) and (2) is a dummy equaling 1 if the borrower is reported as SMA2 in a quarter; in columns (3) and (4), the outcome is a dummy equalling 1 if the borrower has never been recognized as an NPA across the CRILC system between March 2015 and March 2019 and in coulumns (4) and (5), the outcome is a dummy equaling 1 if the borrower is reported as Standard in a quarter. A borrower is considered to be a zombie borrower if its *ICR* (interest coverage ratio) has been less than 1 in any year between 2012 and 2015. All specifications include borrower, industry-time and bank fixed effects, in addition to borrower-specific time varying covariates. Standard errors are clustered by firm bank.

Table A2: Regulatory Interventions and Borrower Asset Quality: Alternate Definition of Distressed Borrowers (Average ICR < 1)

	(1)	(2)	(3)	(4)
	NPA	SMA2	SMA2 Never NPA	SMA0
Exp > 1	.0010	.0190***	.0024	-.0331***
	(.0040)	(.0032)	(.0016)	(.0043)
Exp > 1 *Post Feb12	.0185***	-.0210***	.0066**	.0159**
	(.0072)	(.0045)	(.0028)	(.0078)
ICR < 1*Post Feb12	.0415***	-.0296***	.0122	.0188*
	(.0105)	(.0074)	(.0090)	(.0105)
ICR < 1*Exp > 1	-.0135*	.0129**	.0122**	.0091
	(.0073)	(.0065)	(.0056)	(.0075)
ICR < 1*Exp > 1*Post Feb12	.0206	-.0308***	-.0319***	.0063
	(.0141)	(.0101)	(.0100)	(.0133)
Observations	140027	140027	80574	140027
R^2	.69	.30	.34	.62
Dependent Variable Mean	.20	.11	.04	.63

This table shows the impact of the February 12 circular on the likelihood of borrowers being in the NPA, SMA2 and SMA0 categories. The unit of observation is bank-borrower. The outcome of interest in column (1) is a dummy equaling 1 if the borrower is reported as an NPA in a quarter; in column (2), the outcome is a dummy equalling 1 if the borrower is in the SMA2 category and in column (4), it is a dummy equalling 1 if the borrower is in the SMA0 category. In column (3) the outcome is a dummy equalling 1 if the borrower has never been recognized as an NPA across the CRILC system between March 2015 and March 2019 but is in the SMA2 category in a quarter. A borrower is considered to be a distressed borrower if its *ICR* (Interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Exp* is a dummy equalling 1 if the borrower has exposures greater than Rs 1 billion and *Post Feb12* is a dummy equaling 1 for all quarters post December 2017. All specifications include borrower, industry-time and bank fixed effects, in addition to borrower-specific time varying covariates. Standard errors are clustered by firm bank.

Table A3: Regulatory Interventions and Borrower Asset Quality: Alternate Definition of Distressed Borrowers (Average ICR < 1)

	(1)	(2)	(3)	(4)
			SMA2	
	NPA	SMA2	Never NPA	SMA0
Exp > 1	.0010	.0190***	.0024	-.0331***
	(.0040)	(.0032)	(.0016)	(.0043)
Exp > 1 *Post Feb12	.0185***	-.0210***	.0066**	.0159**
	(.0072)	(.0045)	(.0028)	(.0078)
ICR < 1*Post Feb12	.0415***	-.0296***	.0122	.0188*
	(.0105)	(.0074)	(.0090)	(.0105)
ICR < 1*Exp > 1	-.0135*	.0129**	.0122**	.0091
	(.0073)	(.0065)	(.0056)	(.0075)
ICR < 1*Exp > 1*Post Feb12	.0206	-.0308***	-.0319***	.0063
	(.0141)	(.0101)	(.0100)	(.0133)
Observations	140027	140027	80574	140027
R^2	.69	.30	.34	.62
Dependent Variable Mean	.20	.11	.04	.63

This table shows the impact of the February 12 circular on the likelihood of borrowers being in the NPA, SMA2 and SMA0 categories. The unit of observation is bank-borrower. The outcome of interest in column (1) is a dummy equaling 1 if the borrower is reported as an NPA in a quarter; in column (2), the outcome is a dummy equalling 1 if the borrower is in the SMA2 category and in column (4), it is a dummy equalling 1 if the borrower is in the SMA0 category. In column (3) the outcome is a dummy equalling 1 if the borrower has never been recognized as an NPA across the CRILC system between March 2015 and March 2019 but is in the SMA2 category in a quarter. A borrower is considered to be a distressed borrower if its *ICR* (Interest coverage ratio) has been less than 1 in any year between 2012 and 2015. *Exp* is a dummy equalling 1 if the borrower has exposures greater than Rs 1 billion and *Post Feb12* is a dummy equaling 1 for all quarters post December 2017. All specifications include borrower, industry-time and bank fixed effects, in addition to borrower-specific time varying covariates. Standard errors are clustered by firm bank.

Table A4: Baseline Effect of IBC and Feb 12 circular on NPA recognition: Excluding the “dirty dozen"

This table shows the baseline effect of the IBC and Feb 12 circular on probability of a loan being recognized as a non-performing asset (NPA) and amount of loan recognized as NPA.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	1_{NPA}				Log (NPA)			
Ever ICR $<$ 1*Post Feb 12	0.059***		0.294***					
	(0.007)		(0.035)					
Ever ICR $<$ 1*Post IBC		0.012**		0.052**				
		(0.005)		(0.023)				
No. of Obs.	140521	140521	140521	140521				
R squared	0.68	0.68	0.66	0.66				
Dependent variable mean	0.11	0.11		15.72				

Table A5: Exploiting the size threshold: Heterogenous Effect of Feb 12 circular and IBC on NPA for state-owned versus private sector banks

This table shows the baseline effect of the IBC and Feb 12 circular on the probability of a loan being recognized as a non-performing asset (NPA) and amount of loan recognized as NPA across firms with different sizes of exposures, using a triple difference specification.*Exp > 1* is a dummy equalling 1 if the exposure of a borrower is greater than 1 billion, *Post Feb12* is a dummy equaling 1 for all quarters post December 2017, *Post IBC* is a dummy equaling 1 for all quarters between December 2016 and December 2017 and *PSB* is a dummy equalling 1 if the bank is a public Sector Bank. Standard errors are clustered by firm bank

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:		1_{NPA}			Log (NPA)	
Exp $>$ 1	-0.009	-0.009	-0.017**	0.014	0.057**	-0.065
	(0.006)	(0.006)	(0.009)	(0.032)	(0.028)	(0.043)
Exp $>$ 1 *Post Feb12	0.021**	0.021**	0.029**	0.208***		0.294***
	(0.010)	(0.010)	(0.013)	(0.049)		(0.062)
Exp $>$ 1*PSB	0.003	0.003	0.008	0.091***	0.153***	0.087*
	(0.007)	(0.007)	(0.010)	(0.035)	(0.031)	(0.047)
Post Feb12*PSB	0.050***	0.050***	0.061***	0.134***		0.164***
	(0.010)	(0.010)	(0.012)	(0.039)		(0.048)
Exp $>$ 1 *Post Feb12*PSB	0.012	0.012	0.007	0.217***		0.221***
	(0.013)	(0.013)	(0.015)	(0.060)		(0.073)
Exp $>$ 1 *Post IBC			0.021**		0.075**	0.206***
			(0.011)		(0.036)	(0.050)
Post IBC*PSB			0.027***		-0.037	0.057
			(0.010)		(0.028)	(0.039)
Exp $>$ 1 *Post IBC*PSB			-0.011		-0.019	0.044
			(0.012)		(0.043)	(0.058)
No. of Obs.	143497	143497	143497	143497	143497	143497
R squared	0.69	0.69	0.69	0.66	0.66	0.66
Dep. Var. Mean		0.15	0.11	6.70	7.68	5.47