The Unintended Consequences of Regulatory Forbearance *

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Abstract

The Reserve Bank of India enacted a series of 'asset-quality' forbearance measures during the global financial crisis. Using a bank-firm matched dataset, we find that there is a strong positive correlation between bank- and firm-distress measures and evidence suggests that the forbearance measures encouraged stressed banks to channel credit to low-liquidity and low-solvency firms. Lending to zombie-firms increases and to healthy firms falls significantly for industries and banks with higher proportions of zombies. The data show that prolonged periods of forbearance on bank lending can have persistent effects on the structure of bank-firm relationships. Stressed banks end up in sticky matches with low-quality borrowers and healthy borrowers are more likely to migrate to private banks, foreign banks and non-banking companies in search. Overall, our results suggest that forbearance provided banks with an incentive to hide true asset quality and a license to engage in regulatory arbitrage. Thus, the build-up of stressed assets in the banking system is a by-product of accounting subterfuge.

Keywords: Banks, Stressed Assets, Regulatory Forbearance, Zombie Lending.
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1 Introduction

Incipient stress in loan accounts is a recurrent theme in India's banking system over the last decade[1]. The share of non-performing assets (NPA) and restructured assets (RA) in gross advances (GA) rose significantly between 2008 and 2018 (Figures 1 & 2). The data also show falling profitability and capital provisioning ratios accompanied by a collapse in credit especially for public sector banks.[2]

In this paper, we examine whether regulatory forbearance measures enacted by the Reserve Bank of India during the global financial crisis effectively handed over a license for banks to engage in regulatory arbitrage. We investigate whether the measures provided banks with an incentive to hide true asset quality, and therefore whether the build-up of stressed assets in the system is a by-product of accounting subterfuge. Using both bank and firm-level data, our primary goal is to examine the externalities and costs generated by regulatory forbearance.

Prior to 2008, commercial bank loan portfolios under the RBI's asset classification norms were broadly classified as "standard" (assets in good standing) or non-performing assets (NPAs). Additional sub-classification of NPAs depending on over-due principal and/or interest, further categorized bank assets as sub-standard, doubtful and loss assets. Standard advances restructured for delays or non-payment were immediately re-classified as sub-standard and NPAs re-classified to further lower categories such as from sub-standard to doubtful and so on.

However, in the aftermath of the global financial crisis, the RBI introduced a series of regulatory forbearance measures.[3] The rationale was to provide forbearance for liquidity rather than solvency problems in the form of temporary relief with respect to loan service

[1] https://www.epw.in/journal/2018/34/perspectives/non-performing-assets-commercial-banks.html

[2] A contemporaneous development is the declining credit quality of Indian firms. In a study, Ansari et al. (2016) find that over the sample time period, the aggregate interest coverage ratio for the corporate sector as a whole changes from a peak of 6.92 in 2007 to nearly half at 3.38 between 2008 and 2015. The study notes that the coverage ratio declines even whilst leverage is stable. Thus, the debt capacity of the Indian corporate sector declined measurably over the last decade.

[3] Forbearance refers to the act of granting a concession to the borrower by the lender bank, in view of some economic or legal reasons related to temporary financial difficulties being faced by the borrower.

payments. In particular, the forbearance measures permitted accounts of borrowers engaged in important business activities to retain their "standard" classification even after restructuring subject to certain conditions.[4] In the absence of forbearance, these assets would be classified as NPAs and immediately subject to higher capital provisioning requirements.

With respect to forbearance provision it is important to consider the following trade-off. For viable firms the use of forbearance can allow firms that are solvent but experiencing temporary liquidity problems to continue operations. However, the use of forbearance to avoid the "non-performing" classification or simply keeping zombie firms alive can lead to an inefficient allocation of resources and pose eventual problems for lenders. Therefore, forbearance can create dueling incentives. On the one hand, forbearance may enable borrowers to sustain the capacity to pay their debts during temporary difficulties, and provide a risk management tool for temporarily problematic loans of viable firms. On the other hand, forbearance can also provide a strategy to shield non-performing assets, thus reducing bank incentives to appropriately provision for and manage credit risk in loan portfolios[5].

This leads to a further observation about the the emergence of 'zombie' firms in the Indian corporate sector. In a study, of a sample of 3,112 non-financial companies from the Capitaline database, one-third had interest payments higher than earnings before interest and taxes in 2017. Acharya et al. (2018) show in the context of Europe that while zombie lending may be initially successful in that it can keep the troubled borrowers alive, in the long-run when forbearance is withdrawn many zombie firms will ultimately fail due to their significantly lower firm quality. There is therefore a fear that the lax regulatory policy of RBI between 2008-2015 may have led to increased lending by distressed banks to zombie firms crowding out more productive lending to healthy firms.[6]

We organize the analysis in four steps. First, we examine the relationship between the

[4]See Part B in `https://rbi.org.in/scripts/NotificationUser.aspx?Id=5090&Mode=0`

[5]https://www.bis.org/review/r180420e.htm

[6]Thus, the system suffers from a twin balance Sheet problem where both the banking sector and the corporate sector are under financial stress. While loan restructuring may be helpful when the underlying objective is ensuring the survival of viable units, it can provide an opportunity for regulatory arbitrage when high default probability loans get classified as good loans. In the case of India, there is a growing sentiment that the forbearance policy has led to the latter result.

timeline of the regulatory forbearance policy of the Reserve Bank of India, and the nexus between bank distress, and the liquidity/solvency status of the borrower firms. We begin by classifying banks into stressed or 'bad' banks and 'good' banks based on the proportion of non-performing loans in the total gross advances lent out by the bank in 2007, i.e., before the introduction of forbearance policy by RBI. We then examine the relationship between bank level ratios and the proportion of low quality borrowers in the bank's portfolio, i.e. proportion of firms with low solvency measures and low liquidity measures in a bank's portfolio. Next, we analyze lending by stressed banks to low solvency and low liquidity firms following the implementation of the forbearance policy and whether the lending pattern changed once the policy was withdrawn.

Third, we examine the direct and spillover effects of regulatory forbearance on stressed bank lending to zombie firms and to healthy (or non-zombie) firms across industries.[7]. Finally, we also examine the real effects of the forbearance policy by analyzing the impact of stressed bank lending on the investment and employment outcomes of low-solvency and low-liquidity firms.

We begin by constructing a timeline of the RBI's forbearance stance by carefully parsing policy statements in a series of official circulars posted on the RBI website[8]. Next, we compile a matched firm-bank dataset with corresponding firm and bank fundamentals using annual data from Prowess CMIE. Prowess captures the financial statements from a wide universe of public and private Indian firms which we use to construct firm-level measures such as liquidity, solvency, firm size and so on. The bank-level measures of distress are constructed from the Basic Statistical Returns of Scheduled Commercial Banks (SCBs) in India published annually on RBI's website.

Using a matched dataset of firms and their lead banker, we cover over 8,000 firms over the period 2006-2016 in our analysis to evaluate the allocation of credit from stressed banks to low-quality borrowers.

[7]A firm is classified as a zombie if the firm received subsidized credit, i.e., the firm is able to borrow loans at an average interest rate that is lower than the Prime Lending Rate (PLR) of State Bank of India and has a debt-to-assets ratio greater than 0.15.

[8]https://rbi.org.in/Scripts/BS_CircularIndexDisplay.aspx

Our main findings are as follows. First, we find a strong positive correlation between firm- and bank-distress over the period 2006-2016. Simple univariate regressions show a statistically significant correlation between the proportion of low-liquidity and low-solvency firms in bank portfolios and the proportion of distressed assets on individual bank balance sheets, suggesting a strong co-incidence between bank- and firm-distress.

Secondly, we find that lending to low-solvency and low-liquidity borrowers increased following the implementation of forbearance measures. Surprisingly, we do not find that lending to low-solvency and low-liquidity borrowers declines following the withdrawal of forbearance. Using a triple interaction specification in a pooled regression setting, we show that indirect recapitalization schemes like forbearance in the classification of stressed loans may have encouraged banks to channel debt to not only to firms with low-liquidity but also to low-solvency borrowers. Relatedly, we also find evidence for a sticky match between stressed banks and low-solvency and low-liquidity borrowers. The pattern is consistent with the concern that prolonged periods of "asset-quality" forbearance on bank lending may have persistent effects.

Third, McGowan et al. (2018) suggest that there may be a policy dimension (including bank forbearance policies) to the problem of zombie lending prevalent in many countries. We focus on the match between zombie firms and stressed banks which may adversely affect the ability of healthy firms to borrow from these banks especially if the stressed banks also dominate lending to particular industries. We show that there is a statistically significant increase in zombie lending by stressed banks during the forbearance period. Also, debt levels for zombie firms borrowing from stressed banks doesn't fall significantly in the post-withdrawal period.

The above findings suggest that the lending norms that were relaxed in the forbearance period promoted loans from stressed banks to their existing low-quality borrowers and these loans likely enabled zombie firms to continue to service on their old loans, i.e., forbearance facilitated the ever-greening of previous loans. That the pattern does not appear to reverse or change once the forbearance withdrawal was announced suggests once again the potentially

persistent effects of policies that relax lending norms.

A consequence of lending to zombie-firms is healthy firms may be crowded out and the spillover effects of zombie lending could reduce healthy firms' access to bank credit (Caballero et al. (2008b)). To test this hypothesis, we examine the 'spillovers' to the leverage ratios of higher quality borrowers in industries that have a high proportion of zombie firms and also on the lending of banks with high proportions of zombie firms in their portfolios. We find that the borrowings of non-zombie firms, in industries with high proportions of zombie firms, decline significantly during the forbearance period and the post-withdrawal phase shows no significant change or visible increase in the borrowings of non-zombies. Similarly, the borrowings of healthy firms decline significantly as the proportion of zombies in the lending portfolios of their bankers increase.

Finally, we examine the real effects of the forbearance policy by looking at real investment and employment. We find that capital expenditures by low-solvency firms borrowing from stressed banks declines significantly during the forbearance phase. Moreover, the wage bill for these firms is positively and statistically significantly correlated with the implementation of forbearance suggesting that, in addition to repaying existing loans, low-quality borrowers may have used the new loans for wage payments.

We are, however, unable to discern any statistically significant patterns in the capital expenditures or wage expenditures for low-liquidity firms in the forbearance or withdrawal periods. The overall pattern of results suggest that forbearance may have had the unintended consequence of propping up low solvency firms rather than firms facing temporary liquidity constraints as originally intended. We also make a novel contribution by showing evidence of a sticky match between stressed banks and low-quality borrowers that strengthened during times of forbearance.

Related Literature: Similar to the behavior of weakly-capitalized Japanese banks during the Japan's banking crisis, Acharya et al. (2018) show that following ECB's Outright Monetary Transactions (OMT) policy the banks extended new (subsidized) loans at advantageous conditions to provide their existing impaired borrowers with the liquidity necessary

to meet payments on other outstanding loans. Thereby, these banks avoided (or at least deferred) realizing immediate loan losses in the hope that the respective borrowers would eventually regain solvency. We analyze spillovers in a very similar way. Our paper is also related to the literature that analyzes the impact of explicit bailouts on bank lending, whose findings are rather mixed. For example, Cong et al. (2019) show that implicit government guarantees for state-connected firms become more prominent during recessions while Laeven and Valencia (2018) provide evidence that banking crises last longer in presence of bank guarantees. To our knowledge this is the first paper to directly examine the impact of forbearance on the intensive and extensive margin of the banks. Our nearest neighbor is Acharya et al. (2018) paper, which looks at the impact of unconventional monetary policy in Europe on these margins.

The paper is also related to the literature on marginal banks, namely, banks close to their minimum capital requirement may be reluctant to recognize bad loans either due to sunk costs or due to soft budget constraints.[9] Peek and Rosengren (2005) examine the misallocation of credit in Japan due to the perverse incentives faced by marginal banks to provide additional credit to severely impaired borrowers so as to avoid recognizing losses on their balance sheets. Marginal banks can continue to evergreen loans (also known as "extend and pretend" loans), in the hope that firms recover in the future. These banks are essentially gambling for resurrection, but such zombie-lending can distort competition by subsidizing credit to inefficient firms. Blattner et al. (2019) confirm similar patterns and show how a weak banking sector contributed to low productivity growth following the European sovereign debt crisis. Storz et al. (2017) show that zombie firms connected to weak banks in the periphery countries of the Euro area become further indebted. Sustainable economic recovery therefore requires the deleveraging of both banks and firms

In terms of negative spillovers of zombie firms on rest of the economy, Caballero et al. (2008a) look at Japan and show that healthy firms in zombie-dominated industries exhibit

[9]For example, with sunk costs and ex-ante asymmetric information, Dewatripont and Maskin (1995) theoretically motivate how banks may continue lending to inefficient borrowers even after the borrower type is revealed. Such inefficient lending may also arise due to soft budget constraints as in Peek and Rosengren (2005).

depressed investment and employment. Further, zombie dominated industries also have lower productivity growth. Giannetti and Saidi (2018) explore whether the extent to which lenders internalize the negative spillovers of industry downturns affects their decisions to provide liquidity in periods of distress. Andrews and Petroulakis (2019) explore the connection between 'zombie' firms and bank health.[10] McGowan et al. (2018) argue that it has become easier for weak firms to remain in the market, while more productive firms are less likely to expand. Banerjee and Hofmann (2018) find that zombies are a drag on economic performance because they are less productive so that their presence lowers investment and employment in more productive firms.[11] In addition, there is a growing concern that zombie firms may be holding back potential growth in a number of countries, including Japan (Caballero et al. (2008b)), and the Europe (Acharya et al. (2018)), (Gopinath et al. (2017)).

We also contribute to the novel literature on tackling zombie firms in the economy. Papers in this emerging literature show the prevalence of zombie lending in advanced economies and argue that more intrusive bank supervision can mitigate zombie lending (Bonfim et al. (2019)). Keuschnigg et al. suggest that insolvency regimes that encourage corporate restructuring will enhance measures to strengthen bank balance sheets.

In a similar vein to Acharya et al. (2018), Gropp et al. (2018) analyze the impact of the recapitalization of distressed banks through TARP in the US during the global financial crisis, and show that regions with higher regulatory forbearance had lower productivity growth.[12] In line with these results, we find that regulatory forbearance results in depressed wage growth and capital expenditures for healthy firms. In addition, we show that the effects of forbearance are persistent and do not revert once forbearance measures are retracted. This is consistent with models where frictions to creative destruction processes also predict weak

[10]Indirect means of forbearance include beneficial restructuring, maturity extension or conversion of the payment structure (from regular installments to a lump-sum payment at maturity) and may be more prevalent in developing countries like India.

[11]Further, the study emphasizes that there may be a policy dimension to this problem including structural policy weaknesses (e.g., inadequate insolvency regimes), bank forbearance, loose monetary policy and impaired banking systems, and the persistence of crisis-induced support to small and medium enterprises.

[12]Consistent with the cleansing recessions hypothesis, Gropp et al. (2018) show that regions with higher regulatory forbearance during the crisis experienced slower productivity growth with depressed job creation, employment and wage growth.

recovery (Caballero (2007) and Caballero et al. (2008a)). We also hypothesize that forbearance measures may permanently change industry structure by altering the composition of credit to zombie versus healthy firms.

The paper proceeds as follows. Section 2 provides background details of the RBI's forbearance policy in the aftermath of the global financial policy. Section 3 describes our data sources and presents summary statistics. Section 4 presents our findings on (i) the lending patterns to low-solvency and low-liquidity borrowers following the implementation and withdrawal of forbearance; (ii) lending to zombie firms; (iii) the spillovers to healthy firms, and (iv) the real effects of forbearance. Section 5 concludes.

2 Regulatory Forbearance in the Aftermath of the Global Financial Crisis

This section describes the regulatory forbearance policies implemented by the Reserve Bank of India. In August 2001, the Reserve Bank of India (RBI) introduced the Corporate Debt Restructuring (CDR) mechanism which allowed syndicates or consortium of lenders to restructure the debt of corporate firms. The policy specifically targeted multiple banking accounts/syndication/consortium accounts of corporate borrowers with outstanding exposure of banks and institutions greater than Rs.10 crore. Recognizing the difficulties in reaching an agreement among different lending institutions, the policy specifically targeted exposures involving more than one lender under consortium or multiple banking arrangements. The rationale was that the CDR scheme would allow restructuring of loans to otherwise viable firms and would thus help minimize losses to the both borrowers and creditors through an orderly and coordinated restructuring program.

With the onset of the global financial crisis (GFC), in August 2008 the RBI put in place the 'Special Regulatory Treatment' for the restructuring of debt where following restructuring, lending institutions did not need to downgrade asset quality. This forbearance measure was intended to help viable firms tide over temporary idiosyncratic shocks arising due to the

spillovers of the GFC. The "asset quality" forbearance increasingly became a route to avoid recognizing nonperforming loans.[13] Banks increasingly resorted to the restructuring of loans to postpone the recognition of NPAs, sometimes referred to as 'extend and pretend', rather than for the effective resolution of viable firms originally intended by the scheme.

As the December 2014 Financial Stability Report by RBI also notes, while regulatory forbearance may have been justified during major crisis periods, forbearance for extended periods of time potentially lead to moral hazard problems. It also noted that as India moved towards implementing Basel II norms accounting discretion such as restructuring would subsequently have no impact on capital requirements. Therefore, in May 2013 forbearance on asset classification was withdrawn effective April 1, 2015.

However, since the period was also marked by a sharp rise in bank NPAs, the RBI allowed for some exceptions and loans under certain schemes[14] could still continue to classify assets restructured under these schemes as standard assets thus taking advantage of the lower provisioning requirements for standard assets. [15]. On 12th February, 2018 all forbearance and restructuring schemes were completely withdrawn.

Forbearance measures can therefore be broadly classified into two phases, a phase starting August 2008 and ending May 2013 where forbearance increased and a second phase beginning May 2013 and ending April 2019 wherein forbearance declined. Table 1 summarizes the major policy events and the direction of increases and decreases in forbearance for the period 2008–2016. Although the individual forbearance measures incrementally increased and decreased forbearance, we classify years into a phase I of increasing forbearance and a phase II of declining forbearance to reflect the broad level of forbearance between 2008-2016.

[13]See `https://www.bis.org/review/r180420e.htm`

[14]Specifically, these schemes refer to the Strategic Debt Restructuring (SDR), Flexible Structuring of Project Loans and the Scheme for Sustainable Structuring of Stressed Assets (S4A)

[15]Source: https://www.bis.org/review/r180420e.htm

3 Data

We use bank- and firm-level data from the Prowess database. Prowess covers both publicly listed and unlisted firms from a wide cross-section of manufacturing, services, utilities, and financial industries from 1989-2019. About one-third of the firms in Prowess are publicly listed firms. The companies covered account for more than 70% of industrial output, 75% of corporate taxes, and more than 95% of excise taxes collected by the Government of India (CMIE). The database also provides information about public, private and foreign banks.

The advantage of detailed balance sheet and ownership data at the firm level is the information it provides on a number of variables, such as sales, profitability, and assets for an average of almost 49,384 firms as of 2019. Prowess also provides bank-level data built from the standalone annual financial statements of individual banks. The data are particularly well suited for understanding how banks and firms adjust over time and how their responses may be related to policy changes such as the forbearance policy.

For our analysis we use a sample period from 2006-2016. We end the sample in March 2016 to avoid the confounding the results with the demonetization policy announced in November, 2016. Throughout the sample we distinguish between the phase after introduction of forbearance in 2008 and the phase after withdrawal was announced in 2013.

Prowess covers firms in the organized sector, which refers to registered companies that submit financial statements. According to the government, "the organized sector comprises enterprises for which the statistics are available from the budget documents or reports, etc. On the other hand the unorganized sector refers to those enterprises whose activities or collection of data is not regulated under any legal provision or do not maintain any regular accounts" ("Informal Sector in India: Approaches for Social Security," Government of India, 2000, p. 2). The 1956 Companies Act requires Indian firms to disclose information on capacities, production, and sales in their annual reports. All listed companies are included in the database regardless of whether financials are available.

The Indian NIC system (2008)[16] system classifies firms in the Prowess dataset by in-

[16]http://mospi.nic.in/classification/national-industrial-classification

dustry. The data include firms from a wide range of industries, including mining, basic manufacturing, financial and real estate services, and energy distribution.

Another advantage of the bank- and firm-level data is that detailed balance sheet information allows us to analyze how the forbearance policy affects banks according to their loan portfolios of firms distinguished by solvency and liquidity status. The data allow us to compile a sample of non-financial Indian firms matched with their bankers so that the nature of matching can be explored using the borrower and bank level characteristics. Prowess also provides data on stock market returns and financial performance variables like current assets, current liabilities, debt, cash flows, interest expenses, and so on. We use the financial variables to construct firm-level measures of quality i.e. liquidity and solvency. We also use information on real variables like the change in gross fixed assets and the wage bill of a firm to examine the real effects of the forbearance policy changes.

The firm-level data is matched with the bank-level information obtained from annual Bank Statistical Returns (BRS) available from the Reserve Bank of India's website. The publicly available version has bank-level balance sheet data and common variables such as industry classification, credit, deposits, NPAs, restructured advances, etc.

In 2016, there were 27 public sector banks, 21 private sector banks and 49 foreign banks in the Indian banking system.[17]. In terms of market share, public sector banks account for almost 70%, private sector banks account for almost 23% and the remaining 7% is held by foreign banks. Figure 2 shows that asset quality has declined significantly post-2013 and more so for public sector banks. With this motivation, we restrict our sample of lenders to public and private sector banks. We construct bank-level measures of performance using this dataset.

The fiscal year for a vast majority of Indian firms ends in March. However for some firms the data are released on a quarterly basis as well. The bank-level data is, however, released at the end of March every year. To ensure that we use the latest available information

[17]In addition there were 56 regional rural banks, 1,562 urban cooperative banks and 94,384 rural cooperative banks, and cooperative credit institutions–these banks are excluded from our analysis as they do not lend to the firms in our sample.

about each firm we use the latest date in a financial year for firms' financial variables. We also drop observations with missing values for the variable total assets which is a central variable required for the computation of many variables used in our main analysis. In our final, cleaned dataset, we have a total of 39,227 observations of firm-bank pairs over the years 2006-2016 with a set of 8,609 unique firms covered in the sample. All the regression estimations are run over this sample.

To identify zombie firms, we require a minimum benchmark lending rate for prime borrowers. We use the Prime Lending Rate (PLR) charged by State Bank of India as the benchmark minimum interest rate. The prime lending rate is the rate at which banks are willing to lend to highly-rated borrowers. We use the *minimum* prime lending rate as a conservative estimate of the interest rates at which even the most creditworthy borrowers can borrow.

3.1 Constructing Borrower and Bank-Level Measures

In the formal analysis, we examine both bank and borrower-level responses to the forbearance policy to examine whether bank lending to low-quality firms changed and whether banks used the asset classification benefits to their advantage. In other words, did the forbearance provide an opportunity for regulatory arbitrage? Consistent lending increases to low-solvency and zombie firms following the announcement of forbearance could indicate that the firms were distressed were due to fundamental economic problems and not due to temporary liquidity constraints. Next, we describe the construction of our borrower-level measures from the firm-level data and the bank-level measures.

3.1.1 Borrower-Level Measures

We begin with measures of borrower-level liquidity and solvency indicators. Liquidity ratios are based on the portions of the company's current assets and current liabilities taken from firm balance sheet and indicate the ability to repay short term obligations. We consider the Quick Ratio (Current Assets-Inventory/Current Liabilities) and the Cash Ratio (Cash to

Current Liabilities) as measures of liquidity. The higher the value of these ratios, the more comfortable the firm is with respect to short term survival and cash availability.

The solvency measures indicate the long term survival potential firms. To measure solvency, we use Debt-to-Equity[18] Ratio, Debt to Assets ratio and Altman Scores using Emerging Market weights Following Alfaro et al. (2017), lower Altman Z-scores are associated with greater vulnerability and likelihood of bankruptcy. Companies with EM Z-scores greater than 6.25 are considered to be in the 'safe zone', scores between 5.85 and 3.75 indicate vulnerability, and scores below 3.75 indicate that the firm is in a state of distress. Similarly, the Debt to Equity ratio signals the extent of leverage and measures the ability to repay long term obligations. The lower the ratio, the more comfortable is the leverage position of the firm. The measures are winsorized at 95% level for every year to avoid major outliers from biasing the averages.

Table 2 shows the summary statistics for the selected firm level ratios used in our analysis. We present the statistics for high and low quality borrowers by: solvency, liquidity and zombie status. We also test for the significance of the difference in means between the high and low quality groups. Panel A shows the summary statistics by solvency and liquidity status. We observe that firms classified as low-solvency have significantly lower liquidity measures and significantly higher total debt compared to solvent firms. Similarly, low-liquidity firms also have significantly lower-solvency measures and lower aggregate debt levels compared to the liquid firms. Looking at the panel B which splits the sample via zombie status we see significantly higher aggregate debt, significantly lower interest coverage ratio [19] , significantly higher leverage ratios and lower liquidity ratios for zombie firms compared to the non-zombies in the sample. For the empirical specifications, we use the above median cut-off of debt to equity ratio for indicating low-solvency firm and below median cut-off of cash ratio for indicating low-liquidity. We defer the detailed definitions to the next section.

[18] Assets = Liabilities + Shareholder Equity

[19] Note that our baseline zombie firm definition does not depend on interest coverage ratio.

3.1.2 Bank-Level Measures

At the bank level, we require a measure that can capture the effect of regulatory forbearance on the bank's portfolio of assets. We begin by constructing bank-level portfolios by first collapsing the matched bank-firm dataset at the bank level to compute the total number of borrowers attached to each bank. Next, we map the bank-level information from the RBI, namely, Gross Advances (GA), Restructured Advances (RA) and Non-Performing Advances (NPA) to our collapsed dataset by bank and year to compute the measures as follows.

We construct the 'Hidden Assets Ratio', or the proportion of restructured assets in the total pool of distressed assets of a bank. It is computed as the restructured assets as a proportion of restructured and non-performing assets on a bank's balance sheet ($\frac{RA}{DA}$). Given that more granular level data is not available for tracking the overtime evolution of loans across the different loan classification categories like standard and non-standard[20], we use this measure with the caveat that this is an overestimate of the potential hiding of bad loans by banks in India. For the purpose of our analysis, we define Distressed Assets as the sum total of non-performing loans (NPAs) and restructured loans (RA) in any given year. This is the proportion of potentially bad loans hidden as RAs and declared bad loans as NPAs by banks. We compute the measure as as the fraction of restructured assets and non-performing assets ad a proportion of gross advances by bank ($\frac{DA}{GA}$). Similarly, we compute the NPA ratio as the ratio of non-performing assets to gross advances ($\frac{NPA}{GA}$).

Figure 2 plots the evolution of these measures between 2006-2016, further split by ownership, into public and private banks. Panel A depicts $\frac{RA}{DA}$ steeply rising post 2008 until 2013 indicating that banks used the forbearance policy heavily, reflected in the rising levels of restructured loans. Panel B depicts $\frac{DA}{GA}$, increasing significantly post-2008 and continuing to do so in the post-2013 period indicating the rapidly rising levels of distressed loans. Panel C depicts $\frac{NPA}{DA}$. We can interpret this ratio as the proportion of loans correctly recognized as bad loans. The ratio hovered at relatively low levels till 2013 following which it spikes

[20]RBI annually publishes the aggregate volume of loans in standard and NPA buckets for each bank but does not disclose how an individual loan transitions over years from one bucket to another. We also do not know at the firm level that if that firm's loan has been classified as NPA.

up pretty quickly indicating a transfer restructured assets to the non-performing category (i.e., from Panel A to Panel C). At present, NPAs are almost 10% of total advances of the Indian Banking sector-significantly higher than other emerging markets. Also note that the non-performing loans are significantly higher for public sector banks compared to private sector banks.

Table 3 displays the correlation between the proportion of firms in a bank's portfolio with low-liquidity and low-solvency and the proportion of distressed assets of the bank using simple uni-variate regressions in the panel data ranging from 2006-2016. Panel A (Panel B) shows the coefficients from regression of $\frac{DA}{GA}$, $\frac{RA}{DA}$ and $\frac{NPA}{GA}$ for different measures of low-solvency (low-liquidity). For example, HighDE2 measures the proportion of firms in a bank's portfolio with leverage ratio above two, an accepted definition of 'too high' for leverage. LowCash1 measures the proportion of firms in a bank's portfolio with cash ratio below one as a measure of liquidity constraints. $Q1$ refers to the proportion of low-solvency (or low-liquidity) firms[21] in the bottom 25% and $Q2$ refers to the proportion of low-solvency (or low-liquidity) firms in the bottom 50% of the distribution of relevant firm-level measure in a year. We see significant positive correlation coefficient across all measures of solvency and liquidity suggesting a strong co-incidence of bank- and firm distress. We see these statistically significant and positive correlation coefficients as preliminary evidence for our hypothesis that there may be a time-invariant sticky match between stressed banks and low-quality borrowers.

4 Methodology and Results

Given the likely overlap in the set of low-liquidity firms, low-solvency and zombie credit firms suggests that the forbearance policies may have been an indirect subsidy for low solvency firms who may have not been viable without forbearance. In Table 4 we display the overlaps between the three measures. The confusion matrices dissect the patterns in lending of

[21]We use Debt to Equity Ratio (HighDEQ4, (HighDEQ2, (HighDE2) for indicating low solvency; We use Cash ratio (LowCashQ1, LowCashQ2, LowCash1) to indicate low-liquidity.

stressed banks. They lend more to low-solvency, low-liquidity and zombie credit firms compared to good banks. The set of high solvency but low-liquidity firms and low-solvency but low-liquidity firms is non-trivial. This is important because former constitute the 'intended' beneficiaries of the policy whereas the latter constitute the 'unintended' beneficiaries. A larger share of low-quality firms fall in the portfolio of stressed banks which signals the misallocation of credit by the stressed banks. In our empirical strategy discussed in this section, we test the statistical validity of these patterns. We begin with a pictorial description of our results in Figure 3.

4.1 Firm-level Borrowing

In Figure 3, we observe some striking patterns. In Panel(a), we see a steep expansion in the aggregate credit extended by banks classified as 'stressed' compared to 'good' banks. Though it could also be due to the fact that the stressed banks also are the dominant or systemically important institutions, hence, we need a deeper understanding of credit allocation in the financial sector. If the lending was extended to good quality borrowers then the expansion in credit may not necessarily be problematic. To address this concern, we do a visual inspection of how the aggregate credit is split between good and low quality borrowers where we use different criteria for low-quality of borrower firms: Zombie status (Panel b), Solvency (Panel c) and Liquidity (Panel d). Detailed definitions follow, but on first inspection we see that the credit extended to zombie firms show a steep sustained increase post 2008 whereas the healthy or good firms witness a sharp drop post withdrawal announcement of forbearance by RBI. There is no reversal in the trends for zombie firms after the retraction of forbearance. For the low-solvency firms there is a consistent increasing trend in credit borrowing relative to 2008 and simultaneously a very apparent decline in credit extended to solvent firms post 2008 . We do see a flattening of increase in credit around announcement of withdrawal for low-solvency firms and improvement in credit allocation for solvent firms. Finally, with regard to liquidity, we fail to observe a striking difference between the credit allocated to liquid and low-liquidity firms although we do see a bit of decline in credit extended to liquid

firms post withdrawal of forbearance. This is puzzling since the intended beneficiaries of the original forbearance policy allowances were targeted specifically to address firms with temporary liquidity issues.

Next we move from visual inspection to examine the firm-level dynamics in detail to formally test for the statistical significance of the patterns observed in Figure 3 above. Following Acharya et al. (2018) we use triple-interaction specifications for our variables of interest. First, we test whether lending to low-solvency borrowers increased following the implementation of forbearance measures. Specifically, we explore whether there is any evidence for a sticky match between stressed banks and low solvency borrowers. We estimate the following pooled specification:

$$\begin{aligned} Log(Debt_{j,t+1}) = \alpha_t + \gamma_j + \beta_1 * Stressed\,Bank_b * Low\,Solvency_{j,t} \\ + \delta_k \sum_{k=1}^{2} Stressed\,Bank_b * Forbearance_t^k + \eta_k \sum_{k=1}^{2} Low\,Solvency_{j,t} * Forbearance_t^k \\ + \zeta_k \sum_{k=1}^{2} Stressed\,Bank_b * Low\,Solvency_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \quad (1) \end{aligned}$$

where a bank is classified as $Stressed\,Bank_b$ if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007, i.e., before the introduction of forbearance policy by RBI. It is noteworthy that there is substantial overlap between the subset of banks we classify as stressed based on 2007 NPA ratio and the set of banks placed under the Prompt Corrective Action framework of RBI between February 2014 and January 2018. The Reserve Bank specified certain regulatory trigger points based on the capital to risk-weighted assets ratio (CRAR), the net non-performing assets (NPA) and Return on Assets (RoA), to initiate certain structured and discretionary actions with respect of banks hitting crossing these thresholds.[22]

A firm is classified as $Low\,Solvency_{j,t}$ in the year t if the debt-to-equity measure of the

[22](https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/PCAFR060514_4.pdf

firm in time period t is above median. A firm is classified as $Low\ Liquidity_{j,t}$ in the year t if the cash ratio measure of the firm in time period t is below median. The indicator variable $Forbearance^k = 1$ takes a value of 1 in the years following 2008 i.e. after the introduction of forbearance and $Forbearance^k = 2$ takes a value of 1 post 2013, i.e., after the announcement of withdrawal of forbearance by RBI. All specifications control for time-invariant borrower characteristics and time-varying firm size using log Sales.

The pooled estimation allows us to test the effects of the introduction and withdrawal of forbearance in the same regression specification. Our primary interest lies in the interaction coefficients, ζ_1 and ζ_2. The triple interaction coefficient ζ_1 measures the marginal change on a low solvency firm j's borrowing from a stressed bank b in the post-introduction phase (2009-2016) of our sample.

Note that in all the regression specifications, we also control for the main and pairwise and interaction terms if they are not absorbed by the fixed effects. For brevity we omit these interaction terms from the Tables display.

Table 5 summarizes the results. On average, we observe a positive and statistically significant coefficient of 0.384 in the log of borrowings of low-solvency firms from stressed banks in the increasing forbearance phase. To get a more granular understanding of marginal impacts of lending to low-solvency firms vs good quality firms, we estimated the margin effects for the above regressions. We compare the difference in margins for low solvency variable when it changes from 0 to 1 at (Stressed bank=1, Post Forbearance=1) and at (Stressed bank=0, Post Forbearance=1). The difference in margins is 7% higher lending to low-solvency firms. The triple interaction coefficient ζ_2 measures the marginal change on a low-solvency firm j's borrowing from a stressed bank b in the withdrawal (2014-2016) phase of our sample. The coefficient ζ_2 is insignificant. If the withdrawal of forbearance would curb lending to low-solvency firms, we would expect the borrowings of these firms to go down once the policy was retracted. The results signals a sticky match between bank lending and borrowing by low-quality borrowers even following the withdrawal of forbearance indicating perhaps the potentially persistent effects of having provided forbearance in the

first place.

Next we look at the liquidity-constrained firms. We estimate the following pooled specification:

$$Log(Debt_{j,t+1}) = \alpha_t + \gamma_j + \beta_1 * Stressed\,Bank_b * Low\,Liquidity_{j,t} + \delta_k \sum_{k=1}^{2} Stressed\,Bank_b * Forbearance_t^k + \eta_k \sum_{k=1}^{2} Low\,Liquidity_{j,t} * Forbearance_t^k + \zeta_k \sum_{k=1}^{2} Stressed\,Bank_b * Low\,Liquidity_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \quad (2)$$

Our interest is once again in the triple interaction coefficients ζ_1 and ζ_2. The triple interaction coefficient ζ_1 measures the marginal change on an average liquidity-constrained firm j's borrowing from a stressed bank b in the forbearance phase (2009-2016) of our sample. Table 5 summarises the results. We observe a positive and significant coefficient of 0.306 on the borrowings of an average low-liquidity firm from a stressed bank after introduction of forbearance. This result is robust after controlling for time-invariant bank and borrower characteristics as well as year effects. Again, difference in lending to liquid and low-liquidity firms from stressed banks based on the margins computation comes out to be a differential margin of about 4% higher loans to low-liquidity firms. The triple interaction coefficient ζ_2 measures the marginal change on a liquidty-constrained firm j's borrowing from a stressed bank b in the withdrawal (2014-2016) phase of our sample. Again, similar to solvency result, the coefficient ζ_2 is statistically insignificant whereas we might expect it to be negative once forbearance was withdrawn. The coefficient is consistent with the notion of persistence in the lending to low-quality borrowers not decreasing following the retraction of forbearance.

4.2 Zombie Lending

Identification of zombies: Andrews and Petroulakis (2019) explore the connection between 'zombie' firms (firms that would typically exit in a competitive market) and bank health. Indirect means of forbearance include beneficial restructuring, maturity extension

or conversion of the payment structure (from regular installments to a lump-sum payment at maturity) and may be more prevalent in developing countries like India. McGowan et al. (2018) argue that it has become easier for weak firms that do not adopt the latest technologies to remain in the market, while more productive firms are less likely to expand. Further, the study emphasizes that there may be a policy dimension to this problem including structural policy weaknesses (e.g., inadequate insolvency regimes), bank forbearance, loose monetary policy and impaired banking systems, and the persistence of crisis-induced support to small and medium enterprises. In addition, there is a growing concern that zombie firms may be holding back potential growth in a number of countries, including Japan (Caballero et al. (2008b)), the United Kingdom (Acharya et al. (2018)), and Southern Europe (Gopinath et al. (2017).

Looking at the worsening interest coverage ratio of low quality borrowers in our sample which is coincident with worsening bank health and forbearance provision, we hypothesize that zombie lending may be prevalent in India. Again, we focus on whether there exists a match between zombie firms and stressed banks which adversely affects the ability of healthy firms to borrow from these banks especially if the stressed banks also dominate lending to particular industries. If true, healthy firms may be crowded out and the spillover effects of zombie lending could reduce healthy firm access to to bank credit.

Before we test our hypothesis of a matching between zombie firms and stressed banks, we briefly discuss alternative methods to identify zombie firms from the literature. The seminal approach in Caballero et al. (2008b) defines zombie firms as those potentially receiving subsidized bank credit. More specifically, actual observed interest payments made by the firm are compared with an estimated benchmark interest rate based on the firm's debt structure and market interest rates.

McGowan et al. (2018) base their zombie classification on the interest coverage ratio- the choice is based on the fact that interest coverage ratios encompass channels other than subsidized credit through which zombie firms may be kept alive e.g., non-performing loans (NPLs), government guarantees to SMEs, weak insolvency regimes. Acharya et al. (2018)

classify a firm as zombie if it meets the following criteria: (i) subsidized credit access in year t(ii) it's credit rating (derived from three year median is BB or lower), and (iii) the syndicate composition has either remained constant, or banks that left the syndicate were not replaced by new participants, i.e., the same syndicate has already provided a loan to the firm.

In the baseline specification, we define zombies firms similar to Caballero et al. (2008b). Specifically, we classify a firm as a *Zombie* if the firm received subsidized credit in time period T i.e. the firm is able to borrow loans at an average interest rate that is lower than the Prime Lending Rate (PLR) of State Bank of India and has a debt-to-assets ratio > 0.15.

Impact of forbearance on Zombie Lending and Spillovers: Keeping in line with the triple-interaction pooled regressions, we estimate the following specification to analyze the borrowings of zombie firms in our sample.

$$\begin{aligned} Log(Debt_{j,t+1}) = \alpha_t + \gamma_j + \beta_1 * Stressed\,Bank_b * Zombie_{j,t} \\ + \delta_k \sum_{k=1}^{2} Stressed\,Bank_b * Forbearance_t^k + \eta_k \sum_{k=1}^{2} Zombie_{j,t} * Forbearance_t^k \\ + \zeta_k \sum_{k=1}^{2} Stressed\,Bank_b * Zombie_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \end{aligned} \quad (3)$$

where $k = 1$ for introduction of forbearance and $k = 2$ for withdrawal of forbearance.

Columns (1) and (2) of Table 6 summarize the results. We see a positive and significant coefficient (0.313) on the triple interaction term of zombie lending by stressed banks in the forbearance period on the debt ratios for these firms (Column 1). The positive and significant coefficient rises slightly to 0.324 in the more robust specification with bank and year fixed effects. In terms of the margins calculation, the lending is higher to zombie firms by stressed banks by 2% when compared to lending by good banks. Interestingly debt levels for zombie firms borrowing from stressed banks does not fall significantly in the post-withdrawal period–the coefficient on the triple interaction term is not statistically significant. The findings suggest that the lending norms that were relaxed in the forbearance period promoted loans from stressed banks to their existing low quality borrowers and these

loans likely enabled zombie firms to continue servicing their old loans, i.e., forbearance facilitated the ever-greening of previous loans. Interestingly, the pattern does not appear to reverse or change once the withdrawal of forbearance was announced suggesting once again the potentially persistent effects of policies that relax lending norms.

Spillovers: These findings raise an important question- does zombie-lending crowd out the credit access of healthy firms? To investigate this question, we examine the 'spillovers' to the leverage ratios of higher quality borrowers in industries that have a higher proportion of zombie firms. To identify the granular industry classification, first, we make use of the two-digit NIC codes available from the Prowess data. We calculate the proportion of zombies in every industry h each year t and classify the other firms, not classified as zombie, non-zombie j. With this classification, we estimate the following baseline specification:

$$\begin{aligned} Log(Debt_{j,t+1}) &= \alpha_t + \gamma_j + \beta_1 * Industry\,Frac\,Zombie_{h,t} * Non - Zombie_{j,t} \\ &+ \delta_k \sum_{k=1}^{2} Industry\,Frac\,Zombie_{h,t} * Forbearance_t^k + \eta_k \sum_{k=1}^{2} Non - Zombie_{j,t} * Forbearance_t^k \\ &+ \zeta_k \sum_{k=1}^{2} Industry\,Frac\,Zombie_{h,t} * Non - Zombie_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \quad (4) \end{aligned}$$

where $k = 1$ for introduction of forbearance and $k = 2$ for withdrawal of forbearance.

Columns (3) and (4) of Table 6 present the results. The coefficient on the triple interaction term, which, measures the borrowings of healthy firms (Non-zombie firms) as proportions of zombie firms changes during the forbearance period, is negative and statistically significant (-0.695) in the baseline specification without bank-fixed effects and also in the more robust specification with bank and industry*year fixed effects (-0.880). This result suggests that as the proportion of zombie firms in an industry goes up by 0.1 points the borrowings of non-zombie firms, in those industries is lower on an average by a statistically significant 8.80% relative to the reference group of zombie firms during the forbearance period in the most robust specification. Again, the post withdrawal phase shows no significant change or

visible increase in the borrowings of healthy firms. This is of particular concern as one would expect healthy firms to regain access to credit once forbearance is withdrawn. To summarize, we do not observe any significant reversals in the patterns of borrowings of low-quality and high-quality borrowers once forbearance withdrawal is announced.

Next, we test the hypotheses related to zombie and healthy firm borrowings but from the perspective of banks i.e., what happens to the borrowings of healthy firms that borrow from stressed banks that have a high proportion of zombies in their portfolios? We transpose the data at the bank level and calculate the proportion of zombies in a bank's portfolio in a year. We map this proportion back to the firm level dataset and estimate the following baseline specification:

$$\begin{aligned} Log(Debt_{j,t+1}) &= \alpha_t + \gamma_j + \beta_1 * Bank\,Frac\,Zombie_{b,t} * Non - Zombie_{j,t} \\ &+ \delta_k \sum_{k=1}^{2} Bank\,Frac\,Zombie_{b,t} * Forbearance_t^k + \eta_k \sum_{k=1}^{2} Non - Zombie_{j,t} * Forbearance_t^k \\ &+ \zeta_k \sum_{k=1}^{2} Bank\,Frac\,Zombie_{b,t} * Non - Zombie_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \quad (5) \end{aligned}$$

where $k = 1$ for Introduction of forbearance and $k = 2$ for withdrawal of forbearance.

Columns (5) and (6) of Table 6 summarize the results from the estimation. The coefficient on the triple interaction term is negative and significant (-1.095 and -1.071) in the baseline specification with and without bank-fixed effects. The results suggest that the borrowings of healthy firms who borrow from stressed banks is significantly lower by about 10.7% compared to the zombie firms as the proportion of zombies in the lending portfolios of these bankers increases by 0.1 points in the most robust specification.

The pattern of results from the zombie-lending and spillovers estimations highlight the crowding-out effects of the artificially bolstered survival of low quality borrowers on the healthy firms. If creative destruction were allowed to operate, inefficient and loss making firms would exit allowing the fittest to survive. A perverse pattern appears to prevail instead- the ever-greening of loans to low quality borrowers by stressed banks and reduced access to

bank credit for healthy firms.

4.3 The Real Effects of Forbearance

We hypothesize that policies like forbearance that relax lending norms if continued over a long enough period of time can alter industry structure in industries where stressed banks get permanently matched to low-quality firms. Healthy firms in turn may have to find other lenders to gain credit access giving rise to new bank-firm relationships. We turn next to uncover some evidence about the real effects of the forbearance policy. As a first pass, we look at the association with firm investment and employment patterns. We compute real investment as the $capexratio = \frac{capex_{j,t+1}}{Total\,Assets j,t+1}$ where $capex_{j,t+1}$ is the change in gross fixed assets between year t and $t+1$. For employment, we utilize the proportion of wages in total expenses of firm i.e. $\frac{wages_{j,t+1}}{Total\,Expenses j,t+1}$. We estimate the following specification for low-solvency borrowers:

$$\begin{aligned} y_{j,t+1} = \alpha_t + \gamma_j + \beta_1 * Stressed\,Bank_b * X_{j,t} \\ + \delta_k \sum_{k=1}^{2} Stressed\,Bank_b * Forbearance_t^k + \eta_k \sum_{k=1}^{2} X_{j,t} * Forbearance_t^k \\ + \zeta_k \sum_{k=1}^{2} Stressed\,Bank_b * X_{j,t} * Forbearance_t^k + \epsilon_{j,t+1} \end{aligned} \quad (6)$$

where $y \in (Capex\,Ratio, Wage\,ratio)$ and $X \in (Low\,Solvency, Low\,Liquidity)$; $k = 1$ for introduction of forbearance and $k = 2$ for withdrawal of forbearance.

Panel A of Table 7 summarizes the results for low-solvency borrowers. Columns (1) and (2) signal that following the introduction of forbearance, low-quality borrowers do not appear to have an increase in capital expenditures. In fact, capital expenditures by low-solvency firms borrowing from stressed banks declines significantly during the forbearance phase. Columns (3) and (4) show that these low-quality borrowers, in addition to repaying existing loans, may have used the new loans for wage payments. An interesting observation is that once forbearance is withdrawn, wage expenditures decline. Panel B of Table 7 summarizes

the results for low-liquidity borrowers. We are unable to discern any statistically significant patterns in the capital expenditures or wage expenditures for low-liquidity firms in the forbearance or withdrawal periods. The overall pattern of results suggest that forbearance may have had the unintended consequence of propping up low solvency firms rather than firms facing temporary liquidity constraints as originally intended.

5 Conclusion

This paper provides evidence that the regulatory forbearance measures enacted by the Reserve Bank of India during the global financial crisis effectively handed over a license for banks to engage in regulatory arbitrage. We find that the forbearance measures provided banks with an incentive to hide true asset quality, and therefore the build-up of stressed assets in the system is a by-product of accounting subterfuge. Using both bank and firm-level data, we examine the externalities and costs generated by regulatory forbearance.

We document a series of findings. We find a strong positive correlation between firm- and bank-distress measures over the period 2006-2016. Next, we show that indirect recapitalization schemes like forbearance in classification of stressed loans may have encouraged banks to channel debt to not only to firms with low-liquidity but also to low-solvency borrowers.

We also show that there is a significant increase in the borrowings of zombie firms during our sample period. The flow of credit to low-quality borrowers has led to a significant misallocation of credit, especially, in industries that have a higher proportion of zombies and also through banks that have higher proportion of zombie-borrowers in their portfolio.

We find evidence of the spillovers to the non-zombies in industries that have a higher proportion of zombie firms. Lending to healthy firms falls significantly in industries with a higher proportion of zombies and also by banks that have higher proportions of zombie-borrowers. We also investigate whether there is any evidence of a reversal in these crowding out or spillover effects following the withdrawal of the policy in 2013, but fail to do so. Finally, we find evidence of a significant decline in the capital expenditures and a significant

increase in the proportion of labor costs in the total expenses for low-quality firms.

Overall, the results emphasize the possibly irreversible negative effects of prolonged phases of forbearance. It appears that the process of creative destruction is hindered as low-quality firms on life support of new credit continue to survive at the expense of healthy firms.

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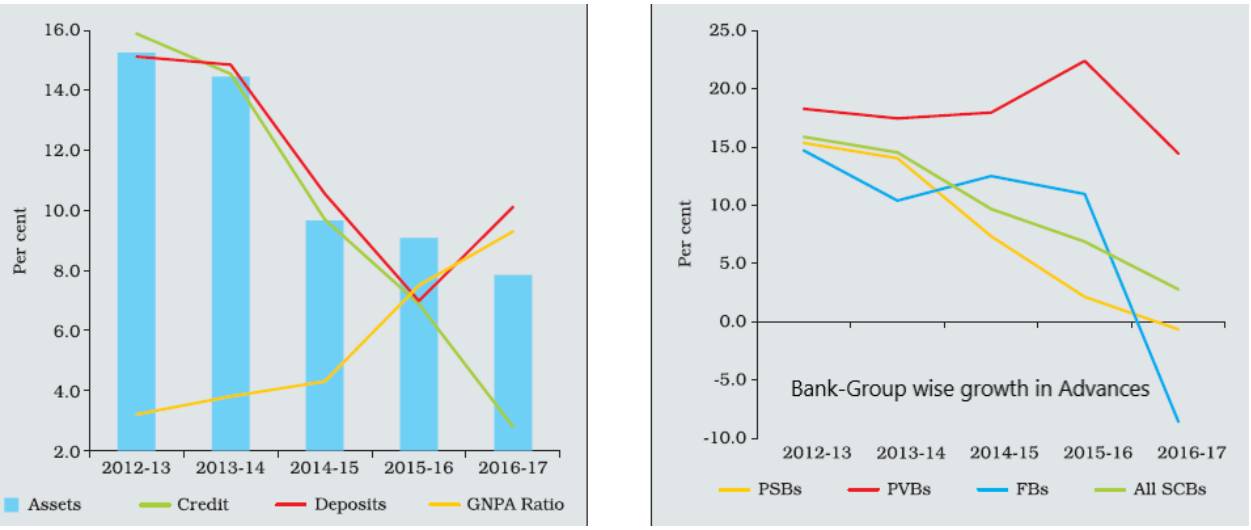
Figure 1: Recent Banking Trends in India

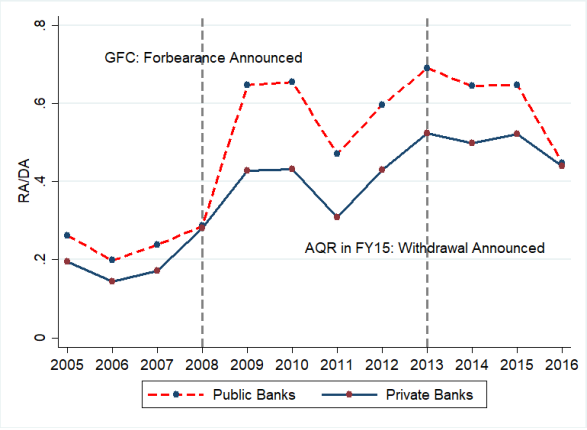
Notes: The left panel of the figure shows the aggregate growth trends of the banks in India in last five years. We observe a slowdown in the growth of assets and a crash in the growth rate of credit. Deposits seem to be going down until 2016, which is the ending year of our sample. There is a steep rise in the share of Gross non-performing loans in total loans of the banks. The right panel of the figure shows the bank-group wise growth in advances. We observe a secular decline in growth of advances across all groups: public, private, foreign and all banks.



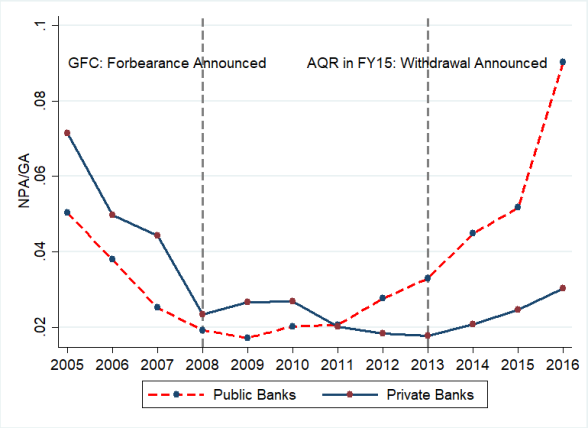
Source: Report on trend and progress of Banking in India 2016-17

Figure 2: Time Series Evolution of Constructed Bank-Level Measures

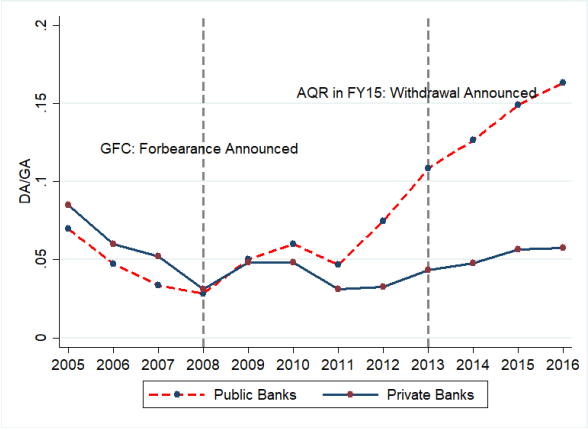
Notes: Panel A of the figure shows the evolution of average bank level proportion of restructured loans in the total distressed loans during the sample period 2006-2016. Panel B of the figure shows the evolution of average bank level proportion of non-performing loans in the total loans during the sample period 2006-2016. Panel C of the figure shows the evolution of average bank level proportion of distressed loans in the total loans given out by a bank during the sample period 2006-2016.



(a) **Hidden assets ratio ($\frac{RA}{DA}$)**



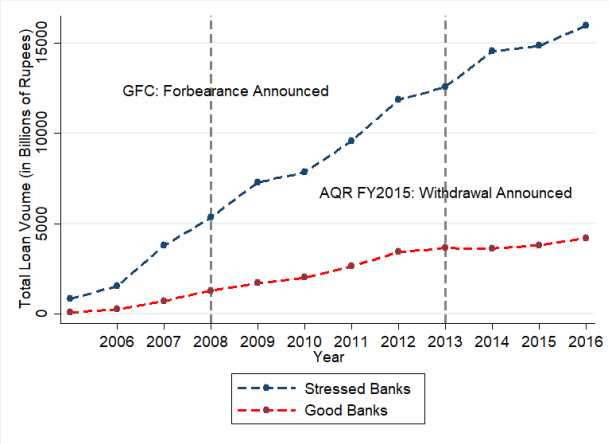
(b) **Non-performing assets ratio ($\frac{NPA}{GA}$)**



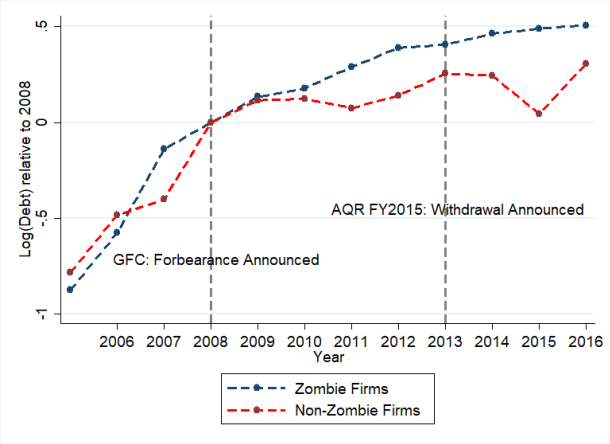
(c) **Distressed assets ratio ($\frac{DA}{GA}$)**

Figure 3: Borrowings of Firms Based on Solvency, Liquidity and Zombie Status

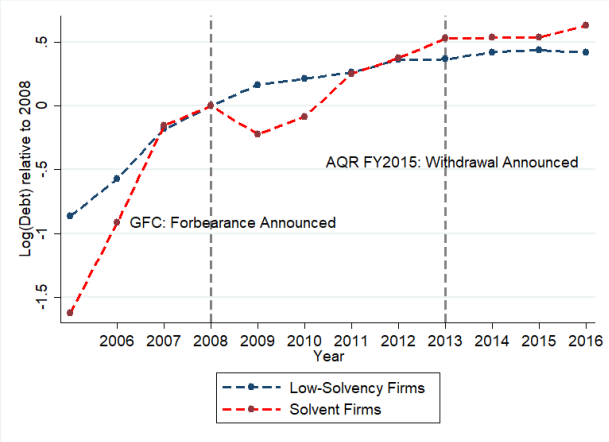
Notes: Panel A of the figure shows the evolution of sum of loans issued by stressed banks and good banks during the sample period 2006-2016. A bank is tagged as *Stressed Bank* if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007 i.e. before the introduction of forbearance policy by RBI. The remaining one-third of the banks are tagged as good banks. Panel B of the figure shows the log-ratio of total debt borrowed by zombie and no-zombie firms in a given year relative to the year of the forbearance announcement, i.e., the y-axis is normalized to 0 at the year of the announcement in 2008. A firm is tagged as *Zombie* if the the firm received subsidized credit in time period T i.e. the firm is able to borrow loans at an average interest rate that is lower than the Prime Lending Rate (PLR) of State Bank of India and has Debt to Assets ratio $> .15$. Remaining firms are tagged as non-zombies. Panel C of the figure shows the log-ratio of total debt borrowed by the low-solvency and solvent firms in a given year relative to the year of the forbearance announcement, i.e., the y-axis is normalized to 0 at the year of the announcement in 2008. A firm is tagged as *Low Solvency* if the Debt to equity measure of the firm in time period T is above median. Remaining firms are tagged as solvent. Panel D of the figure shows the log-ratio of total debt borrowed by the low-liquidity and liquid firms in a given year relative to the year of the forbearance announcement, i.e., the y-axis is normalized to 0 at the year of the announcement in 2008. A firm is tagged as *Low Liquidity* if the cash ratio measure of the firm in time period T is below median. Remaining firms are tagged as liquid.



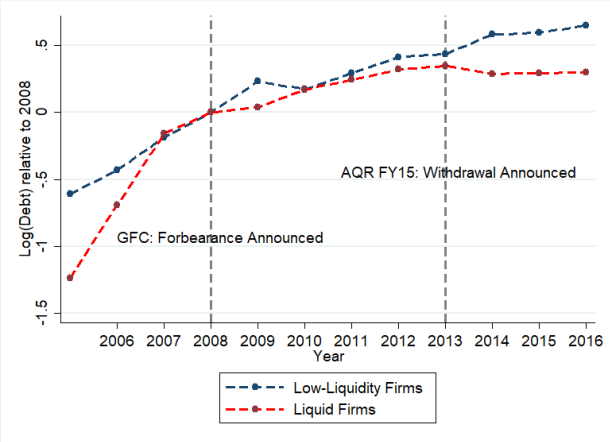
(a) **Aggregate Lending By Banks**



(b) **Debt of zombie & non-zombie firms**



(c) **Debt of low-solvency & solvent firms**



(d) **Debt of low-liquidity & liquid firms**

Table 1: Major Regulatory Announcements since 2008

Announcement Date	Content of Announcement	Direction of RF
27-Aug-08	Special Regulatory Treatment Announced allowing forbearance	Increase
30-May-13	Announcement of withdrawal of Forbearance beginning April 1, 2015	Decrease
26-Feb-14	Framework for Revitalising Distressed Assets in the Economy-Guidelines on Joint Lenders Forum (JLF) and Corrective Action Plan (CAP)	Increase
15-Jul-14	Flexible Structuring of Long Term Project Loans to Infrastructure and Core Industries	Increase
1-Apr-15	Asset Quality Review Started	Decrease
8-Jun-15	Strategic Debt Restructuring Scheme for conversion of debt to equity	Increase
13-Jun-16	Scheme for Sustainable Structuring of Stressed Assets	Increase
12-Feb-18	Resolution of stressed assets: Revised Framework	Decrease

Table 1: This table lists in a chronological order the major policy announcements by RBI pertaining to the increase or decrease in forbearance allowed on classification norms of stressed assets held by banks. The dates were collected by a detailed survey of all master RBI circulars released between August 27, 2008 and February 12, 2018.

Table 2: Summary Statistics

Panel A: Descriptive Statistics by Solvency and Liquidity

	(1)	(2)	(3)	(4)	(5)	(6)
	Solvency			Liquidity		
Variables	Low-Solvency	Solvent	t-stat Diff	Low-Liquidity	Liquid	t-stat Diff
Quick Ratio	0.91	3.46	(-33.59***)	0.67	3.38	(-39.57***)
Cash Ratio	0.28	1.61	(-28.29***)	0.03	1.71	(-39.94***)
Altman Score	7.75	7.30	(2.99***)	7.24	7.24	(0.02***)
Interest Cov Ratio	10.12	50.66	(-102.48***)	18.58	40.63	(-53.48***)
Debt Asset Ratio	0.45	0.12	(225.17***)	0.68	0.38	(20.08***)
Debt Equity Ratio	4.87	0.15	(25.87***)	3.50	1.46	(11.30***)
Total Debt	5858.00	1461.85	(13.67***)	3698.36	4319.40	(-1.88***)
Log(Sales)	6.92	5.71	(42.57***)	6.33	6.06	(9.72***)
Observations	17976	16720		20073	18289	

Panel B: Descriptive Statistics by Zombie Status

	(7)	(8)	(9)
	Zombie Firms		
Variables	Zombie	Non-Zombie	t-stat Diff
Quick Ratio	0.85	3.09	(-33.84***)
Cash Ratio	0.22	1.45	(-30.35***)
Altman Score	7.43	6.94	(3.40***)
Interest Cov Ratio	4.85	55.61	(-150.81***)
Debt Asset Ratio	0.58	0.51	(4.00***)
Debt Equity Ratio	3.30	1.92	(7.29***)
Total Debt	6206.48	923.75	(19.33***)
Log(Sales)	6.86	5.39	(53.32***)
Observations	19331	19896	

Notes: Table 2 shows the summary statistics for the selected firm level ratios used in our analysis. We present the statistics for high and low quality borrowers by: Solvency, Liquidity and Zombie status. We also test for the significance of difference in means between the high and low quality groups. Panel A shows the summary statistics by solvency and liquidity status. Panel B splits the sample via zombie status.

Table 3: The Relationship Between Bank and Firm Distress

Measure	RA/DA	NPA/GA	DA/ GA
% Borrowers (Debt-Equity Ratio > Q4)	0.722***	0.0362***	0.144***
% Borrowers (Debt-Equity Ratio > Q2)	0.695***	-0.00164	0.0769***
% Borrowers (Debt-Equity Ratio > 2)	1.303***	0.0408***	0.212***
% Borrowers (Cash Ratio < Q1)	0.384**	0.0310*	0.0946***
% Borrowers (Cash Ratio <Q2)	0.387***	0.00935	0.0407*
% Boorrowers (Cash Ratio <1)	0.973***	0.0776***	0.219***

Notes: This table summarizes the correlation between bank level ratios and the proportion of low quality borrowers in the bank's portfolio i.e. proportion of firms with low solvency measures and low liquidity measures in a bank's portfolio. $LowCashQ1$ refers to the proportion of borrowers with a cash ratio measure in the lowest quartile Q1. $LowCashQ2$ refers to the proportion of borrowers with a cash ratio measure below the median Q2. $LowCash1$ refers to the proportion of borrowers with a cash ratio measure < 1 which is the industry accepted signal of declining liquidity. $HighDEQ4$ refers to the proportion of borrowers with a debt to equity measure in the top quartile Q4. $HighDEQ2$ refers to the proportion of borrowers with a debt to equity measure above the median Q2. $HighDEQ4$ refers to the proportion of borrowers with a debt to equity measure > 2 which is the industry accepted signal of insolvency.

Table 4: Confusion Matrices for the panel of firm-year-bank observations in our sample (#39,227)

	Good Banks				Stressed Banks			
		$Liquidity_{j,t}$				$Liquidity_{j,t}$		
$Solvency_{j,t}$		High	Low	Overall		High	Low	Overall
	High	38%	16%	54%	High	30%	14%	44%
	Low	18%	28%	46%	Low	18%	38%	56%
	Overall	56%	44%	100%	Overall	48%	52%	100%
		$Zombie_{j,t}$				$Zombie_{j,t}$		
$Solvency_{j,t}$		No	Yes	Overall		No	Yes	Overall
	High	47%	8%	55%	High	35%	9%	45%
	Low	12%	33%	45%	Low	12%	44%	55%
	Overall	59%	41%	100%	Overall	47%	53%	100%
		$Zombie_{j,t}$				$Zombie_{j,t}$		
$Liquidity_{j,t}$		No	Yes	Overall		No	Yes	Overall
	High	36%	17%	53%	High	27%	19%	45%
	Low	21%	26%	47%	Low	20%	35%	55%
	Overall	57%	43%	100%	Overall	46%	54%	100%

Notes: Table shows the distribution of sample across the measures of firm quality and bank quality. A bank is tagged as *Stressed Bank* if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007 i.e. before the introduction of forbearance policy by RBI. A firm is tagged as *Low Solvency* if the Debt to equity measure of the firm in time period T is above median. A firm is tagged as *Low Liquidity* if the cash ratio measure of the firm in time period T is below median. A firm is tagged as *Zombie* if the the firm received subsidized credit in time period T i.e. the firm is able to borrow loans at an average interest rate that is lower than the Prime Lending Rate (PLR) of State Bank of India and has Debt to Assets ratio $> .15$.

Table 5: The Impact on the Borrowings of Low-Solvency & Low-Liquidity Firms

$Dependent\,Variable: Log\,Debt_{j,t+1}$	*Solvency*		*Liquidity*	
	(1)	(2)	(3)	(4)
$Stressed\,Bank_b * Low\,Solvency_{j,t} * Forbearance_t^{Post\,2008}$	0.359***	0.384***		
	(0.125)	(0.123)		
$Stressed\,Bank_b * Low\,Solvency_{j,t} * Forbearance_t^{Post\,2013}$	0.0661	0.0603		
	(0.0899)	(0.0893)		
$Stressed\,Bank_b * Low\,Liquidity_{j,t} * Forbearance_t^{Post\,2008}$			0.310***	0.306***
			(0.0939)	(0.0928)
$Stressed\,Bank_b * Low\,Liquidity_{j,t} * Forbearance_t^{Post\,2013}$			-0.0304	-0.0182
			(0.0884)	(0.0883)
No. of Obs.	21827	21827	24080	24080
R-sq.	0.931	0.933	0.927	0.928
Borrower FE	Y	Y	Y	Y
Year FE	N	Y	N	Y
Bank FE	N	Y	N	Y

Notes: This table summarises the results of the regression where the dependent variable is Log of Debt of a firm in period $T+1$ and the explanatory variables are triple interaction dummies indicating the Low-Solvent firms borrowing from stressed banks in the post introduction of forbearance period. A bank is tagged as *Stressed Bank* if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007 i.e. before the introduction of forbearance policy by RBI. A firm is tagged as *Low Solvency* if the Debt to equity measure of the firm in time period T is above median. A firm is tagged as *Low Liquidity* if the cash ratio measure of the firm in time period T is below median.The indicator variable $Forbearance^{post\,2008}$ takes a value 1 in the years post 2008 i.e. after the introduction of forbearance. The indicator variable $Forbearance^{post\,2013}$ takes a value 1 in the years post 2013 i.e. after the announcement of withdrawal of forbearance by RBI. All specifications control for time invariant borrower characterstics and time varying firm size via Log of Sales.

Table 6: The Impact on Borrowings of Zombie and Non-Zombie Firms

$Dependent\,Variable: Log\,Debt_{j,t+1}$	$\underbrace{Direct\,Effects}$ $Zombie\,Firms$		$\underbrace{Spillover\,Effects}$ $Non-Zombie\,Firms$			
			$Within\,Industry_i$		$Within\,Bank_b$	
	(1)	(2)	(3)	(4)	(5)	(6)
$Stressed\,Bank_b * Zombie_{j,t} * Forbearance_t^{Post\,2008}$	0.313***	0.324***				
	(0.105)	(0.103)				
$Stressed\,Bank_b * Zombie_{j,t} * Forbearance_t^{Post\,2013}$	0.0167	0.0205				
	(0.0908)	(0.0907)				
$NonZombie_t * Industry\,Frac\,Zombie_{h,t} * Forbearance_t^{Post\,2008}$			-0.695**	-0.880***		
			(0.279)	(0.309)		
$NonZombie_t * Industry\,Frac\,Zombie_{h,t} * Forbearance_t^{Post\,2013}$			0.136	0.0202		
			(0.251)	(0.288)		
$NonZombie_t * Bank\,Frac\,Zombie_{b,t} * Forbearance_t^{Post\,2008}$					-1.090**	-1.071**
					(0.438)	(0.428)
$NonZombie_t * Bank\,Frac\,Zombie_{b,t} * Forbearance_t^{Post\,2013}$					-0.347	-0.433
					(0.441)	(0.457)
No. of Obs.	24126	24126	24126	24126	24126	24126
R-sq.	0.930	0.931	0.930	0.934	0.930	0.934
Borrower FE	Y	Y	Y	Y	Y	Y
Year FE	N	Y	N	N	N	N
IndustryXYear FE	N	N	N	Y	N	Y
Bank FE	N	Y	N	Y	N	Y

Notes: This table summarizes the direct and spillover effects of regulatory forbearance where the dependent variable is Log of Debt of a firm in period $T+1$ and the explanatory variables are triple interaction terms as discussed following. (1) and (2) look at the Zombie firms borrowing from stressed banks in the post introduction of forbearance period. A firm is tagged as *Zombie* if the the firm received subsidized credit in time period T i.e. the firm is able to borrow loans at an average interest rate that is lower than the Prime Lending Rate (PLR) of State Bank of India and has Debt to Assets ratio $> .15$. A bank is tagged as $Stressed\,Bank$ if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007 i.e. before the introduction of forbearance policy by RBI. The indicator variable $Forbearance^{post\,2008}$ takes a value 1 in the years post 2008 i.e. after the introduction of forbearance. The indicator variable $Forbearance^{post\,2013}$ takes a value 1 in the years post 2013 i.e. after the announcement of withdrawal of forbearance by RBI. (3) and (4) show the spillovers on the Log of borrowings of non-zombie firms as the proportion of zombies in a specific industry goes up. (5) and (6) show the spillovers on the borrowings of non-zombie firms as the proportion of zombies attached to their lead lending bank goes up. All specifications control for time invariant borrower characterstics and time varying firm size via Log of Sales.

Table 7: The Real Effects of Forbearance on Labor and Capital

Panel A: Low-Solvency Firms

$Dependent\,Variable:$	$Capex_{j,t+1} = \frac{\Delta GFA_{j,t+1}}{Total\,Assets_{j,t+1}}$		$Emp._{j,t+1} = \frac{Wages_{j,t+1}}{Total\,Expenses_{j,t+1}}$	
	(1)	(2)	(3)	(4)
$Stressed\,Bank_b * Low\,Solvency_{j,t} * RF_t^{Post\,2008}$	-0.0171*	-0.0173*	0.0163**	0.0162**
	(0.00932)	(0.00931)	(0.00705)	(0.00704)
$Stressed\,Bank_b * Low\,Solvency_{j,t} * RF_t^{Post\,2013}$	0.00820	0.00790	-0.0116*	-0.0111*
	(0.00619)	(0.00620)	(0.00666)	(0.00667)
No. of Obs.	22144	22144	24678	24678
R-sq.	0.453	0.456	0.862	0.863
Panel B: Low-Liquidity Firms				
	(5)	(6)	(7)	(8)
$Stressed\,Bank_b * Low\,Liquidity_{j,t} * RF_t^{Post\,2008}$	-0.0105	-0.00973	0.00302	0.00279
	(0.00804)	(0.00803)	(0.00605)	(0.00604)
$Stressed\,Bank_b * Low\,Liquidity_{j,t} * RF_t^{Post\,2013}$	-0.00489	-0.00458	0.00323	0.00361
	(0.00625)	(0.00620)	(0.00598)	(0.00598)
No. of Obs.	24136	24136	27002	27002
R-sq.	0.436	0.439	0.850	0.851
Borrower FE	Y	Y	Y	Y
Year FE	N	Y	N	Y
Bank FE	N	Y	N	Y

Notes: This table summarizes the real effects of regulatory forbearance on capital & employment. Panel A depict results for Low solvency firms and Panel B depict results for Low liquidity firms. In specifications (1) & (2) the dependent variable is the capex ratio defined as the proportion of change in gross fixed assets out of total assets of a firm in period $T+1$. (3) & (4) show results for expenditure on employment proxied via the proportion of wages in the total expenses of a firm in period $T+1$. A bank is tagged as $Stressed\,Bank$ if the proportion of non-performing loans in the total gross advances lent out by the bank is in top two terciles in the year 2007 i.e. before the introduction of forbearance policy by RBI. A firm is tagged as $Low\,Solvency$ if the Debt to equity measure of the firm in time period T is above median. A firm is tagged as $Low\,Liquidity$ if the cash ratio measure of the firm in time period T is below median.The indicator variable $Forbearance^{post\,2008}$ takes a value 1 in the years post 2008 i.e. after the introduction of forbearance. The indicator variable $Forbearance^{post\,2013}$ takes a value 1 in the years post 2013 i.e. after the announcement of withdrawal of forbearance by RBI. All specifications control for time invariant borrower characteristics and time varying firm size via Log of Sales.

Table 8: Entry of Non-Zombie Firms

	(1) join	(2) join	(3) join	(4) join	(5) join
$private\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.0438***	0.0441***	0.0414***	0.0419***	-0.00489
	(0.0132)	(0.0132)	(0.0132)	(0.0144)	(0.0213)
$foreign\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.0978***	0.0987***	0.110***	0.103***	0.0829**
	(0.0246)	(0.0247)	(0.0247)	(0.0246)	(0.0401)
$others_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.0288	0.0292	0.0404	0.0259	-0.0174
	(0.0316)	(0.0318)	(0.0316)	(0.0328)	(0.0598)
$private\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	-0.0169*	-0.0179*	-0.0154*	-0.00991	-0.0135
	(0.00909)	(0.00917)	(0.00911)	(0.00986)	(0.00942)
$foreign\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	0.00628	0.00545	0.0100	0.0115	-0.00449
	(0.0186)	(0.0188)	(0.0188)	(0.0192)	(0.0185)
$others_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	0.0590**	0.0580**	0.0455*	0.0545*	0.0638**
	(0.0290)	(0.0294)	(0.0244)	(0.0293)	(0.0254)
No. of Obs.	124170	124170	123999	113477	57051
R-sq.	0.131	0.133	0.161	0.357	0.0943
Borrower FE	Y	Y	Y	N	N
Year FE	N	Y	Y	N	N
Bank FE	N	N	Y	N	N
Firm X Yr	N	N	N	Y	N
Bank X Yr	N	N	N	N	Y

Table 9: Exit of Non-Zombie Firms

	(1) left	(2) left	(3) left	(4) left	(5) left
$private\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.0109	0.0108	0.0151	-0.00134	0.0127
	(0.0103)	(0.0103)	(0.0102)	(0.0114)	(0.0102)
$foreign\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.000180	0.000182	0.00457	-0.0107	0.0212
	(0.0210)	(0.0210)	(0.0210)	(0.0207)	(0.0207)
$others_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2008}$	0.0256	0.0256	0.0514*	0.0296	0.0451
	(0.0273)	(0.0273)	(0.0264)	(0.0252)	(0.0302)
$private\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	-0.00317	-0.00314	-0.00265	0.00920	-0.00530
	(0.00839)	(0.00839)	(0.00835)	(0.00906)	(0.00810)
$foreign\,Bank_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	-0.0442**	-0.0441**	-0.0530**	-0.0419*	-0.0486**
	(0.0223)	(0.0224)	(0.0222)	(0.0232)	(0.0216)
$others_b \times Non-Zombie_{j,t} \times Forbearance_t^{Post\,2013}$	0.00356	0.00466	0.00981	0.00377	-0.000687
	(0.0233)	(0.0233)	(0.0213)	(0.0212)	(0.0235)
No. of Obs.	124170	124170	123999	113477	123259
R-sq.	0.118	0.118	0.149	0.366	0.0902
Borrower FE	Y	Y	Y	N	N
Year FE	N	Y	Y	N	N
Bank FE	N	N	Y	N	N
Firm X Yr	N	N	N	Y	N
Bank X Yr	N	N	N	N	Y

The unintended consequences of regulatory forbearance

Online Appendix

Anusha Chari Lakshita Jain Nirupama Kulkarni

Table A1: Provisioning Requirements on various Categories of Loans

Asset Category	**Npa Duration**	**Provisioning Rate**
Standard		0.25%-1%
Sub-Standard	<1 year	15%
Doubtful	Up to one year	25%
	One to three years	40%
	More than three years	100%
Loss		100%

Notes: This table lists in a provisioning requirements on various categories of loans as defined by the Reserve Bank of India. The provisioning requirements for standard assets depends on the industry sector of the loan and hence we indicate above the range of provisioning rates across all industries.