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Does bankruptcy law improve the fate of distressed firms? The role of credit channels☆

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ABSTRACT

Growing financial failure at firm-level can have serious consequences for banks in terms of rising non-performing assets, in the absence of a strong bankruptcy system. Such a scenario in India made its dysfunctional insolvency system to be reformed, introducing the new Insolvency and Bankruptcy Code (IBC) in 2016. Using a panel of 33,845 Indian firms over the period of 2008–2019 and by employing a difference-in-differences approach, we investigate how the IBC has supported financially distressed firms in mitigating their intrinsic vulnerability during the post-IBC period, compared to their non-distressed counterparts. We find that through expanded credit availability and lower cost of debt financing during the post-IBC period, distressed firms are able to improve their performance relative to non-distressed firms. Furthermore, we provide evidence that the benefits stemming from the implementation of the IBC policy are more prominent for those financially distressed firms that are larger, younger and more collateralized. Our results are robust to a battery of tests and identification strategies. Our conclusions are relevant in contributing to the current academic and policy debates on safeguarding and preserving business performance and continuity under stressed scenarios.

1. Introduction

A credit ecosystem that effectively balances the rights of creditors and debtors lies at the heart of the development process of capital markets (Djankov et al., 2008) and increase in entrepreneurial activities (Francis et al., 2009). In this respect, bankruptcy procedures must ensure not only the rescue of viable businesses, but also the preservation of borrowers' repayment incentives (Hart, 1995; Rodano et al., 2016). Tracing bankruptcy reforms in 11 major economies (including three emerging markets: Brazil, China and Russia) during 2001–2009, Hasan et al. (2020) observe that the reforms contribute to greater issuance of long-term debt while strengthening creditor rights. In the context of India, there was no speedy resolution mechanism until 2016, although there were two mechanisms for debt recovery and strengthening creditor rights, namely, (1) the Debt Recovery Tribunal Act of 1993 (DRT Act) and (2) the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interests Act of 2002 (SARFAESI Act). While the DRT Act did not allow creditors to advance their priority claims on a defaulting firm without a court/tribunal, the SARFAESI Act strengthened creditors' rights by allowing them to take possession of the assets of a defaulting firm without a court/tribunal trial. With this two-tier system in place, creditors preferred the SARFAESI Act but had to transit through the DRTs when collateral is insufficient to fulfil

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debtors' obligations, making it costly and time-consuming for creditors to recover their debt through an official trial. On 28 May 2016, the Government of India instituted a new more efficient mechanism called the Insolvency and Bankruptcy Code (hereafter IBC) for faster resolution of debt recovery cases.

In this paper, we examine the impact of the IBC on the access to credit and the performance of financially distressed firms using a difference-in-differences (hereafter DID) approach to tease out the impact of the policy. As firms closer to the point of distress are most likely to be influenced by the bankruptcy procedures, our empirical analysis is conducted by exploiting firm heterogeneity based on firms' status of being in financial distress. We acknowledge several contributions to the existing literature. Firstly, to the best of our knowledge, this is the first paper that uses a causal identification approach to investigate the impact of the IBC policy on the *"credit channels"* of distressed firms. The notion *"credit channels"* is referred to as expanded availability of long-term and short-term financing and a reduction in the cost of credit due to better and faster debt recovery mechanisms established under the IBC framework (Gupta, 2018).[1] Secondly, we explore the influence of the IBC policy on the performance of financially distressed firms via the *"credit channels"* as highlighted above. In this context, *"credit channels"* can be viewed as the transmission mechanisms through which the IBC policy can improve the performance of distressed firms with a consequent improvement in India's ranking on the 'Ease of Doing Business' Index. Thirdly, we study the differential effects of the IBC policy on firm performance by accounting for firm heterogeneity based on the size, age and collateral of financially distressed firms. This is mainly to address the differences across firms in relation to financial constraints originating from imperfections in the capital market as highlighted by Fazzari et al. (1988). Overall, we believe addressing these questions is of crucial importance for policy makers in order to draw appropriate conclusions on the effectiveness of the new law.

We analyse the above questions by using a panel of 33,845 non-financial Indian firms for the period of 2008–2019 and by employing a quasi-natural experiment. Further, in order to rule out the possibility that omitted variables and reverse causality can affect our estimation results, we use three different identification strategies. First, we employ a DID method to examine the influence of the reform on "*credit channels*" of distressed firms as compared to non-distressed firms. Second, we employ an instrumental variable approach and use two-stage least squares (2SLS) regression analysis to address potential endogeneity across control variables.[2] Third, to reduce the possibility that our results could be driven by differences in firms' fundamentals between the treated and control groups, we apply the DID regressions between the highly comparable propensity score matched treated and control groups.[3]

Our study is related to the studies of Vig (2013), Gopalan et al. (2016) and Jose et al. (2020). Gopalan et al. (2016) find that reducing creditors' enforcement costs leads firms to decrease their proportion of short-term debt and increase their long-term debt, as well as to reduce the number of banking relationships after the DRT Act. Vig (2013) finds that an increase in the rights of secured creditors negatively affects the use of secured credit by firms and decreases the cost of secured borrowing due to liquidation bias after the SARFAESI Act.[4] Jose et al. (2020) find evidence for deleveraging among firms after the IBC policy as their reliance on borrowings declined, especially for weak and large firms. However, our study is different from the above studies in three main aspects. First, unlike Jose et al. (2020), we undertake a causal identification approach to examine the effects of the IBC policy on *"credit channels"* of distressed firms relative to non-distressed firms, as opposed to looking at the average borrowing pattern of all firms over time, which could be reflecting a declining trend for a sub-set of firms in the post-IBC period. Second, we test for the role of the *"credit channels"* in influencing the performance of liquidity-constrained distressed firms by facilitating their restructuring and survival in the post IBC period. Lastly, we also test for the effect of the IBC policy on the performance of financially distressed firms by taking into account their heterogeneity based on size, age and collateral.

To preview our findings, first we find that the IBC policy has improved the *"credit channels"* for financially distressed firms resulting in an increase in credit supply and a sharp decline in the cost of debt as compared to their non-distressed counterparts (Gopalan et al., 2016; Rodano et al., 2016; Vig, 2013). Second, we find that it is through these *"credit channels"* that financially distressed firms improve their performance. Third, we find that larger, younger and more collateralized distressed firms enjoy improved performance after the IBC policy through greater access to long-term financing and the reduction in the cost of borrowing as compared to their non-distressed counterparts.

Our study is of particular relevance for policy makers to evaluate the effectiveness of the reforms brought over by the new IBC law being operational in India since 28 May 2016. In the absence of the much-needed institutional arrangements when a firm defaults, its management, capital and labour would normally come to a standstill. With a sound bankruptcy process that can rapidly resolve such a default scenario, there could be more entrepreneurship, greater risk taking, and better debt market access. In this regard, the IBC is a one-stop solution for resolving insolvencies, aiming to protect the interests of small investors and make the process of doing business less cumbersome (CPPR, 2015). Moreover, although we conduct our experiment for Indian firms, we believe that our findings could be largely generalized because India is a representative of several emerging financial markets along a wide array of dimensions. As in most emerging markets, India's debt market is dominated by state-owned banks, and the domestic credit to private sector by banks (% of GDP) is 50% in 2019, compared to a world average of 90.5% (Source: World Development Indicators). Recent statistics from World

[1] The IBC policy significantly reduces enforcement costs by strengthening the rights of creditors and by allowing them to bypass lengthy judicial processes following firm default, thus improving creditors' ability to lend and reducing creditors' distrust.

[2] The results of two-stage least squares (2SLS) regression analysis are mentioned in section 7.5.

[3] The propensity score matching results are provided in section 7.6.

[4] Vig (2013) specifically focused on the firms that have a higher proportion of tangible assets in their study and defined the 'treated' group accordingly. While using the same definition of the 'treated' group, we found similar results as highlighted by Vig (2013). However, the main focus of this paper is to study the impact on distressed firms in the backdrop of the most recent insolvency reform, and thus our 'treated' group includes firms which are financially distressed.

Bank's Doing Business Data show the creditor rights index of India, improving from 6 in 2014 to 9 in 2019 compared to the world average of 5.67 in 2019. Earlier in India, it used to take 4.3 years to resolve insolvency in 2014 which declined to 1.6 years in 2019 compared to the world average of 2.47 years in 2019. In light of the Covid-19 pandemic and the current business failures globally, our study is even more relevant in the sense that financially distressed companies in the presence of a strong bankruptcy system can still access the credit market and make themselves survive under these stressed scenarios.

The remainder of this paper is structured as follows. In section two, we provide the detailed features of the new IBC bankruptcy reform. In section three, we provide the background literature and develop our testable hypotheses. Section four presents the econometric modelling strategy. In section five, we present the data along with their descriptive statistics, while we report the econometric results in section six. In section seven, we subject our models to various robustness tests, and finally, in section eight, we provide concluding remarks.

2. The IBC reform in India

The IBC reform of 2016 in India consolidated the fragmented regulations in creating a unified law for insolvency and bankruptcy. With the enactment of the IBC law in 2016, firms in India have now access to a comprehensive insolvency resolution framework, and the rights of the creditors have been significantly elevated, enabling the resolution of insolvency in a time efficient manner. The IBC law, which became operational in December 2016, supersedes the SARFAESI Act of 2002, the RBI's restructuring programmes, and the debt recovery tribunals. Prior to the IBC law, corporate insolvency procedures in India were contained under different legislations, and resolving insolvency was indeed a challenge, since the Indian multi-layered legal framework did not offer a complete solution and involved the participation of various tribunals in resolving insolvency.

Hence, the IBC 2016 is a single, consolidated code for insolvency resolution of all entities unlike the previous laws such as Companies Act 1956 or SICA 1985, or SARFAESI Act 2002 that applied selectively to a certain group of debtors and creditors. The IBC empowers all creditors - secured, unsecured, financial and operational - to initiate insolvency proceedings. This is a significant departure from the previous framework where unsecured financial creditors and operational creditors including the employees of the debtor firm had no rights to seek resolution of an insolvent firm. The IBC gives opportunity to all key stakeholders to participate in the insolvency proceedings and collectively assess the viability of the defaulting firm. This is different from the individual recovery rights accorded to only secured financial creditors by the SARFAESI Act, to the detriment of other creditors (Sengupta et al., 2016). As per the Economic Survey released by the Government of India on 31 January 2020, the IBC has improved resolution processes compared to the earlier mechanisms. It resulted in recovery of 42.5% of the amount involved, compared to 14.5% under the SARFAESI Act. In terms of duration, the survey stated that, under the IBC, it takes 340 days on an average compared to the duration of 4.3 years in the earlier system. This outcome suggests that, since the IBC is specifically designed for firms in financial distress, the law aims to prevent corporate failure and hence could maintain or improve the value of a distressed firm, whereas the SARFAESI Act was not applicable for restructuring and reorganization processes. Thus, the IBC law has helped maintain creditor rights to the creditor's benefit while limiting hasty liquidation to the debtor's benefit resulting in increased efficiency only to keep viable firms alive. In other words, the IBC has helped expand credit availability without restricting credit demand, unlike the SARFAESI Act that had a negative effect on the demand for secured debt as mentioned in Vig (2013).

Under the IBC, companies have to complete the insolvency process within 180 days, whereas for smaller companies (with an annual turnover of INR10 million), it should be completed within 90 days (with an extension by 45 days). If debt resolution does not happen within this timeframe, the company goes for liquidation. The resolution process may be initiated either by the debtor or the creditor. More than 3774 cases have been admitted into Corporate Insolvency Resolution Processes (CIRPs) under the IBC as of 31 March 2020.

When a default in repayment occurs, creditors can gain control over debtor's assets to resolve insolvency, as a result of the strengthening of creditor's rights under the IBC. An efficient bankruptcy code can therefore facilitate a smooth functioning of credit markets, as creditor rights protect creditors during default and can ensure availability of debt capital at a lower cost. In view of the growing non-performing assets (NPA) in the public sector banks in India, the government was committed to introduce the new law to address the NPA problem. The law has strengthened the bargaining power of creditors, which has improved the availability of credit to distressed firms. Thus, unlike the earlier multiple mechanisms of resolution, the unified IBC reform brought in a faster insolvency resolution that has altered the shape of credit markets by lowering excessive leverage and financial distress, which is also reflected in lower credit risk premium leading to lower cost of debt capital.

3. Related literature and hypothesis development

3.1. Influence of the IBC on distressed firms

There is an extant literature that investigates the effect of bankruptcy laws on the restructuring of financially distressed firms (Chen et al., 1995), as an effective bankruptcy law should allow liquidity-constrained and financially distressed firms to reorganize and continue running their businesses. In an important empirical work on financially distressed firms, Alderson and Betker (1995) report that firms facing high liquidation costs choose capital structures in such a way that financial distress becomes less likely. Asquith et al. (1994) document that debt structure affects the restructuring of financially distressed firms. Using a sample of 87 countries over the period 2005–2016, Stef and Dimelis (2020) find that banking activity in terms of private credit flow is greater in countries with a high level of creditors' protection and bankruptcy systems that enable the survival of financially distressed firms. Gutiérrez et al. (2012) also analyse the effect of the bankruptcy law on firms that find themselves in financial distress.

Moreover, there are several other papers in the bankruptcy literature, investigating the effect of stronger creditor rights on the credit conditions applied to firms that have higher probability of default with those of firms deemed less likely to default (Rodano et al., 2016; Favara et al., 2017). Rodano et al. (2016) exploit the Italian bankruptcy law reforms to disentangle the effects of reorganization and liquidation in bankruptcy on bank financing and firm investments. They highlight that those firms that are more likely to be in distress are more responsive to the design of insolvency and bankruptcy reforms. Further, Favara et al. (2017) argue that the prospect of an imperfect enforcement of debt contracts in default reduces shareholder-debtholder conflicts and induces leveraged firms to invest more and take on less risk as they approach financial distress.

As the IBC's ultimate objective is to develop a "coherent and speedy process to identify financial distress at an initial stage, and initiate revival procedures if the business is considered viable" (CPPR, 2015), firms closer to the point of financial distress are most likely to be influenced by this bankruptcy law. Hence, following the above arguments, our empirical analysis is conducted by exploiting firm heterogeneity in their probability of facing financial distress. To identify firms' differential exposure to the policy reform, we implement a difference-in-differences (DID) analysis by constructing the treated and control groups based on firms' status of being in financial distress.

As the IBC helped strengthen creditor rights in India, it is likely to affect both supply of and demand for credit by distressed firms. An efficient bankruptcy law tries to determine how to compensate creditors that have seen their debt agreement violated, while maximising the value of insolvent firms (Hart, 2000). To achieve this, bankruptcy law tries to maximise the value of firms in financial distress before they file for bankruptcy. During this phase, managers of distressed firms will have strong incentives to make risky investments so that if the project succeeds, bankruptcy can be avoided or delayed. There is a common apprehension that the debtors avoid resorting to insolvency, because under the insolvency resolution process, the board of the debtor can be replaced by the resolution professional. However, contrary to this apprehension, in the first six months after the IBC law was introduced, around 24% of the petitions were led by debtors (Chatterjee et al., 2017). As the law establishes a framework for collective action by creditors to resolve the financial stress of the debtor, the process shifts away from a debtor-in-possession model to a model where creditors decide on the resolution while an impartial professional runs the operations of the debtor as a going concern. Hence, due to the expedited "creditor in control" resolution process and the aim to prevent corporate failure and maintain the value of a distressed firm under the IBC law, we do not expect a decrease in long-term demand for debt or a decrease in corporate risk taking.

On the supply side, due to stronger creditor rights in the post-legislation period, we expect an improvement in bank credit supply to distressed firms. Araujo et al. (2012) and Rodano et al. (2016) document that bankruptcy reforms aimed at strengthening creditor rights help reduce the cost of debt and improve access to credit and investment. Djankov et al. (2007) document that strengthened creditor rights are associated with a higher ratio of private credit to GDP, corroborating the notion that improved creditor rights facilitate credit market development. Further, Ponticelli and Alencar (2016) and Neira (2019) highlight that improved bankruptcy procedures result in higher lending. Hence, as the suppliers of credit are more protected post-IBC, they are more willing to supply credit to distressed firms. Overall, the IBC helps in expanding credit availability without restricting credit demand, unlike the legislation of SARFAESI that protected the secured creditors resulting in a decrease in credit demand.

3.2. *Impact of the IBC on "credit channels"*

There is an extensive literature that identifies creditor rights as a significant determinant of credit market development (La Porta et al., 1997, 1998; Djankov et al., 2007; Haselmann et al., 2010). As a matter of fact, ensuring the effective functioning of capital markets has been a matter of concern for policy makers, especially in developing economies with weaker legal framework and lower institutional quality (Aghion et al., 2005), and where contract enforcement is costly and time consuming (Gopalan et al., 2016; Vig, 2013).

Our paper contributes to the literature that links enforcement costs to firms' debt maturity choice. This is central to the study of Gopalan et al. (2016) who, by exploiting the introduction of DRTs in India, find that reducing enforcement costs leads firms to decrease their reliance on short-term debt as a source of financing in favour of more developmentally-focused long-term debt. In this regard, the results are supportive of Diamond (2004)'s "lender passivity" argument according to which a decrease in contract enforcement costs should have, ceteris paribus, a dual effect. On the one hand, it increases lenders' willingness to grant long-term credit, as sound legal regimes may encourage lenders' enforcement of contracts by making it either less costly or highly effective. On the other hand, it induces firms to opt for long-term debt in their financing mix, as short-term debt involves costs for firms since it limits a firm's ability to renegotiate better credit terms following credit quality improvement (Roberts and Sufi, 2009). Therefore, the policy's departure from the earlier approach of "debtor in possession" to "creditor in possession" acts to decrease contract enforcement costs in a scenario where the sustainability of firms' access to credit now depends less on short- and more on long-term debt.

Further, our study adds to the general consensus that creditor rights promote financial development by relaxing financial constraints. Chakrabarti and Pattison (2019) who exploit the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) in the US also provide evidence that creditor protection is likely to reduce the cost of credit and lead to sharing of the gains with the debtor. Giannetti (2003) provides evidence that stronger creditor rights are associated not only with higher leverage but also with greater availability of long-term debt. In another paper, Qian and Strahan (2007) find that, on average, firms in countries characterised by stronger secured creditor rights have longer-maturity loans and more secured debt. Acharya et al. (2011), by analysing whether bankruptcy codes affect capital structures of the US and UK firms, find that the difference in leverage ratios between equity-friendly and debt-friendly credit systems is decreasing the liquidation value of the asset. Davydenko and Franks (2008) analyse recovery rates in the UK, France, and Germany and find that differences in creditors' rights across countries lead banks to adjust their lending practices to mitigate costly aspects of bankruptcy law. Using a large cross-country firm-level dataset, Gopalakrishnan and Mohapatra

(2020) find that a stronger insolvency regime reduces firms' likelihood of defaulting on their debt, while also mitigating the adverse effects of economic shocks on firms' default risk.

Since, the IBC is a unified reform to maintain creditor rights to the creditor's benefit while limiting hasty liquidation to the debtor's benefit resulting in efficiency, we expect distressed firms to benefit from the IBC policy as summarized in our first hypothesis *(H1),* which is related to the effects of the reform on the *"credit channels"* of distressed firms:

H1. *The IBC has led to an increased availability of financing and a reduction in the cost of credit,* i.e.*, the "credit channels", for financially distressed firms as compared to their non-distressed counterparts.*

3.3. Impact of the "credit channels" on firm performance

Since the introduction of the IBC helps improve creditors' ability to lend by reducing creditors' distrust, we study the influence of "credit channels" on performance of distressed firms. Several studies have investigated the outcome of introduced reforms in different countries. In this regard, India has been the setting of several studies due to its relatively long period of corporate bankruptcy resolutions during which companies enjoy a complete moratorium on all debt payments (Gopalan et al., 2007). Specifically, long-lasting recovery procedures are likely to result in greater enforcement costs on the part of creditors that further affect borrowers' performance due to lack of access to credit.

This paper further contributes to the literature supporting the argument that one of the primary purposes of bankruptcy laws is to facilitate the restructuring of financially distressed firms to enable them to invest again in value-creating opportunities (Chen et al., 1995). In this regard, bankruptcy law has proved to exert a significant influence on the performance of firms that find themselves in financial distress (Gutiérrez et al., 2012). The reason for this is that financially distressed firms may experience greater problems because of suboptimal investment decisions, thus significantly affecting their performance (Morgado and Pindado, 2003). Within this context, suboptimal investment decisions may lead distressed firms to either underinvest due to financial constraints, or overinvest and take excessive risks in the face of defaulting on their debt obligations and losing control. On the one hand, the underinvestment process arises from the fact that distressed firms might forego positive NPV projects because of their difficulty in accessing credit due to the impossibility to substitute their secured debt with unsecured financing (Vig, 2013). Thus, if the investment outlay stemming from all positive NPV projects is higher than the internal funds available, the firm might forego these investment projects due to the difficulty in obtaining external financing. On the other hand, the overinvestment process is driven by the fact that distressed firms may undertake negative NPV projects to boost their returns and chances of survival with the objective to return to a healthy condition in the market. Thus, an effective bankruptcy law allows liquidity-constrained and financially distressed firms to improve their access to credit and undertake optimal investment decisions, helping them improve their financial health and continue running their businesses.

Thus, the discussion on the influence of the IBC law on performance of financially distressed firms materializes in our second hypothesis *(H2*), which is related to the effects of the law on firm performance through the *"credit channels"*:

H2. *The IBC has led to an improvement in the performance of financially distressed firms due to an expanded availability of financing and a reduction in the cost of credit,* i.e.*, the "credit channels" as compared to their non-distressed counterparts.*

3.4. Differential effect of the law on firm heterogeneity

We further examine the effects of the policy while accounting for firm heterogeneity based on size, age and collateral of distressed firms, thus contributing to the debate on financial constraints. Regarding firm size, the beneficial effect of the policy on firm performance through the *"credit channels"* could ultimately be greater for larger firms since smaller companies are perceived by lenders as risky (Hartarska and Gonzalez-Vega, 2006; ECB, 2014). Moreover, smaller firms generally lack a sound performance history, borrowing experience, and strong reputation in the market regarding their competence and honesty that could result in asymmetric information. Given that smaller firms rely more on relationship lending based on soft information and that the IBC helps mitigate frictions for asset-based lending based on hard information, we expect the IBC to have a more profound effect on larger firms that borrow from large financial institutions who mostly rely on hard information of pledged assets (Filomeni et al., 2020a, 2020b; Stein, 2002; Berger and Udell, 2006). In this regard, Berger and Udell (2006) show that large institutions tend to lend to larger firms, while small institutions lend more to smaller firms based on stronger bank-firm relationships (Haynes et al., 1999; Cole et al., 2004; Scott, 2004; Berger et al., 2005). Therefore, this may lead to credit restrictions, higher interest rates, or increased collateral requirements for smaller firms, deterring their demand for credit (Berger and Udell, 1990; Berger and Udell, 1998).

With respect to firm age, we argue that the beneficial effect of the policy on firm performance through the "credit channels" is greater for younger firms as they have greater potential for growth and innovation over time, compared to older firms (Chaveerug and Ussahawanitchakit, 2008; Withers et al., 2019). Moreover, further empirical evidence shows that younger firms use relatively more commercial debt than older firms, although they face greater difficulty in accessing debt than more established firms (Robb, 2002). As the IBC helps mitigate the issues of information asymmetry and facilitates lending to younger firms, it helps them improve their firm performance through the "credit channels". Overall, the IBC reform alleviates information asymmetry - that exists in imperfect capital markets hampering access to external finance - and thereby facilitates lending (Stiglitz and Weiss, 1981; Berger and Udell, 2006).

Regarding firm collateral, Benmelech and Bergman (2011) document a negative relationship between collateral and the cost of external debt finance, suggesting that bankrupt firms impose negative externalities on their non-bankrupt competitors through a collateral channel that ultimately leads to an increased cost of external debt finance. Cerqueiro et al. (2016) show that collateral plays an important and positive role in the provision of lending, concluding that collateral is an important contractual device that affects the

behaviour of borrowers and lenders. Rajan and Winton (1995) argue that a high collateral might be considered as a sign that the borrower is in difficulty, since banks are usually more inclined to lend if backed by higher collateral when the borrowers' prospects are poor. Consequently, in the post IBC period, we expect high-collateralized distressed firms to benefit from a lower cost of debt and an increased access to long-term financing, since lenders can easily recover their outstanding exposures if the firm defaults in a more efficient and less costly judicial system. This would result in a pronounced effect on performance of high-collateralised distressed firms compared to low-collateralised firms.

Thus, the above discussion on the differential effects of the IBC policy on firm performance based on firm heterogeneity of financially distressed firms can be summarized in our third hypothesis (*H3*):

H3. *The IBC has enhanced the performance of larger, younger and more collateralized financially distressed firms through the "credit channels" as compared to their counterparts.*

4. Empirical methodology

4.1. Impact of the IBC reform on "credit channels"

In this section, we examine the impact of the legal reform on access to credit and cost of debt financing for distressed firms by employing a DID estimation method. We examine two key "*credit channels" (CC)* of firms' debt structure and cost of borrowing. We measure debt structure by the ratios of long-term debt to total assets and short-term debt to total assets (Bougheas et al., 2006),[5] and cost of borrowing is measured by the ratio of total interest expenses to total debt (Araujo et al., 2012). Further, firms' financial distress is measured by using accounting data in line with the literature (Asquith et al., 1994; Sudarsanam and Lai, 2001; Koh et al., 2015). We define a dummy for distressed firms, '*Distress*', which takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise.[6] To test our first hypothesis *(H1),* we estimate the following model:

$$CC_{int} = a_0 + a_1 IBC_t * Distress_{int} + a_2 Distress_{int} + a_3 \mathscr{X}_{int-1} + \gamma_i + [\delta_n * \varphi_t] + e_{int} \quad (1)$$

where $i = 1, 2, \ldots, N$ refers to the cross-section of units (firms in this case) in sector n at time t. γ_i, δ_n, φ_t are firm, industry and time fixed effects, respectively. '$\mathscr{X}$' is the vector of explanatory factors at firm-level, and e_{int} are the disturbance terms.[7] '*IBC*' is a time dummy which takes value 1 for years 2016–2019, and 0 otherwise. The main variable of interest is the DID coefficient of '*IBC * Distress*', that captures the impact of the IBC policy on debt structure and cost of debt of financially distressed firms, compared to non-distressed firms.[8] The above models are estimated using firm fixed effects to control for unobserved heterogeneity at firm-level, and time fixed effects account for macroeconomic and aggregate shocks that affect credit demand or supply (Rodano et al., 2016).

Although the DID specification allows us to control for omitted variables that affect both the treated and the control group in a similar manner, identification of the causal effect requires controlling for any systematic shocks to the treated group that are correlated with the legal change, that is, controlling for other shocks that might be correlated with financial distress and the IBC law. For example, it might be the case that growth opportunities and credit shocks changed across different industries around the same time, and this is a concern because some industries are more reliant on external finance than other industries. In this regard, following Vig (2013) and Thapa et al. (2020), we control for such shocks by augmenting our main regression specifications to include the interaction between industry and time (δ_n * φ_t) fixed effects. This is a non-parametric way of controlling for time-varying industry-specific shocks.

Finally, the set of control variables in vector $\mathscr{X}$ include firms' size, liquidity, age and collateral.[9] We lag all time-varying, firm-specific variables by one period to reduce possible simultaneity problems. *Firm size* is measured as the natural logarithm of total assets (Bose et al., 2019) which is an important indicator of firm performance. Larger firms have better access to external finance as they are less financially constrained (Bougheas et al., 2006; Beck et al., 2008), and hence have higher performance relative to smaller firms.

Liquidity of the firms is measured by the ratio of current assets less current liabilities over total assets (Greenaway et al., 2007). According to Fang et al. (2009), firms with liquid assets have better performance as it relaxes financial constraints. Next, we include *age* which is measured as the natural logarithm of the number of years since incorporation. Younger firms grow and innovate over time and are likely to be more leveraged (Klapper et al., 2002). Finally, we include *collateral* which is measured by the ratio of net fixed assets to

[5] Short-term debt includes borrowings from banks and financial institutions, and current portion of long-term debt that must be repaid within a period of 12 months. Long-term debt includes debt from banks and financial institutions, bonds and debentures that is not expected to be repaid within the next 12 months from the balance sheet date. Total debt is the sum of long-term and short-term borrowings.

[6] We use the definition of distressed or sick firms from the Companies (Second Amendment) Act, 2002 that was enacted with the objective of determining the sickness in industrial units (Senapati and Ghosal, 2016).

[7] We provide the correlation matrix among all control variables such as size, liquidity, age and collateral in Table A1 of the Appendix.

[8] We also classify firms into distressed vs non-distressed groups using values in the pre-IBC period as the classification of distressed firms might itself be impacted by the IBC policy. The results obtained from these classifications are qualitatively and quantitatively similar to the main results.

[9] In addition, we also control for additional factors in equation (1) that may influence firms' debt structure such as market to book value of equity (MB), and the ratio of cash and bank balances to total assets (Cash/Assets) in separate regressions provided in Table A2 of the Appendix. *'MB'* captures the firm's growth potential/valuation especially in emerging markets (Thapa et al., 2020), and *'Cash/Assets'* measure firms' cash holdings which provide insurance against any liquidity shocks in line with the precautionary motive of cash (Vig, 2013). Our main results remain qualitatively and quantitatively similar even after controlling for these additional factors.

total assets (Vig, 2013). Vig (2013) argue that an increase in the value of collateral helps firms to increase their borrowing capacity by reducing borrowing costs.

4.2. Exploring the role of "credit channels" on firm performance

In this section, we explore the impact of the legal reform on performance of financially distressed firms through the *"credit channels"*. To test our second hypothesis *(H2),* we measure firm performance using return on assets (*ROA*) which is the ratio of net income to total assets (Liu et al., 2014). In this model, we incorporate the estimated *CC* ($\widehat{CC}$) from Eq. (1) to assess how firm performance (*ROA)* responded to changes in credit channels after IBC was introduced. To avoid the generated regression problem (we do not observe, but estimate CC; see Pagan, 1984; Bose et al., 2020), we obtain standard errors using a bootstrap procedure. This model is estimated as follows:

$$\begin{aligned} ROA_{int} = {} & a_0 + a_1 IBC_t * Distress_{int} * \widehat{CC}_{int-1} + a_2 IBC_t * \widehat{CC}_{int-1} + a_3 Distress_{int} * \widehat{CC}_{int-1} + a_4 IBC_t * Distress_{int} \\ & + a_5 \widehat{CC}_{int-1} + a_6 Distress_{int} + a_7 \mathscr{X}_{int-1} + \gamma_i + [\delta_n * \varphi_t] + e_{int} \end{aligned} \tag{2}$$

The main variable of interest is the coefficient of triple interaction term of '*IBC*Distress**$\widehat{CC}$', that captures whether the distressed firms with increased access to credit and reduced cost of debt in the post-IBC period are able to improve their performance relative to their non-distressed counterparts.

4.3. Accounting for firm heterogeneity

Intuitively, not all distressed firms are expected to benefit equally from the reform. In this section, we take into account firm-level heterogeneity using three main criteria i.e., size, age and collateral. Larger firms are characterised by less idiosyncratic risk and stronger socioeconomic networks that reduce the cost of external capital and increase their access to external financing (Bris et al., 2014; Gozzi et al., 2010). Moreover, as larger firms tend to borrow from large financial institutions that mostly rely on hard information of pledged assets (Filomeni et al., 2020a, 2020b; Stein, 2002; Berger and Udell, 2006), we expect the IBC to mitigate frictions for asset-based lending to larger firms. Since younger firms are at an earlier stage of their development or life cycle, they are likely to be more leveraged as it facilitates them to grow faster until they reach some critical or sustainable size (Quader, 2017; Klapper et al., 2002). Moreover, collateral plays an important role in raising external funding. Empirical evidence shows that higher-collateralized firms face lower cost of debt and benefit from higher availability of external finance (Benmelech and Bergman, 2011). Thus, we argue that distressed firms that are larger, younger and more collateralized are likely to be less financially constrained after the reform.

We classify a firm as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms operating in the same industry in that given year. We hypothesise that distressed firms which are larger, younger and more collateralized might benefit more from the IBC, since they experience less difficulty in obtaining external finance as compared to their smaller, older and less collateralised counterparts. Therefore, our objective is to investigate the impact of the IBC on firm performance of financially distressed firms by considering their size, age and collateral, as stated in our third hypothesis *(H3)*.

5. Data and descriptive statistics

5.1. Data

Our dataset draws from the profit and loss and balance sheet information provided by the Centre for Monitoring Indian Economy (CMIE) in its Prowess database. CMIE is a private research organization in India that collects data and makes it available through Prowess database comprising over 40,000 Indian companies of different sizes, ownership groups, and operating in a wide variety of sectors, such as manufacturing, utilities, resources, and services.

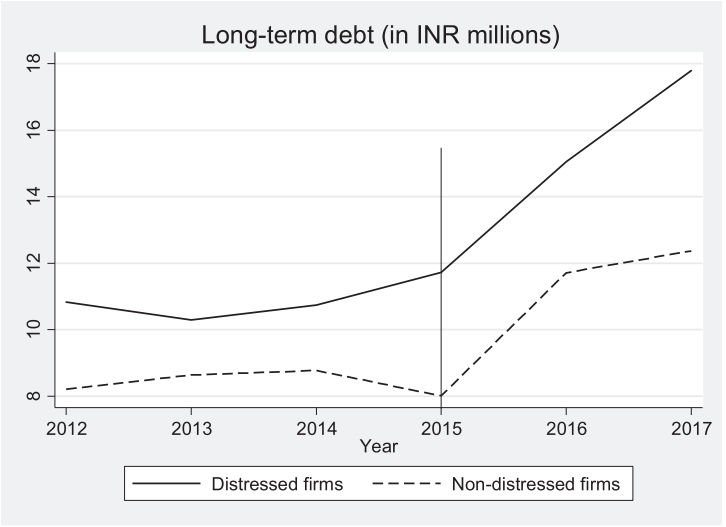
Following normal selection criteria used in the literature, companies with missing information on debt ratios and performance measures are excluded from the sample. Further, to avoid the effect of possibly spurious outliers driving our results, all the control variables used in the regression models are winsorized at 1% level.[10] The final panel dataset has an unbalanced structure for 33,845 firms over the period of 2008–2019.

5.2. Descriptive statistics

To provide a simple visual account of how the *"credit channels"* i.e., debt structure and cost of financing, change after the IBC is implemented, we present Fig. 1. Fig. 1 graphs the evolution of long-term debt and cost of debt among Indian firms over the sample period, disentangling financially distressed firms from their non-distressed counterparts. The vertical line indicates the change in policy. Fig. 1(a) shows a relative rise in long-term debt for the distressed firms after the policy change, compared to non-distressed

[10] To choose the level of winsorization at the 1% level, we perform focused visual inspection of the distribution of our sample values. Our results are also robust to winsorization at the 5% level.

(a) Debt structure



(b) Cost of financing

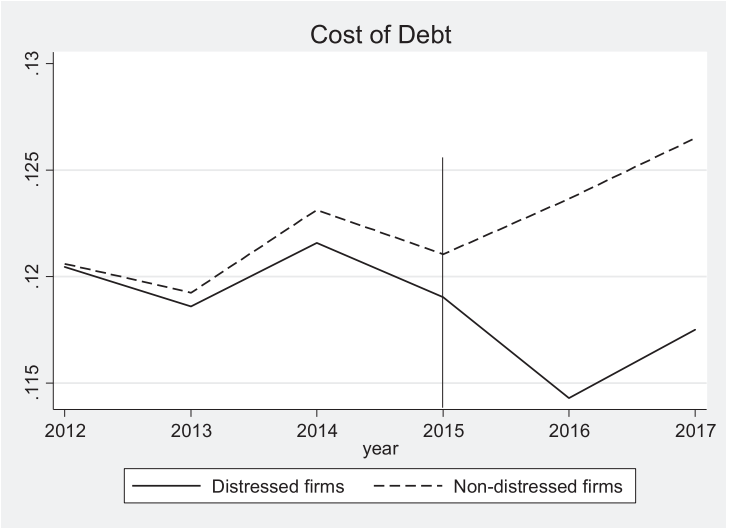


Fig. 1. Pattern in "credit channels" for distressed and non-distressed groups.
Notes: The above figure displays the real long-term debt (in INR millions) and cost of debt among distressed and non-distressed firms.

firms. Fig. 1(b) depicts a nearly continuous decline in the cost of borrowing for the distressed firms after the IBC policy. Both graphs support the model's parallel-trends assumption, suggesting that in the absence of the reform, both groups may exhibit similar pattern in the debt-structure and the cost of financing.

Table 1 reports descriptive statistics on the main variables of interest. We report mean and standard deviation for the whole sample (column 1), the values for distressed and non-distressed firms before IBC (columns 2 and 3), and distressed and non-distressed firms after IBC (columns 5 and 6). Table 1 also reports the *p*-values for the test of equality of means for distressed versus non-distressed firms before and after IBC reform (columns 4 and 7, respectively). Finally, column 8 provides the number of observations for each variable included in the models.

To begin with, after the introduction of the policy reform, the increase in long-term debt and short-term debt is higher for distressed

Table 1
Descriptive statistics.

		IBC = 0			IBC = 1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Whole sample	*Distress = 1*	*Distress = 0*	*p-value*	*Distress = 1*	*Distress = 0*	*p-value*	*Observations*
LTD/TA	0.18 (0.22)	0.32 (0.31)	0.14 (0.16)	0.000	0.42 (0.36)	0.16 (0.19)	0.000	97,866
STD/TA	0.18 (0.17)	0.23 (0.25)	0.17 (0.15)	0.000	0.28 (0.27)	0.16 (0.15)	0.000	119,458
Cost of debt	0.12 (0.17)	0.11 (0.16)	0.12 (0.17)	0.000	0.09 (0.15)	0.12 (0.19)	0.000	144,259
ROA	1.14 (1.24)	0.83 (1.21)	1.26 (1.26)	0.000	0.91 (1.30)	1.13 (1.17)	0.000	186,685
Size	6.06 (2.33)	5.11 (2.44)	6.17 (2.15)	0.000	5.58 (2.74)	6.53 (2.38)	0.000	205,145
Liquidity	0.02 (0.50)	−0.48 (0.99)	0.10 (0.27)	0.000	−0.28 (0.83)	0.13 (0.32)	0.000	199,756
Age	2.81 (0.85)	2.52 (0.96)	2.71 (0.84)	0.000	3.05 (0.77)	3.19 (0.65)	0.000	199,533
Collateral	0.29 (0.25)	0.26 (0.23)	0.34 (0.30)	0.000	0.25 (0.24)	0.36 (0.30)	0.000	191,553
Observations		32,856	114,565		9912	47,871		

Notes: The table presents sample means with standard deviations in parentheses. In columns 4 and 7 we report the *p*-values of tests of equalities of means between distressed and non-distressed firms. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC is* a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. *Return on assets (ROA)* is the ratio of net income to total assets. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets.

firms, compared to non-distressed firms. More specifically, long-term debt ratio has increased by 10 percentage points and short-term debt ratio has increased by 5 percentage points among the distressed firms after the IBC reform.[11] Further, there is a decline in the cost of debt by 2 percentage points and an increase in performance (ROA) by 8 percentage points for the distressed firms after the IBC policy. With respect to other variables, our results show that distressed firms are smaller, younger, have lower levels of liquidity and collateral in both pre- and post-IBC periods against their non-distressed counterparts.

Overall, two main points can be highlighted from these statistics. First, there is an increase in both long-term and short-term debt, and a reduction in the cost of debt for distressed firms after the IBC reform as opposed to non-distressed firms. Second, there is a notable improvement in the financial performance of distressed firms as highlighted by the return on assets after the IBC policy relative to non-distressed firms. In the following sections, a formal regression analysis framework tests the role of the IBC initiative on firm performance.

6. Empirical results

6.1. The IBC reform and "credit channels"

In this section, we report the impact of the policy reform on *"credit channels"* of firms' debt maturity choice, i.e., long- versus short-term financing, and firm's pricing of borrowing, i.e., the cost of credit, using DID estimation. The results of this analysis are provided in Table 2. In columns 1 and 2 of Table 2, we provide the results for the ratios of long- and short-term borrowings, followed by the results for cost of credit shown in column 3. The main variable of interest is '*IBC * Distress*' which measures the direct impact of the IBC policy on credit channels of financially distressed firms compared to non-distressed firms. We find a significant impact of the policy on long- versus short-term debt financing, and firm's pricing of borrowing for the distressed firms. The economic magnitude of the interacted coefficients suggests that after the introduction of the policy reform, the access to long-term debt increased by 6.3%, short-term debt increased by 1.4%, while the cost of borrowing declined by 0.8% for distressed firms as compared to non-distressed firms. These coefficients are statistically significant at the 5% level of significance. This result indicates that after the IBC policy, distressed firms significantly improved their *"credit channels"* while experiencing lower cost of credit with respect to their non-distressed counterparts.

Moving to other control variables, we find that *distressed* firms have a positive and significant relationship with debt structure as they might have to borrow more to cover their losses (Opler and Titman, 1994). Further, we find significant impacts of firm *size*, *liquidity, age* and *collateral* on firms' debt structure showing that larger, more liquid, younger and better collateralised firms are more likely to have greater access to debt. Finally, we find a negative and significant impact of firm *size* on cost of credit showing that larger firms face lower cost of borrowings and financial constraints.

6.2. Exploring the role of "credit channels" on firm performance

In this section, we report the impact of the *"credit channels"* on firm performance measured by the return on assets. In columns 1

[11] We decompose the long-term and short-term debt ratios to gauge the evolution of the numerator and the denominator separately for distressed firms. We find that a decrease in assets does not drive the increase in debt ratios. Table A3 of the Appendix shows that long-term debt, short-term debt and total assets increased significantly for distressed firms after the IBC policy.

Table 2
Impact of the IBC on credit channels.

	(1)	(2)	(3)
Dependent variable=	LTD/TA	STD/TA	Cost of debt
IBC*Distress	0.063***	0.014**	−0.008**
	(8.28)	(2.42)	(−2.21)
Distress	0.049***	0.037***	−0.001
	(13.67)	(13.17)	(−0.06)
Size	0.001	0.007***	−0.003***
	(0.16)	(6.46)	(−2.60)
Liquidity	0.023**	0.061***	−0.001
	(2.41)	(12.42)	(−0.28)
Age	−0.045***	−0.011***	0.001
	(−9.02)	(−2.90)	(0.14)
Collateral	0.133***	0.021***	−0.005
	(15.55)	(3.96)	(−1.19)
Observations	74,156	90,210	107,464
R-squared	0.084	0.047	0.003
Number of firms	18,966	21,356	24,635
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variables are *LTD/TA* which is the ratio of long-term debt to total assets, *STD/TA* which is the ratio of short-term debt to total assets and *cost of debt* which is the ratio of total interest expenses to total debt. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

and 2 of Table 3, we provide the results for long- and short-term borrowing, followed by the results for cost of credit shown in column 3. The main variable of interest is the coefficient of triple interaction term '*IBC*Distress*$\widehat{CC}$' which measures the impact of the *"credit channels"* on the performance of distressed firms after the IBC policy was implemented, compared to non-distressed firms. We find a significant impact on firm performance for distressed firms with increased access to long-term debt (coefficient of 0.514) and a reduction in the cost of debt (coefficient of −0.081) after the introduction of the IBC relative to their counterparts. The economic magnitude of the triple-interaction coefficients suggests that one standard deviation increase in long-term debt (0.07) improves firm performance by 16.7% among distressed firms, compared to non-distressed firms.[12] While, a one standard deviation reduction in cost of borrowing (0.02) improves firm performance by 2.3% among distressed firms, compared to non-distressed firms. These coefficients are statistically significant at the 1% level. The results indicate that after the IBC, distressed firms benefit from both increased access to debt and reduced cost of borrowing which further help them to improve their performance resulting in higher growth opportunities, compared to their non-distressed counterparts.

Moving to other control variables, we find that *distressed* firms face lower performance as they may experience greater information asymmetry (Opler and Titman, 1994). Further, we find a significant impact of firm *size*, *age* and *collateral* on firm performance showing that larger, younger and more collateralised firms experience higher performance due to lower financial constraints.

These findings provide evidence that the IBC reform strengthened the legal infrastructure pertaining to the liquidation, rehabilitation and revival of failing commercial entities by reducing contract enforcement costs (Gupta, 2018).

6.3. Accounting for firm heterogeneity

We now explore the link between the "credit channels" and firm performance for financially distressed and non-distressed firms after the policy while categorising firms based on firm size, age and collateral. Tables 4, 5 and 6 report the results of the "credit channels" on firm performance for larger/smaller, younger/older and more/less collateral firms, respectively.

The coefficients of the triple interaction term '*IBC*Distress*$\widehat{CC}$' in Table 4 indicate that larger distressed firms benefit from

[12] The economic magnitudes of the triple-interaction term are calculated as follows: marginal effect of '*IBC * Distress*' + marginal effect of '*IBC*Distress*$\widehat{CC}$'*standard deviation of '$\widehat{CC}$'.

Table 3
Impact of "credit channels" on firm performance.

	Dependent variable = Return on Assets		
	(1)	(2)	(3)
	CC = LTD/TA	*CC = STD/TA*	*CC=Cost of debt*
IBC*Distress *$\widehat{CC}$	0.514***	−0.446	−0.081***
	(3.22)	(−0.61)	(−7.13)
IBC*Distress	0.131***	0.323*	−0.021
	(4.02)	(1.84)	(−0.74)
IBC*$\widehat{CC}$	0.151	0.873*	−0.388***
	(0.60)	(1.80)	(−6.39)
Distress*$\widehat{CC}$	−0.508***	−0.283***	−0.499***
	(−2.89)	(−4.67)	(−4.45)
$\widehat{CC}$	0.053	0.141***	0.027
	(1.47)	(2.78)	(1.09)
Distress	−0.188***	−0.140***	−0.114***
	(−4.25)	(−8.48)	(−8.50)
Size	0.089***	0.062***	0.062***
	(7.45)	(6.58)	(8.22)
Liquidity	0.024	0.010	0.016
	(0.70)	(0.25)	(0.59)
Age	−0.185***	−0.075**	−0.160***
	(−5.33)	(−2.09)	(−5.05)
Collateral	0.096***	0.237***	0.278***
	(3.03)	(5.24)	(6.48)
Observations	49,861	61,391	71,097
R-squared	0.029	0.034	0.031
Number of firms	15,396	17,295	19,711
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

improved performance due to increase in long-term debt (coefficient of 0.383) and reduced cost of borrowing (coefficient of −0.065) after the introduction of the IBC, while there is no significant impact observed for smaller distressed firms.[13] The economic magnitude of the triple-interaction coefficients suggests that one standard deviation increase in long-term debt improves firm performance by 13.2% among larger distressed firms, while a one standard deviation reduction in cost of borrowing improves firm performance by 3.4% for larger distressed firms. The test of equality shows a significant difference between the coefficient values of larger and smaller distressed firms at the 5% level.

Further in Table 5, we find that the performance of younger distressed firms improved after the introduction of the IBC policy, compared to their counterparts. The economic magnitude of this effect shows one standard deviation increase in long-term debt improves performance by 10.9%, and a one standard deviation reduction in cost of borrowing improves firm performance by 7% for younger distressed firms.

Finally, in Table 6, we find an improvement in the performance of distressed firms with a greater collateral value as compared to their counterparts. The economic magnitude of this effect shows one standard deviation increase in long-term debt improves performance by 10.4%, and a one standard deviation reduction in cost of borrowing improves firm performance by 4.8% for more

[13] One possible explanation for the lack of significance for smaller distressed firms is the use of relationship lending versus asset-based lending for larger firms. This may also explain why the coefficient of size is positive and significant for only larger firms.

Table 4
Accounting for firm heterogeneity: Firm size.

	Dependent variable = Return on Assets					
	CC = LTD/TA		*CC = STD/TA*		*CC =Cost of debt*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Larger firms	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress *$\widehat{CC}$	0.383**	0.003	−0.377	−0.467	−0.065***	−0.045
	(2.29)	(0.11)	(−0.43)	(−0.40)	(−4.64)	(−1.14)
IBC*Distress	0.105***	0.178**	0.224	0.019	−0.033	−0.003
	(3.30)	(2.01)	(1.07)	(0.07)	(−1.04)	(−0.05)
IBC*$\widehat{CC}$	0.289	0.590***	−0.738	−0.358	−0.355***	−0.158
	(1.34)	(2.79)	(−1.30)	(−0.35)	(−5.06)	(−1.18)
Distress*$\widehat{CC}$	−0.396**	−0.683**	−0.374***	−0.206*	−0.572***	−0.465**
	(−2.17)	(−1.98)	(−5.56)	(−1.91)	(−6.70)	(−2.50)
$\widehat{CC}$	0.106*	0.023	0.077	0.128	0.026	0.199
	(1.85)	(0.40)	(1.42)	(1.28)	(0.92)	(0.02)
Distress	−0.183***	−0.180**	−0.137***	−0.120***	−0.110***	−0.109***
	(−3.80)	(−2.25)	(−6.77)	(−3.63)	(−8.07)	(−3.55)
Size	0.080***	0.001	0.080***	0.043**	0.062***	0.003
	(6.44)	(0.31)	(7.53)	(2.40)	(6.73)	(0.10)
Liquidity	0.003	0.022	0.038	0.009	0.010	0.015
	(0.09)	(0.47)	(1.08)	(0.18)	(0.40)	(0.40)
Age	−0.195***	−0.107	−0.169***	−0.050	−0.227***	−0.050
	(−5.86)	(−1.61)	(−4.17)	(−0.62)	(−5.56)	(−0.17)
Collateral	0.027	0.325***	0.077*	0.437***	0.100***	0.400***
	(0.99)	(3.50)	(1.82)	(4.42)	(2.83)	(5.04)
Observations	34,235	15,626	41,560	19,831	47,084	24,013
R-squared	0.041	0.021	0.043	0.035	0.040	0.025
Number of firms	10,300	7296	11,536	8416	12,820	10,050
Test of equality: p-values	0.007		0.453		0.046	
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. A firm is classified as *larger* in a given year if size is in the top 50% of the distribution of size for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

collateralized distressed firms. The test of equality shows significant differences between the groups based on firms' age and collateral at 5% and 1% levels, respectively. The other control variables behave as conjectured.

To sum up, our results indicate that the larger, younger and more collateralized distressed firms benefit the most from the introduction of the IBC policy as compared to their counterparts.

7. Robustness section

7.1. Alternative measure of firm performance

In our main models, firm performance is measured by return on assets. We now use sales growth as an alternative measure of firm performance, defined as the percentage change in sales earning of firms (Opler and Titman, 1994; Fan et al., 2007; Giannetti and Ongena, 2007). Sales growth is of interest because it is the most direct measure of customer driven losses in sales (Opler and Titman, 1994) and also a proxy for the investment growth opportunities of firms (Bose et el., 2019; Tsoukalas et al., 2016).

Table 7 reports the results which confirm an improvement in firm performance of distressed firms due to improved access to long-term debt, and reduction in the cost of borrowing after the IBC was implemented compared to non-distressed firms. We further find that larger, younger and more collateralized distressed firms improve their performance through these 'credit channels' after the IBC relative to their counterparts.

Table 5
Accounting for firm heterogeneity: Firm age.

	Dependent variable = Return on Assets					
	CC = LTD/TA		*CC = STD/TA*		*CC =Cost of debt*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Younger firms	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress *$\widehat{CC}$	0.461**	0.002	−0.756	−0.563	−0.067***	−0.171
	(2.08)	(0.39)	(−0.71)	(−0.95)	(−4.59)	(−0.86)
IBC*Distress	0.077*	0.112**	0.322	0.289*	−0.134***	−0.540
	(1.96)	(2.50)	(1.40)	(1.66)	(−3.22)	(−1.06)
IBC*$\widehat{CC}$	0.473***	0.993***	0.431	1.277**	−0.508***	−0.430***
	(3.00)	(3.07)	(0.57)	(2.32)	(−4.48)	(−4.05)
Distress*$\widehat{CC}$	−0.232	−0.089*	−0.283**	−0.327***	−0.626***	−0.488***
	(−0.86)	(−1.70)	(−2.55)	(−4.70)	(−3.76)	(−3.98)
$\widehat{CC}$	0.529*	0.103**	0.062	0.135*	0.039	0.021
	(1.66)	(2.02)	(0.77)	(1.96)	(1.19)	(0.65)
Distress	−0.143***	−0.126***	−0.115***	−0.132***	−0.111***	−0.120***
	(−6.28)	(−6.20)	(−3.47)	(−5.79)	(−4.74)	(−6.18)
Size	0.034***	0.094***	0.046***	0.058***	0.047***	0.058***
	(3.23)	(6.44)	(3.20)	(4.11)	(4.25)	(5.51)
Liquidity	0.078*	0.023	0.036	0.035	0.034	0.072**
	(1.68)	(0.47)	(0.59)	(0.96)	(0.93)	(2.09)
Age	−0.060	−0.143	−0.035	−0.135	−0.054	−0.472***
	(−0.55)	(−0.74)	(−0.53)	(−0.73)	(−1.09)	(−2.88)
Collateral	0.358*	0.271***	0.107***	0.309***	0.122***	0.341***
	(1.83)	(4.66)	(2.58)	(5.06)	(3.06)	(6.28)
Observations	21,991	27,870	25,288	36,103	30,485	40,612
R-squared	0.025	0.035	0.026	0.038	0.029	0.033
Number of firms	8598	7834	9374	9107	11,136	9965
Test of equality: p-values	0.021		0.765		0.001	
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. A firm is classified as *younger* in a given year if age is in the bottom 50% of the distribution of age for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

7.2. Alternative measure of financial distress

In our main models, the measure of financial distress comes from the Companies (Second Amendment) Act, 2002, which requires a firm to have accumulated losses exceeding 50% of average net worth in any one of the preceding four years. We now measure firms' financial distress using interest coverage ratio, which is widely used in the empirical literature (Purnanandam, 2008). Interest coverage ratio is measured as the ratio of earnings before interest and taxes to interest expenses. We define a dummy for distressed firms, '*Distress*', which takes value one if interest coverage ratio is in the bottom 50% of the distribution of interest coverage ratio for all firms operating in the same industry in that given year, and zero otherwise.

Table 8 reports these results which show a significant impact of the IBC initiative on "credit channels" of distressed firms compared to non-distressed firms. We further find an improvement in firm performance of distressed firms due to improved access to long-term debt, and reduction in the cost of borrowing after the IBC reforms, compared to non-distressed firms. Finally, we find that larger, younger and more collateralized distressed firms improve their performance through these 'credit channels' after the IBC, relative to their counterparts.

7.3. Placebo test for the pre-policy period

This section presents a placebo test as an additional robustness check for the validity of our main results. If homogeneity across time-periods is assumed, then similar results should hold prior to the treatment period. Following Imberman and Kugler (2012) and Bose et al. (2019), we now perform the analysis for the pre-policy period of 2008–2015. Instead of the reform taking place in 2016, it is

Table 6
Accounting for firm heterogeneity: Firm collateral.

	Dependent variable = Return on Assets					
	CC = LTD/TA		*CC = STD/TA*		*CC =Cost of debt*	
	(1)	(2)	(3)	(4)	(5)	(6)
	More collateral	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress *$\widehat{CC}$	0.428***	0.004	−0.748	−0.178	−0.052***	−0.189
	(3.62)	(0.58)	(−0.95)	(−0.18)	(−4.30)	(−1.12)
IBC*Distress	0.074***	0.098	0.347*	0.245	−0.047	−0.364
	(3.24)	(1.06)	(1.79)	(1.06)	(−1.53)	(−0.78)
IBC*$\widehat{CC}$	0.352	0.700*	1.069*	1.226	−0.263***	−0.233**
	(1.52)	(1.67)	(1.94)	(1.27)	(−3.25)	(−2.29)
Distress*$\widehat{CC}$	−0.510***	−0.228**	−0.152**	−0.423***	−0.400***	−0.206
	(−3.16)	(−2.48)	(−2.42)	(−3.18)	(−3.65)	(−0.17)
$\widehat{CC}$	0.094***	0.117*	0.149*	0.057	−0.105***	−0.028
	(3.11)	(1.84)	(1.91)	(0.77)	(−2.86)	(−0.78)
Distress	−0.176***	−0.157***	−0.132***	−0.104***	−0.108***	−0.069
	(−4.17)	(−4.08)	(−7.16)	(−3.42)	(−8.50)	(−0.49)
Size	0.065***	0.070***	0.034***	0.037**	0.045***	0.030**
	(5.76)	(3.15)	(3.91)	(2.06)	(5.02)	(2.44)
Liquidity	0.034	0.069	0.026	0.010	0.025	0.035
	(1.00)	(1.01)	(0.59)	(0.20)	(0.82)	(0.71)
Age	−0.281***	−0.031	−0.199***	−0.121*	−0.251***	−0.050
	(−6.39)	(−0.40)	(−5.17)	(−1.89)	(−6.52)	(−0.99)
Collateral	0.077***	0.023	0.184***	0.034	0.239***	0.001
	(3.01)	(0.15)	(4.77)	(0.26)	(6.10)	(0.01)
Observations	31,596	18,265	34,578	26,813	39,983	31,114
R-squared	0.049	0.034	0.048	0.029	0.052	0.024
Number of firms	10,292	7865	10,870	9861	12,349	11,276
Test of equality: p-values	0.000		0.562		0.000	
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. A firm is classified as more collateralized in a given year if collateral is in the top 50% of the distribution of collateral for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

assumed that the reform took place in 2013–2015.[14] If there are any pre-existing trends, then there should be a significant impact of the policy on "credit channels" and firm performance. This procedure helps to rule out if any other confounding economic events surrounding the reform shock are influencing the results.[15] If the results show insignificant effects of the policy on "credit channels" and firm performance, then it proves the validity of our treatment effect.

Table 9 presents the results which demonstrate an insignificant impact of the IBC initiative on "credit channels" for distressed firms using both the debt and the cost of financing channels. We do not find any significant impact of these "credit channels" on firm performance for distressed firms. Furthermore, the results for firm performance are also insignificant for larger, younger and more collateralized distressed firms. Therefore, the placebo test again strengthens the validity of our main results.

[14] DID tests for the pre-policy period are also performed using the reform period after 2014 and 2012. The results show almost similar results both quantitatively and qualitatively as 2013–2015 reform period.

[15] We also omit the IBC enactment year of 2016 out of the sample to consider any information leakage and potential effects of firms already incorporating this effect into their decision-making as it is highly unlikely that the news about bankruptcy reform was unanticipated. The results remain qualitatively and quantitatively similar to our main results.

Table 7
Robustness: Alternative measure of firm performance.

	Dependent variable = Sales growth					
	(1)		(2)		(3)	
Panel A:	*CC = LTD/TA*		*CC = STD/TA*		*CC=Cost of debt*	
IBC*Distress*$\widehat{CC}$	0.767***		1.337		−0.071***	
	(3.42)		(1.60)		(−3.69)	
Observations	52,276		65,511		76,574	
R-squared	0.118		0.138		0.116	
Number of firms	15,175		17,246		19,576	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B:	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	0.749***	0.377	0.396	0.422	−0.057**	−0.028
	(2.89)	(1.45)	(0.13)	(1.63)	(−2.55)	(−1.43)
Observations	36,247	16,029	44,861	20,650	51,217	25,357
R-squared	0.082	0.235	0.084	0.238	0.084	0.270
Number of firms	10,336	7051	11,786	8150	13,022	9778
Test of equality: *p*-values	0.024		0.944		0.045	
Panel C:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.470**	0.011	1.467	0.643	−0.064***	−0.205
	(2.11)	(1.15)	(1.31)	(0.52)	(−3.76)	(−0.84)
Observations	22,994	29,282	27,174	38,337	33,410	43,164
R-squared	0.147	0.143	0.141	0.154	0.146	0.087
Number of firms	8414	7708	9342	8990	11,034	9815
Test of equality: *p*-values	0.021		0.503		0.001	
Panel D:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.427*	0.006	0.377	0.207	−0.081***	−0.287
	(1.82)	(1.45)	(1.23)	(0.57)	(−3.41)	(−1.00)
Observations	33,596	18,680	37,377	28,174	43,572	33,002
R-squared	0.139	0.110	0.156	0.130	0.144	0.123
Number of firms	10,183	7551	10,858	9671	12,285	11,031
Test of equality: *p*-values	0.036		0.576		0.026	

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is sales growth which is the annual percentage increase in sales of firms. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. *LTD/TA* is the ratio of long-term debt to total assets. *STD/TA* is the ratio of short-term debt to total assets. *Cost of debt* is the ratio of total interest expenses to total debt. A firm is classified as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. The remaining specifications, which are not reported for brevity are identical to Tables 3-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

7.4. Alternative classification of firms

In the main model, we classified distressed firms as larger, more collateralized (or younger) if size, collateral (or age) was in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms operating in the same industry in that given year. In order to confirm that these results are not driven by the way we divide the sample, we carry out two additional tests. First, we use the 25th percentile as an alternative cut-off point. Thus, we classify distressed firms as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 25% of the distribution of size, collateral (or age) for all firms operating in the same industry in that year. Second, we also include firm heterogeneity based on firms' ownership structure, classifying distressed firms into public versus private firms.

Table 10 (panels A-C) confirms, again, that the IBC policy helped larger, younger and more collateralized distressed firms to improve their performance due to increased debt, and reduced cost of borrowing after the introduction of the IBC policy compared to their counterparts. The test of equality shows significant differences between the two groups of distressed firms based on size, age and collateral. Further, the results in panel D show that both public and private distressed firms are able to improve their performance due to improved access to long-term debt, and a decline in the cost of debt after the introduction of the IBC policy. The test of equality shows there are no significant differences between the two groups of distressed firms based on ownership. Hence, to conclude, our main results are also robust to an alternative classification of firms.

Table 8
Robustness: Alternative measure of financial distress.

Dependent variable =	LTD/TA	STD/TA	Cost of debt
Panel A:	(1)	(2)	(3)
IBC*Distress	0.035***	0.021***	−0.013***
	(10.32)	(7.50)	(−4.15)
Observations	74,156	90,210	107,464
R-squared	0.072	0.062	0.004
Number of firms	18,966	21,356	24,635

Dependent variable=	**Return on Assets**		
Panel B:	(1)	(2)	(3)
	CC = LTD/TA	*CC = STD/TA*	*CC=Cost of debt*
IBC*Distress*$\widehat{CC}$	0.389***	−0.220	−0.020**
	(2.21)	(−0.46)	(−2.46)
Observations	49,861	61,391	71,097
R-squared	0.033	0.039	0.031
Number of firms	15,396	17,295	19,711

	(1)	(2)	(3)	(4)	(5)	(6)
Panel C:	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	0.308**	0.125	−0.675	−0.557	−0.019**	−0.007
	(2.03)	(0.72)	(−1.31)	(−0.61)	(−2.17)	(−0.58)
Observations	34,235	15,626	41,560	19,831	47,084	24,013
R-squared	0.051	0.026	0.039	0.033	0.040	0.035
Number of firms	10,300	7296	11,536	8416	12,820	10,050
Test of equality: *p*-values	0.067		0.841		0.089	
Panel D:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.204**	0.025	−0.275	−0.799	−0.032***	−0.158
	(1.97)	(0.14)	(−0.33)	(−1.38)	(−3.85)	(−1.18)
Observations	21,991	27,870	25,288	36,103	30,485	40,612
R-squared	0.030	0.034	0.024	0.034	0.029	0.034
Number of firms	8598	7834	9374	9107	11,136	9965
Test of equality: *p*-values	0.046		0.509		0.039	
Panel E:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.463**	0.309	−0.353	−0.116	−0.016**	−0.184
	(2.48)	(1.13)	(−0.72)	(−0.14)	(−2.03)	(−0.52)
Observations	31,596	18,265	34,578	26,813	39,983	31,114
R-squared	0.058	0.033	0.057	0.033	0.061	0.028
Number of firms	10,292	7865	10,870	9861	12,349	11,276
Test of equality: *p*-values	0.089		0.638		0.003	

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variables are the ratio of long-term debt to total assets, the ratio of short-term debt to total assets, and the ratio of total interest expenses to total debt in Panel A. In Panels B-E, the dependent variable is return on assets. *Distress* is a dummy that takes value 1 if interest coverage ratio is in the bottom 50% of the distribution of interest coverage ratio for all firms operating in the same industry in that given year, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. 'CC' refers to the credit-channels of debt-structure and cost of borrowings. A firm is classified as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level in Panel A, and standard errors are bootstrapped in Panels B-E. The remaining specifications, which are not reported for brevity are identical to Tables 2-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

7.5. Addressing potential endogeneity concerns

This section presents the instrumental variable method (two-stage least squares - 2SLS) used to deal with the potential endogeneity concern of the explanatory variables. We assume that all control variables used in the model are endogenous and we use their own values lagged twice as instruments. The validity and importance of the instruments for the control variables are verified using a

Table 9
Robustness: Placebo test.

Dependent variable=	LTD/TA	STD/TA	Cost of debt
Panel A:	(1)	(2)	(3)
IBC*Distress	0.074	−0.002	−0.028
	(1.36)	(−0.05)	(−0.90)
Observations	48,050	59,968	69,520
R-squared	0.030	0.008	0.042
Number of firms	14,871	17,299	19,686

Dependent variable=	**Return on Assets**		
Panel B:	(1)	(2)	(3)
	CC = LTD/TA	*CC = STD/TA*	*CC=Cost of debt*
IBC*Distress*$\widehat{CC}$	0.006	−0.042	−0.036
	(0.14)	(−0.49)	(−1.27)
Observations	38,892	51,614	58,507
R-squared	0.019	0.015	0.017
Number of firms	12,680	16,112	18,122

	(1)	(2)	(3)	(4)	(5)	(6)
Panel C:	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	−0.017	0.012	−0.092	0.126	−0.027	−0.100
	(−0.35)	(0.16)	(−0.93)	(0.52)	(−0.83)	(−1.06)
Observations	27,970	10,922	36,312	15,302	40,136	18,371
R-squared	0.026	0.018	0.019	0.020	0.021	0.021
Number of firms	8906	4650	11,102	6207	12,126	7428
Test of equality: *p*-values	0.795		0.465		0.952	
Panel D:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.029	−0.046	−0.105	0.018	−0.025	−0.051
	(0.48)	(−0.60)	(−1.02)	(0.12)	(−0.66)	(−1.15)
Observations	16,629	22,263	21,760	29,854	25,064	33,443
R-squared	0.030	0.016	0.018	0.016	0.021	0.016
Number of firms	6135	6775	7844	8562	8985	9486
Test of equality: *p*-values	0.497		0.263		0.675	
Panel E:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.012	−0.140	0.037	0.086	0.015	−0.070
	(0.28)	(−1.04)	(0.44)	(0.39)	(0.49)	(−1.08)
Observations	24,891	14,001	29,094	22,520	32,739	25,768
R-squared	0.036	0.019	0.024	0.018	0.026	0.020
Number of firms	8458	5793	9743	8467	10,884	9595
Test of equality: *p*-values	0.276		0.653		0.358	

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variables are the ratio of long-term debt to total assets, the ratio of short-term debt to total assets, and the ratio of total interest expenses to total debt in Panel A. In Panels B-E, the dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2013–2015, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. A firm is classified as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level in Panel A, and standard errors are bootstrapped in Panels B-E. The remaining specifications, which are not reported for brevity are identical to Tables 2-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

number of diagnostic tests. The results for these tests are also reported in Table 11.[16]

Table 11 shows the results of the 2SLS model. The results validate that distressed firms benefit from an increased access to long-term and short-term debt, and a reduction in cost of credit after the IBC initiative, compared to non-distressed firms. We further find that distressed firms improve their firm performance due to increased credit supply and reduced cost of borrowing. Finally, we find

[16] In addition to the normal diagnostics/statistics reported at the bottom part of the tables, the Anderson Rubin chi-square test was also employed, obtaining identical *p*-values as with Anderson Rubin F-test.

Table 10
Robustness: Alternative classification of firms.

	Dependent variable = Return on Assets					
	CC = LTD/TA		*CC = STD/TA*		*CC=Cost of debt*	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	0.436***	0.132	−0.556	−0.493	−0.074***	−0.035
	(3.12)	(0.73)	(−0.95)	(−0.27)	(−5.94)	(−0.45)
Observations	45,987	3874	56,466	4925	64,797	6300
R-squared	0.037	0.044	0.038	0.059	0.034	0.037
Number of firms	13,970	2362	15,707	2815	17,697	3510
Test of equality: *p*-values	0.000		0.190		0.046	
Panel B:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.403***	0.284	−0.708	−0.639	−0.043***	−0.067
	(3.83)	(0.48)	(−1.49)	(−1.04)	(−3.56)	(−0.43)
Observations	8252	41,609	8726	52,665	11,187	59,910
R-squared	0.043	0.033	0.025	0.033	0.020	0.030
Number of firms	3841	12,170	4029	13,961	5065	15,511
Test of equality: *p*-values	0.048		0.490		0.087	
Panel C:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.404***	0.142	−0.722	−0.422	−0.074***	−0.116
	(3.05)	(0.39)	(−0.98)	(−1.07)	(−5.53)	(−0.42)
Observations	43,186	6675	50,809	10,582	58,205	12,892
R-squared	0.031	0.092	0.036	0.039	0.038	0.024
Number of firms	13,405	3384	14,685	4512	16,574	5406
Test of equality: *p*-values	0.062		0.317		0.036	
Panel D:	*Public firms*	*Private firms*	*Public firms*	*Private firms*	*Public firms*	*Private firms*
IBC*Distress*$\widehat{CC}$	0.211***	1.363**	−0.138	−0.954	−0.019**	−0.021**
	(3.72)	(2.44)	(−1.08)	(−0.81)	(−2.19)	(−2.30)
Observations	28,285	14,063	38,608	18,390	44,198	21,330
R-squared	0.031	0.023	0.023	0.015	0.020	0.014
Number of firms	8032	5814	9928	7042	11,103	8288
Test of equality: *p*-values	0.101		0.484		0.153	

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. 'CC' refers to the credit-channels of debt-structure and cost of borrowings. In panels A-C, a firm is classified as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 25% of the distribution of size, collateral (or age) for all firms in the same industry in that year. In panel D, a firm is classified into public versus private firms based on the ownership structure. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are bootstrapped. The remaining specifications, which are not reported for brevity are identical to Tables 3-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

that larger, younger and more collateralized distressed firms improve their performance through these 'credit channels' after the IBC, relative to their counterparts. Overall, the diagnostic tests do not specify any problem regarding the application of instruments used and provide a reliable robustness check to the main results.

7.6. Applying a matching estimation

Our main results could be driven by the differences in firms' fundamentals between the treated (distressed) and control (non-distressed) groups. It is for this reason that we now consider a non-parametric method – propensity score matching (hereafter PSM) – to accommodate this potential endogeneity (see Heckman et al., 1997, 1998; Mallick and Yang, 2013). PSM technique enables 'like-for-like' comparison and it is an appropriate method to examine the relationship between financial distress and firm performance. To achieve ex-ante comparability across firms, we employ Leuven and Sianesi's (2003) PSM approach and used kernel matching as

Table 11
Robustness: Addressing endogeneity concerns.

Dependent variable=	LTD/TA	STD/TA	Cost of debt
Panel A:	(1)	(2)	(3)
IBC*Distress	0.052***	0.001	−0.008**
	(6.09)	(0.14)	(−2.04)
Observations	53,516	66,433	78,638
Number of firms	12,650	14,611	16,949
Kleibergen-Paap	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000
Hansen J	0.508	0.213	0.050

Dependent variable=	**Return on Assets**		
Panel B:	(1)	(2)	(3)
	CC = LTD/TA	*CC = STD/TA*	*CC=Cost of debt*
IBC*Distress*$\widehat{CC}$	0.424***	−0.258	−0.074***
	(3.91)	(−0.42)	(−5.84)
Observations	40,765	53,531	63,254
Number of firms	10,685	13,023	14,971
Kleibergen-Paap	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000
Hansen J	0.246	0.992	0.531

	(1)	(2)	(3)	(4)	(5)	(6)
Panel C:	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	0.363***	0.084	−0.111	−0.413	−0.057***	−0.033*
	(3.25)	(0.69)	(−0.14)	(−0.49)	(−4.13)	(−1.73)
Observations	28,693	11,086	36,929	15,339	42,773	18,889
Number of firms	7162	3831	8691	4878	9826	6001
Kleibergen-Paap	0.000	0.000	0.000	0.000	0.000	0.004
Stock-Wright	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.331	0.684	0.721	0.499	0.239	0.986
Test of equality: *p*-values	0.043		0.317		0.012	
Panel D:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.706**	0.005	−0.475	−0.487	−0.056***	−0.151
	(2.15)	(0.74)	(−0.41)	(−0.74)	(−4.52)	(−0.76)
Observations	17,377	23,167	20,976	32,233	25,884	36,881
Number of firms	5285	5654	6133	7242	7523	7989
Kleibergen-Paap	0.000	0.000	0.000	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.479	0.010	0.125	0.150	0.738	0.712
Test of equality: *p*-values	0.020		0.920		0.017	
Panel E:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.355***	0.153	−0.530	−0.464	−0.046***	−0.063
	(3.25)	(0.21)	(−0.80)	(−0.46)	(−4.47)	(−0.34)
Observations	26,444	13,076	29,978	21,917	35,449	25,928
Number of firms	7057	4247	7724	6339	8949	7427
Kleibergen-Paap	0.000	0.000	0.000	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.905	0.309	0.634	0.896	0.173	0.392
Test of equality: *p*-values	0.046		0.865		0.089	

Notes: All specifications are estimated using two-staged least squares (2SLS) method with firm, time and industry fixed effects. The dependent variables are the ratio of long-term debt to total assets, the ratio of short-term debt to total assets, and the ratio of total interest expenses to total debt in Panel A. In Panels B-E, the dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. '*CC*' refers to the credit-channels of debt-structure and cost of borrowings. The Kleibergen-Paap is a test of under-identification distributed as chi-square under the null of under-identification. The Anderson Rubin and Stock-Wright LM S statistic are weak-instrument-robust inference tests, distributed as F-test and chi-square respectively, under the null that coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and the over-identifying restrictions are valid. The Hansen J statistic is a test of the over-identifying restrictions, distributed as chi-square under the null of instrument validity. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level. The remaining specifications, which are not reported for brevity are identical to Tables 2-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

Table 12
Robustness: Propensity score matching estimation.

Dependent variable=	LTD/TA	STD/TA	Cost of debt
Panel A:	(1)	(2)	(3)
IBC*Distress	0.052***	0.028***	−0.010**
	(5.30)	(7.73)	(−2.13)
Observations	62,095	76,730	90,104
R-squared	0.092	0.055	0.004
Number of firms	13,386	15,184	16,689

Dependent variable=	**Return on Assets**		
Panel B:	(1)	(2)	(3)
	CC = LTD/TA	*CC = STD/TA*	*CC=Cost of debt*
IBC*Distress*$\widehat{CC}$	0.442***	−0.328	−0.067***
	(3.24)	(−0.47)	(−4.36)
Observations	44,227	54,839	62,940
R-squared	0.030	0.039	0.032
Number of firms	12,314	13,954	15,532

Panel C:	(1)	(2)	(3)	(4)	(5)	(6)
	Larger firms	*Smaller firms*	*Larger firms*	*Smaller firms*	*Larger firms*	*Smaller firms*
IBC*Distress*$\widehat{CC}$	0.313**	0.098	−0.066	−0.594	−0.064***	−0.022
	(2.11)	(0.52)	(−0.07)	(−0.57)	(−3.97)	(−0.84)
Observations	31,298	12,929	38,269	16,570	43,102	19,838
R-squared	0.052	0.041	0.060	0.041	0.049	0.030
Number of firms	8650	5688	9809	6612	10,719	7723
Test of equality: *p*-values	0.032		0.549		0.036	
Panel D:	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*	*Younger firms*	*Older firms*
IBC*Distress*$\widehat{CC}$	0.751***	0.203	−0.696	−0.894	−0.063***	−0.268
	(2.94)	(0.47)	(−0.50)	(−1.39)	(−3.73)	(−1.33)
Observations	19,539	24,688	22,647	32,192	27,042	35,898
R-squared	0.029	0.038	0.052	0.044	0.042	0.037
Number of firms	7123	6179	7903	7187	9168	7687
Test of equality: *p*-values	0.067		0.841		0.000	
Panel E:	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*	*More collateral*	*Less collateral*
IBC*Distress*$\widehat{CC}$	0.487***	0.002	−0.759	−0.333	−0.063***	−0.108
	(3.72)	(0.89)	(−0.97)	(−0.25)	(−4.84)	(−0.51)
Observations	28,153	16,074	31,027	23,812	35,576	27,364
R-squared	0.055	0.058	0.057	0.044	0.056	0.030
Number of firms	8384	6580	8984	8269	10,005	9216
Test of equality: *p*-values	0.015		0.749		0.046	

Notes: All specifications are estimated using propensity score matched difference-in-differences estimator with firm, time and industry fixed effects. The dependent variables are the ratio of long-term debt to total assets, the ratio of short-term debt to total assets, and the ratio of total interest expenses to total debt in Panel A. In Panels B-E, the dependent variable is return on assets. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. Leuven and Sianesi's (2003) propensity score matching technique is used to match distressed and non-distressed. Matching samples are chosen on a one-to-one basis, where each of the "distressed firm" is matched with a "non-distressed firm" of comparable size and similar industry in the pre-treatment (one year before the policy was introduced) period. IBC is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. 'CC' refers to the credit-channels of debt-structure and cost of borrowings. A firm is classified as larger, more collateralized (or younger) in a given year if size, collateral (or age) is in the top (or bottom) 50% of the distribution of size, collateral (or age) for all firms in the same industry in that year. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level in Panel A, and standard errors are bootstrapped in Panels B-E. The remaining specifications, which are not reported for brevity are identical to Tables 2-6. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

implemented by Martincus and Carballo (2008) and Mallick and Yang (2013).[17] The main concept of this estimator is to find the best possible match between distressed and non-distressed firms based on several observable characteristics. Matched samples are chosen where each of the "distressed firm" is matched with a "non-distressed firm" of comparable size and similar industry in the pre-policy (one year before the policy was introduced) period.[18] Next, we apply the DID regressions between these highly comparable propensity score matched treated and control groups.

These results are reported in Table 12 and they again confirm that the IBC policy helped distressed firms to improve their "credit channels" of greater access to debt and reduced cost of debt, compared to their non-distressed counterparts. Further, the distressed firms are able to improve their performance due to these "credit channels" after the IBC policy relative to their counterparts. In addition, larger, younger and more collateralized distressed firms improved their performance, compared to their counterparts. Thus, our results still prove to be robust to this matching technique.

8. Conclusions

This paper evaluates the effects of a unique bankruptcy resolution mechanism in the context of distressed corporate debt market in India, providing novel evidence on the impact of the bankruptcy reform (balancing the rights of both creditors and debtors) on the performance of financially distressed firms via exploring the credit flow channels of long-term financing and the cost of debt. Within the Indian context, both theoretical and empirical work on corporate bankruptcy has emphasized that there was no speedy resolution mechanism until 2016, when the government of India instituted a new more efficient IBC mechanism for faster resolution of debt recovery cases. The IBC was aimed at addressing the deficiencies revealed by the two previous mechanisms in place for debt recovery and strengthening creditor rights, i.e., the DRT Act of 1993 and the SARFAESI Act of 2002.

Using a rich panel dataset for Indian firms, this paper acknowledges several contributions to the existing literature. First, we show that the IBC policy has been successful in improving the *"credit channels"* reflected in the increased credit supply and the reduced cost of debt for financially distressed firms, compared to their non-distressed counterparts. Second, we find that it is precisely through these *"credit channels"* that financially distressed firms improve their performance. In this regard, our results support the view that these *"credit channels"* are indispensable to spur firm-level business investments, and overall economic growth. Lastly, in the post-IBC period, when we account for firm heterogeneity, we find that larger, younger, and more collateralised financially distressed firms derive most benefits compared to their non-distressed counterparts.

We conclude that the results of the paper are relevant to the current academic and policy debates on safeguarding and preserving businesses in the midst of the current Covid-19 crisis, which is likely to drive many businesses into bankruptcies. Given the profound implications of this Covid-19-induced pandemic, fostering a deep understanding of the provisions is paramount to avoid bankruptcy. A strong bankruptcy system can not only support financially distressed companies to benefit from a quick and long-lasting revival process, but also it can make lenders more confident to lend to enable better credit access by firms under stressed scenarios.

Appendix

Table A1: Correlation matrix.

	Size	Liquidity	Age	Collateral
Size	1.000			
Liquidity	0.138	1.000		
Age	0.142	0.012	1.000	
Collateral	0.006	−0.222	−0.038	1.000

Notes: *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets.

Table A2: Additional factors influencing "credit channels".

	(1)	(2)	(3)
Dependent variable=	LTD/TA	STD/TA	Cost of debt
IBC*Distress	0.067***	0.012*	−0.008**
	(7.82)	(1.76)	(−2.07)

(*continued on next page*)

[17] Following Martincus and Carballo (2008), the results are based on the kernel matching method with a bandwidth of 0.04. The main concept of this method is that the control observations are assigned more weights if they are closer to the propensity score of a treated observation and lower weights on more distant observations.

[18] The quality of matching appears good as there are no statistically significant differences in the pre-policy mean values of the covariates across distressed and non-distressed firms, suggesting there is an adequate `like-for-like' comparison in the matching exercise (see Table A4 of the Appendix).

(*continued*)

	(1)	(2)	(3)
Dependent variable=	LTD/TA	STD/TA	Cost of debt
Distress	0.050***	0.034***	−0.001
	(12.54)	(10.65)	(−0.25)
Size	0.001	0.007***	−0.002*
	(0.43)	(5.53)	(−1.91)
Liquidity	0.010	0.074***	−0.001
	(0.97)	(12.92)	(−0.38)
Age	−0.047***	−0.013***	0.001
	(−8.37)	(−3.14)	(0.11)
Collateral	0.155***	0.035***	−0.003
	(15.75)	(5.85)	(−0.55)
MB	0.001	0.001***	0.001
	(0.52)	(2.58)	(0.85)
Cash/Assets	−0.022	−0.001	−0.128***
	(−0.73)	(−0.03)	(−2.98)
Observations	61,923	75,363	86,544
R-squared	0.093	0.050	0.004
Number of firms	16,795	18,988	21,413
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time*Industry FE	Yes	Yes	Yes

Notes: All specifications are estimated using a difference-in-differences estimator with firm, time and industry fixed effects. The dependent variables are *LTD/TA* which is the ratio of long-term debt to total assets, *STD/TA* which is the ratio of short-term debt to total assets and c*ost of debt* which is the ratio of total interest expenses to total debt. *Distress* is a dummy that takes value 1 if a firm in a year has accumulated losses equal to or exceeding 50% of its average net worth in the immediately preceding four financial years, and 0 otherwise. *IBC* is a dummy that equals 1 if the observation occurs in the post-reform period of 2016–2019, and 0 otherwise. *Size* equals natural logarithm of total assets. *Liquidity* is current assets less current liabilities over total assets. *Age* is the natural logarithm of the number of years since incorporation. *Collateral* is the ratio of net fixed assets to total assets. *MB* is the ratio of the market value of equity to its book value. *Cash/Assets* is the ratio of cash and bank balances to total assets. We lag all firm-level variables by one time-period. Robust t-statistics are reported in the parentheses. Standard errors are clustered at the firm level. Statistical significance is denoted at 1% (***), 5% (**), and 10% (*).

Table A3: Descriptive statistics for different components of debt ratios.

	Distress = 1		
	IBC = 0	*IBC = 1*	*p-value*
LTD (INR million)	1014 (3342)	2126 (4966)	0.000
STD (INR million)	509 (1654)	1015 (2401)	0.000
TA (INR million)	2196 (9503)	3730 (12225)	0.000

Notes: The table presents sample means with standard deviations in parentheses.

Table A4: Balancing properties of matched firms.

	Mean		*t-test*	
	Distress = 1	*Distress = 0*	*t-statistic*	*p-value*
Size	5.365	5.428	−1.04	0.299
Age	2.498	2.502	−0.19	0.847
Industry dummies	3.051	3.035	0.36	0.720

Notes: Matching method `t-test' is the *t*-test to the equality of given firm characteristics between distressed and non-distressed firms.

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