Creditor Rights and Investment Efficiency in Financially Distressed Firms

Shivangi Agarwal
Goa Institute of Management, India
shivangi.agarwal@gim.ac.in
Shivangi.2019phd@iimu.ac.in

Bidisha Chakrabarty*
Saint Louis University, USA
bidisha.chakrabarty@slu.edu

Lubomir P. Litov
University of Oklahoma, USA
litov@ou.edu

Bhavya Singhvi
Indian Institute of Management Udaipur, India
bhavya.singhvi@iimu.ac.in

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Abstract: Do strong creditor rights in bankruptcy law improve the efficiency of investments in financially distressed firms? Exploiting a landmark insolvency resolution reform, we find that strengthening creditor-control rights improves the investment efficiency of financially distressed firms compared to non-distressed firms by reducing their overinvestment. Further, stronger creditor rights are more effective in improving the investment efficiency of firms with higher personal costs of bankruptcy of shareholders and less disciplined managers. Fear of sub-optimal liquidation, loss of control over the firm, and management turnover in the event of insolvency in a regime with stronger creditor rights incentivizes managers and shareholders of distressed firms to utilize resources more efficiently.

Keywords: Creditor Rights, Bankruptcy, Distress, Investment Efficiency, Corporate Governance.

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* Corresponding author.

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1. Introduction

Theory suggests that by delineating the rights of creditors and debtors in financial distress, bankruptcy laws affect firms' investment decisions. When legal provisions strengthen creditor rights in bankruptcy, the anticipated losses for shareholders increase, which may discourage investment in projects with positive net present value, resulting in underinvestment (Myers, 1977). Conversely, stronger creditor protections can enhance the value of collateral and broaden access to debt financing for distressed firms (Bose et al., 2021). This, in turn, may incentivize managers to overinvest in risky projects (Jensen and Meckling, 1976; Li et al., 2017) or undertake inefficient investments to rescue firms from distress (Jensen, 1986; Malmendier and Tate, 2008). These studies suggest that shifting more rights to creditors under bankruptcy can reduce investment efficiency in distressed firms, either through overinvestment or underinvestment.

Alternatively, stronger creditor rights may impose costs on shareholders and managers, creating countervailing incentives that can improve investment efficiency. First, enhanced bargaining power for creditors can precipitate premature liquidation upon default, reducing shareholder value (Acharya et al., 2011; Acharya and Subramanian, 2009; Vig, 2013). Second, if ownership transfers to new investors, it can increase the personal cost of bankruptcy of shareholders through loss of business and financial incentives, and reputational damage (Schoenherr and Starmans, 2022). Fear of inefficient liquidation and higher personal cost of bankruptcy can discipline shareholders of distressed firms, leading to more prudent investment. During insolvency, managers are dismissed from their positions, which leads to financial loss and future career concerns which may incentivize them to improve investment efficiency (Rainville et al., 2022). Collectively, these arguments suggest improved investment efficiency of distressed firms if creditor rights are strengthened.

Which of these effects transpire? To answer this question, we exploit a shock to bankruptcy laws that shifted greater rights to creditors during bankruptcy. In particular, we analyze the impact of the announcement of the Insolvency and Bankruptcy Code (IBC) in India in 2015 on the

investment efficiency of financially distressed firms. IBC is a landmark regulatory change that significantly shifted the powers in the bankruptcy process from debtors to creditors.[1]

Our sample is drawn from all listed firms in India during the period 2011 to 2020. Following Biddle et al. (2009) and Chay et al. (2023), we calculate our main dependent variable—investment efficiency of firms—as actual investment minus optimal investments obtained from a predictive regression. To measure financial distress, we use the interest coverage ratio (Purnanandam, 2008).[2] Our empirical tests exploit a difference-in-differences design and compare distressed firms against the non-distressed firms before and after the announcement of IBC.

Our main result is that after the announcement of IBC, the investment efficiency of distressed firms improved significantly compared to non-distressed firms. Our estimates indicate that distressed firms improved investment efficiency by 0.8% of total assets more compared to non-distressed firms, which is 15.38% (0.008/-0.052) of the mean investment efficiency of the distressed firms in the pre-IBC period. In terms of the value of this effect, the change in investment efficiency of distressed firms due to IBC is INR 180.34 million more compared to change in investment efficiency of non-distressed firms.[3] Thus, shifting rights to creditors during bankruptcy leads to an appreciable improvement in investment efficiency.

Earlier we previewed studies which suggest that the improved investment efficiency could arise due to reduction in overinvestment (indication of disciplined investments) or improvement in underinvestment (indication of improved risk appetite) in distressed firms. To examine which of these two effects leads to the documented improvement in investment efficiency, we divide our

[1] IBC permits the initiation of insolvency proceedings upon a borrower's default, promptly removes management upon admission of insolvency, and shifts powers to creditors during bankruptcy. It significantly strengthened creditor rights and imposed heavy penalty on managers and shareholders of firms, starkly different from the erstwhile debtor-in-possession insolvency regime in India. In Section 2 we present details of the reforms introduced by the IBC.
[2] In robustness tests (Section 6), we use several other alternative variable measurements based on other studies.
[3] We test for pre-trends and find no significant difference in investment efficiency of financially distressed and non-distressed firms in the period before IBC, suggesting that the effect is driven by IBC.

sample into two groups, overinvesting and underinvesting subsamples, based on whether they deviate positively or negatively from the predicted optimal investment, respectively. For the overinvesting group, we find that distressed firms significantly improve investment efficiency comparison to non-distressed firms. In particular, distressed firms' reduction in overinvestment is higher than that of the non-distressed firms by 1.9% of total assets, which is 24.05% (0.019/-0.079) of the mean investment efficiency of the overinvesting group in the pre-IBC period.[4] However, we do not find any statistically significant impact in the underinvesting group. Thus, the improvement in investment efficiency results from reduction in overinvestment in distressed firms. These results support the argument that stronger creditor rights under IBC induced discipline among shareholders and managers of distressed firms and incentivized them to make more efficient investment decisions, but did not improve the risk-appetite of underinvesting distressed firms.

We perform a battery of checks to assess the robustness of our main result. First, to eliminate the effect of possible temporal confounds, we perform a pre-treatment placebo test (Rosenbaum, 2017). Specifically, we choose a sample from the pre-IBC period and assign a *pseudo* shock year and repeat all our tests. We do not find any significant change in the investment efficiency of the distressed firms around the *pseudo*-shock. Second, we expect that distressed and non-distressed firms may differ in firm characteristics. Although we control for this using firm fixed effects in all our regressions, additionally we conduct propensity weighting analysis and find results similar to the analysis without propensity weighting. Third, to ensure that variable measurement or empirical design choices do not drive our results, we conduct the following analysis: i) Instead of measuring investments based on cash expenditures, we use changes in the level of gross fixed assets. ii) As an alternative to using Tobin's Q, we use sales growth rate to measure growth opportunities. iii) To ensure our findings are not sensitive to using interest coverage ratio to classify firms as distressed,

[4] In value terms, reduction in overinvestment by distressed firms due to IBC is INR 476.63 million more compared to reduction in overinvestment by non-distressed firms.

we use both the Z-score (Altman, 1968) and distance to default (Bharath and Shumway, 2008) for alternative classifications. iv) To ensure that our results are not driven by the choice of cutoffs, we replace the quartile-based classification of distressed with, in turn, terciles and median. v) We use alternative time frames around the IBC shock. Our inferences remain the same across all these tests.

We next examine mechanisms. The literature points to several (albeit) non-exclusive channels. First, enhanced creditor rights may raise shareholders' personal bankruptcy costs and induce investment caution (Schoenherr and Starmans, 2022). We stratify firms by ownership concentration, the share held by Indian Individuals and Hindu Undivided Families (HUF) promoters, the number of blockholders, indicator for >50% individual/HUF promoter ownership, and business-group affiliations. Across all these partitions, the post-IBC improvement in investment efficiency among financially distressed firms is concentrated in subsamples with higher personal bankruptcy costs for shareholders.

Second, stronger creditor rights may heighten managerial discipline by increasing the career costs of insolvency (Rainville et al., 2022). To proxy for governance and monitoring, we use the following variables: proportions of non-executive and non-executive independent directors, Big-4 auditor status, whether borrowing is exclusively from government-owned banks, and industry competition (HHI). Comparisons across these subsamples yield (mixed) evidence that greater managerial discipline explains the post-IBC rise in managerial investment caution in financially distressed firms.

Third, increased creditor rights could elevate the threat of premature liquidation (Acharya et al., 2011; Acharya and Subramanian, 2009; Vig, 2013). Using asset tangibility, leverage, and the number of lending banks to capture variations in liquidation threat, we find no evidence that this channel accounts for the post-IBC shift in investment behavior. Taken together, the results indicate that higher shareholder personal bankruptcy costs and, to a lesser degree, managerial discipline in financially distressed firms under IBC drive the improvement in investment efficiency.

In further tests, we also examine and find that the efficiency gains are attributable to changes in capital expenditures—measured as net spending on fixed-asset purchases—rather than acquisitions or R&D outlays. Finally, these gains translate into superior operating performance, measured by return on assets, in years 2 and 3 after IBC, consistent with a lagged mapping from investment efficiency to operating results.

This study makes several contributions to the literature. First, we add to the body of research that examines how creditor rights affect a firm's investment decisions. While studies have documented that strong rights to creditors increase the availability of credit and leads to higher investments (Guevara and Riutort, 2024; Ponticelli and Alencar, 2016), evidence also indicates that substantial creditor rights can make borrowers fearful of premature and inefficient liquidation, which disincentivizes risk-taking, investment in innovation, or mergers and acquisitions (Acharya et al., 2011; Acharya and Subramanian, 2009; Closset and Urban, 2019; Rainville et al., 2022; Schoenherr and Starmans, 2022). While these papers provide evidence on the level of investment, they do not examine whether the impact of strong creditor rights translates into efficient investments. Our result that stronger creditor rights improve the investment efficiency of distressed firms by reducing over-investments enhances our understanding of the effect of creditor rights on the *optimality* of firms' investment decisions.

Second, our paper adds to the evidence on firms' investment efficiency. Studies show that information asymmetry and agency conflicts between creditors and other stakeholders impact the efficiency of investments (Stein, 2003), especially when firms are in distress (Jensen, 1986; S. C. Myers and Majluf, 1984). Due to high investment distortions, creditors take various measures like enforcing strong governance (Jiang et al., 2018), better monitoring (Antón and Lin, 2020), requiring high-quality financial reporting (Biddle et al., 2009; Biddle and Hilary, 2006), and explicitly restricting capital expenditures through loan covenants (Ersahin et al., 2021; Nini et al., 2009) to ensure efficiency in investment decisions. We add to this evidence by documenting an improvement in

investment efficiency through regulatory intervention in the bankruptcy resolution process. We show that strong rights to creditors in bankruptcy laws can not only help in resolving distress but also improve investment efficiency before insolvency.

Lastly, our paper contributes to the growing body of research examining the impact of the IBC on the business landscape in India (Bose et al., 2021). The IBC represents a landmark reform that has fundamentally overhauled bankruptcy regulation, reducing insolvency resolution time and improving creditor recovery rates. A study by Bose et al. (2021) investigating the effect of the IBC on distressed firms found that they experience an increase in credit levels, a decrease in cost of debt, and an increase in performance compared to non-distressed firms after IBC. We add to this literature. Our findings show that the announcement of IBC improved investment efficiency in distressed firms by reducing overinvestment. Our results indicate that strong rights to creditors in insolvency resolution discipline managers and shareholders, which improves the utilization of resources in distressed firms. While these findings are - important for policymakers in assessing the success of the IBC, they also carry broader policy implications that can be generalized to understand the welfare effects of strong creditor rights in bankruptcy laws elsewhere.

2. Institutional details

Prior to the enactment of the Insolvency and Bankruptcy Code (IBC) in India, laws regulating firm insolvency were complex, giving opportunity to creditors to recover from defaulting customers (Sharma et al., 2016). In 1987, the Government of India created the Board for Industrial and Financial Reconstruction (BIFR) under the Sick Industrial Companies Act (SICA). The BIFR was responsible for reviving industrial firms facing financial distress. A firm was referred to the BIFR if its net worth became negative and the Board was tasked to assess the extent of sickness and the possibility of revival. All proceedings against the firm were paused till reorganization and existing managers and board of directors continued to control the company's assets and had the power to

steer the rehabilitation. Lack of powers to creditors and complete control by defaulting managers and owners led to longer delays in the resolution, opportunistic behavior by insiders, and substantial erosion in the assets of firms (Gopalan et al., 2023) and distressed firms remained distressed.[5]

No such process existed for non-industrial firms and creditors could only recover their money by taking firms into liquidation, through the judicial courts. However, the judiciary in India has long been burdened by high caseloads, lengthy delays, and rigid procedural requirements, complicating the resolution of liquidation cases (Visaria, 2009). Thus, creditors in India had negligible power before the IBC to recover their money from defaulting borrowers. The Government of India also introduced specialized courts called Debt Recovery Tribunals (DRT) to improve contract enforcement for banks and financial institutions, but these powers did not ensure the reorganization or liquidation of the defaulting firms. [6,7]

To resolve these issues and improve creditors' recovery, the Government of India constituted a committee to design a new bankruptcy law in 2014 and implemented the law in May 2016.[8] The IBC simplified the bankruptcy process in India and provided one complete solution for resolution and liquidation for all firms registered under the Companies Act 1956. It significantly increased the powers of creditors during the bankruptcy process and imposed strict penalties on shareholders and

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[5] The performance of BIFR in resolution of firms was reported by the SICA. See link to the report below: 31Goswamicommitteeoftheindustriaisicknessandcorporaterestructuring1993.pdf (ibbi.gov.in)

[6] https://thewire.in/economy/debt-recovery-npa-insolvency

[7] As per the Reserve Bank of India's report on trend and progress of banking in India, 2019-2020, the recoveries to banks under DRT was 4.1% and under SARAFESI was 26.7% of the amount involved - https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/0RTP2020_F3D078985540A4179B62B7734C7B445C9.PDF (see for example Table IV.13 in the Reserve Bank of India's report).

[8] The Bankruptcy Law Reform Committee was constituted by the Department of Economic Affairs, Ministry of Finance in August 22, 2014, to study the corporate bankruptcy legal framework in India. During the drafting process, the committee received written submissions from its members and other departments, and also invited and received comments from the public (starting October 20, 2014 (discussed in the Interim report). The committee submitted an interim report in February 2015 (https://msme.gov.in/sites/default/files/Interim_Report_BLRC.pdf) and comments from the public were again sought through notification dated 10 February 2015 (https://icmai.in/upload/pd/Comments-IR-11022015.pdf). The committee submitted its final report in November 2015 and again sought public comments on the draft in November 2015 and the final draft incorporating public comments was introduced in Lok Sabha on 21 December 2015. The bill was passed by Lok Sabha on 05 May 2016 and Rajya Sabha on 11 May 2016. The Insolvency and Bankruptcy Act was finally notified on 28 May 2016.

managers of firms. It allowed creditors to take the firm to insolvency immediately after default of an amount of one lakh rupees.[9] Unlike SICA 1985, which allowed the managers and board of directors of the distressed firms to retain their powers to take all business decisions during resolution, IBC enshrined the dismissal of the current board of directors as well as managers immediately after the admission of the insolvency application by the Court (Sharma et al., 2016). The Resolution Professional (RP) appointed by the court on the recommendation of the firm's Committee of Creditors (CoC) was transferred every authority held by the board of directors of the firm. Throughout the insolvency process, the RP would control the firms' operations and make significant business decisions as approved by the CoC.

During the resolution process, the RP analyzed all submitted resolution plans and presented them to the CoC, which could either liquidate the firm or accept any of the presented plans. After November 2017, wilful defaulters, defaulting managers, promoters, disqualified directors, etc. were made ineligible to submit a resolution plan. In the event of liquidation, the law also specified the priority order to be followed while allocating proceeds to various stakeholders, with creditors receiving the second highest priority following the costs of the insolvency procedure. Overall, IBC dramatically improved the powers of creditors and imposed harsh penalties on shareholders and managers of firms in default. These changes allow us to study the impact of strengthening the rights of creditors in insolvency resolution on the investment efficiency of distressed firms.

3. Hypothesis development

Studies show that managers and shareholders often pursue investments for personal benefit at the expense of creditors (Stein, 2003), leading to inefficient investment decisions. Creditors particularly care about such investment decisions during times of distress, as they impact the future cash flow

[9]This amount has been increased to one crore rupees in 2020 - https://www.mca.gov.in/Ministry/pdf/Notification_28032020.pdf

generating capacity of the firm and its ability to pay off debt (Jensen, 1986; Myers and Majluf, 1984). Inefficient investments can be overinvestment or underinvestment. Overinvestment occurs when firms invest in negative NPV projects (Biddle et al., 2009) and underinvestment results in the abandonment of positive NPV projects. Both reduce firms' ability to generate future cash flows and are detrimental to creditors of the distressed firm.[10]

Strong creditor rights under IBC can lead to underinvestment in distressed firms for various reasons. During bankruptcy, shareholders only receive what remains after creditors have been paid. This low priority in distribution discourages shareholders from contributing capital even to positive NPV investments (Bhagat et al., 2005; Eisdorfer, 2008; Stein, 2003). As IBC provides substantial rights to creditors and improves recovery prospects, anticipated losses for shareholders increase in the case of the bankruptcy. This might reduce shareholders' contribution to new positive NPV investments, leading to underinvestment (Favara et al., 2017; Myers, 1977).

Alternatively, stronger creditor rights can lead to overinvestment. Studies have found that financially distressed firms invest aggressively in risky projects (Bhagat et al., 2005; Eisdorfer, 2008). They argue that shareholders are tempted to invest in high-risk payoff projects even with negative NPV. If successful, these investments generate high returns to shareholders; if not, shareholders incur no additional cost since they do not anticipate receiving any return even from positive NPV projects. This might encourage shareholders to invest in high-risk projects (Jensen and Meckling, 1976; Li et al., 2017). As IBC increased the availability of credit for financially distressed firms (Bose et al., 2021), this can tempt shareholders to overinvest in high-risk, high-return investments, even with negative NPV, leading to an overinvestment problem.

[10] In recent work, Gurrea-Martinez (2023) shows that other than this traditional classification of insolvency into debtor- versus creditor-friendly, there can also be cases of insolvency systems that are pro-debtor and pro-creditor, anti-debtor and anti-creditor, or somewhere in the middle. In a multi-country sample, Albertus, Gurrea-Martinez, Hotchkiss, and Zheng (2025) examine insolvency regimes around the world over the last 25 years and show that benefits for both secured creditors and debtors are sometimes positively correlated, or move independently, instead of being negatively correlated.

Additionally, managers can also undertake inefficient investments due to overconfidence and over-optimism (Myers and Majluf, 1984; Stein, 2003). Overconfident managers overpay to acquire firms (Malmendier and Tate (2008)), face higher default risk (Hackbarth, 2008), and underestimate the volatility of future earnings even when facing a high probability of bankruptcy (Ge et al., 2024). Greater credit after IBC can induce overconfident managers to undertake inefficient investments to rescue firms from distress, aggravating the overinvestment problem.

However, strengthening creditors' rights in bankruptcy can also improve investment efficiency in distressed firms. Studies show that strong rights to creditors can create fear of premature liquidation among shareholders (Acharya et al., 2011; Vig, 2013). Tarantino (2013) provides theoretical evidence that stronger bankruptcy laws that reduce opportunities for debt renegotiations improve creditors' ability to use bankruptcy laws to control agency problems and reduces investment distortions. As IBC allows creditors to easily push the defaulting firm into liquidation, it ceases the continuation option of firms, which can create fear of premature liquidation among shareholders which may reduce overinvestment in financially distressed firms.

Harsh penalties under strong bankruptcy laws can also increase personal costs of bankruptcy for shareholders, especially when they are under-diversified (e.g. family firms) (Schoenherr and Starmans, 2022). These costs include loss of business and financial incentives, reputation, and career concerns. Schoenherr and Starmans (2022) examine how the personal cost of bankruptcy affects the impact of creditor rights and find that, in comparison to firms with managers and owners with lower personal cost of bankruptcy, those with higher personal cost of bankruptcy use less credit and make fewer investments under more debtor-friendly bankruptcy laws. They document that in bankruptcy laws that dismiss management, firms with owners and managers that have a high personal cost of bankruptcy decrease investments with a high risk of failure. Since many firms in India are family owned where promoters hold significant ownership, provisions like allowing bankruptcy initiation on a simple default, immediate dismissal of the board of directors on initiation of bankruptcy, and

disqualifying defaulting promoters from filing resolution plan in IBC can impose heavy personal costs of bankruptcy. These costs can discipline shareholders and reduce overinvestment after IBC.

Imposing heavy costs on managers of defaulting firms can also exert a larger disciplining effect, leading to investment decisions beneficial for all stakeholders and ensuring the survival of firms. Managers, due to their tendencies to accumulate private benefits and overconfidence, invest in inefficient projects even when firms are financially distressed (Ge et al., 2024; Pryshchepa et al., 2013). Penalties like management turnover and more bargaining power to creditors in the IBC might lead to reputational, career-related, and financial concerns for managers. This can improve discipline in managers and incentivize them to reduce their inefficient investments, especially in firms with worse managerial agency problems (Eckbo and Thorburn, 2003; Rainville et al., 2022). This disciplining effect of strong creditor rights in IBC can increase cautiousness among managers, reducing their overconfidence and over-optimism while selecting an investment in a firm, especially when facing financial distress. It can also motivate managers to creatively rescue the firm from distress and leave their 'quiet life' (Bertrand and Mullainathan, 2003), leading to better and more efficient investment decisions. Additionally, managers do not always make corporate decisions according to the interest of shareholders, as shareholder maximization imposes costs on other stakeholders (Eckbo and Thorburn, 2003; Hirshleifer and Thakor, 1992). Strong bankruptcy laws that impose huge penalties on managers in the form of reputation and career concerns can induce them to not agree to bad investment decisions forced by shareholders, further leading to improvement in the investment efficiency of firms suffering from financial distress.

However, if shareholders of distressed firms become overly cautious due to fear of inefficient liquidation or if managers of distressed firms become overly cautious due to reputational and career concerns, then the distressed firms' underinvestment problem might increase after IBC. These discussions and arguments suggest that there is no clear prediction of the effect of IBC on the investment efficiency of distressed firms.

4. Data, Empirical methodology, and Descriptive statistics

4.1. Data

Our data comes from the Prowess database, which has been widely used by researchers studying Indian firms (Bose et al., 2021; Gopalan et al., 2016; Kariya, 2021; Vig, 2013). Prowess is owned and managed by the Centre for Monitoring Indian Economy, which collects extensive data on Indian listed as well as unlisted companies. For our analysis, we collect data for all listed firms for the period 2011-2020. Following Gopalan et al. (2016), we filter out financial firms, government-owned businesses, and entity categories other than Indian public limited companies from the sample. Additionally, we eliminate firm-year observations if the total debt, cash, net sales, fixed assets, or total assets have negative values, and firm-year observations with less than 12 reporting months or missing values for the main dependent and independent variables. To minimize the impact of outliers in the analysis, we winsorize all variables at the 1st and 99th percentiles.

These filters leave us with 14,030 firm-year observations in the final panel dataset. As noted earlier, the Committee to design the new bankruptcy law was constituted in 2014 and IBC was notified on 28th May 2016. Since IBC was in the news in 2015 and could have started impacting investment decisions in 2015, we include 2011 to 2014 in the pre-IBC period and 2015 to 2020 in the post-IBC period.

4.2. Empirical methodology

4.2.1. Measuring investment efficiency

Estimating investment efficiency is a two-step process. First we calculate optimal investments by regressing investments on growth opportunities of firms, and then we estimate the efficiency of investment of firms by measuring the deviation between actual investments and the optimal investment of firms. We estimate the optimal investment of firms using the regression model below

(Biddle et al., 2009; Chay et al., 2023):

$$Investments_{i,j,t} = \alpha_1 + \beta_1[Tobin's\ Q_{i,j,t-1}] + \varphi_t + \delta_j + \varepsilon_{ijt} \quad (1)$$

where, *i*, *j*, and *t* indicate the focal firm, industry and year, respectively. $Investments_{i,j,t}$ is the total expenditure on the purchase of fixed assets, mergers and acquisitions, research and development expenses subtracting the value of fixed assets sold scaled by lagged total assets of the firm. We proxy growth opportunities of firms using $Tobin's\ Q_{i,j,t-1}$, calculated by dividing the market value of total assets by the book value of these total assets.

We predict optimal investments using Equation 1 and calculate the difference between the firm's actual investment and the predicted/optimal investment. We multiply the absolute value of the difference by -1 to ensure that the measure captures investment efficiency (and not inefficiency), i.e., a positive coefficient indicates an improvement in investment efficiency, while a negative coefficient will indicate a decline in efficiency. We also conduct separate analyses for overinvestment and underinvestment by firms in Section 4.3.

4.2.2. Difference-in-difference model

Next, we use a difference-in-difference regression to examine how investment efficiency is impacted by IBC. To investigate the effect of IBC on a sample of financially distressed firms relative to a non-distressed firm sample, we classify firms into distressed and non-distressed groups using their level of financial distress in the year 2014 (i.e., immediately before the shock year). We measure financial distress using the interest coverage ratio which is common in the literature (Purnanandam, 2008). We divide the full sample into 4 quartiles based on the interest coverage ratio of firms within an industry in 2014, and denote firms in the lowest quartile (lowest interest coverage) as financially

distressed firms and the rest as non-distressed firms.[11] We fix the classification in 2014 for two reasons. First, it ensures that the changes in distress levels after the announcement of IBC do not influence our analysis. Second, it requires considerable time to change investment policy and examining the same distressed firms over a long period allows us to identify changes in long-term investment decisions of firms. The difference-in-difference model used for analysis is as follows:

$$(InvEff)_{i,j,t} = \alpha_1 + \beta_1 \left[Distress_{i,j}\right] * \left[IBC_t\right] + \beta_n X_{i,j,t-1} + \gamma_i + \delta_j * \varphi_t + \varepsilon_{i,j,t} \qquad (2)$$

$InvEff_{i,j,t}$ is our dependent variable which can take the value as defined in the earlier section – calculated as deviations of actual investments from optimal investments multiplied by -1, for firm *i,* industry *j*, and time *t*. $Distress_{i,t}$ equals 1 for firms in the lowest quartile of interest coverage ratio within the industry in the year 2014, 0 otherwise. IBC_t equals 1 for the years 2015-2020, 0 for 2011-2014. To control for unobserved time-invariant within-firm variations, we use firm fixed-effects γ_i and to control for time-varying industry-specific shocks, we use industry-year fixed effects $\delta_j * \varphi_t$.

Following Biddle et al. (2009) and Chay et al. (2023), our vector of control variables, X_{ijt-1}, includes firm characteristics that can impact investment or investment efficiency of firms – firm size, tangibility, investment volatility, cashflow from operation as a proportion of sales, cash flow volatility, slack measured as the ratio of cash and bank to net PPE, sales volatility, an indicator for dividend paid, operating cycle, age of the firm, an indicator if firms have financial loss, cash to total assets ratio, firm leverage, and industry leverage. The detailed definition for all variables is provided in Appendix A. All explanatory variables are lagged by one year to reduce any possible simultaneity issues. The main coefficient of interest is β_1, which measures the effect of IBC on investment efficiency of financially distressed firms compared to non-distressed firms.

[11] Similar methodology has been used in Vig (2013), Bose et al. (2021), Kariya (2021), Thapa et al. (2020).

4.3. Descriptive Statistics

Panel A of Table 1 presents the summary statistics for all variables used in the analysis. The final sample includes 14,030 observations for the sample period 2011 to 2020. The average value of investment efficiency is (-)4.5%, suggesting that the average difference between actual investments and optimal investments equals 4.5% of the lagged total assets. Firms in our sample have mean investments of 5.2% of the lagged total assets, while the average Tobin's Q (market-to-book ratio) is 83.4% of the total assets of the firm.

Insert Table 1

In Panel B of Table 1, we report the mean and standard deviation of all variables separately for the distressed and non-distressed firms in the pre- and post-IBC period and conduct a *t*-test to check the differences in their means before and after IBC. In the Pre-IBC period, distressed firms had an average investment efficiency of (-)5.25% of lagged total assets, while the mean value for non-distressed firms is (-)5.35% of lagged total assets; the *t*-test for difference in means does not indicate any significant difference between them. However, in the post-IBC period, the average investment efficiency for the distressed firms reduced to (-)3.55% of lagged total assets, while the mean value for non-distressed firms reduced to (-)4.10% of lagged total assets. The *t*-test of the difference between these means is significant and suggest an improvement in investment efficiency after IBC, although we caution against over-reliance on univariate results.

5. Results

5.1. Main Analysis

In this section, we present the results from the regression model in Section 4.2.2, which estimates the effect of IBC on the investment efficiency of financially distressed firms compared to non-distressed firms. The results are reported in Table 2. In both Columns 1 and 2, the dependent

variable is $InvEff_{i,j,t}$, an absolute value of deviations of actual investments from optimal investments. In Column 1, we include firm and year fixed effects while in Column 2 we estimate an expanded model with firm as well as industry*year fixed effects.[12] In both models, the primary variable of interest is the coefficient on $[Distress_{i,j}] * [IBC_t]$ i.e., β_1,which captures the effect of the IBC on the aggregate investment efficiency of financially distressed firms relative to non-distressed firms.

Insert Table 2

In both Columns 1 and 2, β_1 is positive and significant (at 1% level), suggesting a reduction in overall deviations from expected investments after IBC for financially distressed firms. These results suggest that strong rights to creditors in bankruptcy laws improved the overall efficiency of investments. In Column 2 with firm and industry*year fixed effects, we find that the investment efficiency of financially distressed firms improved by 0.8% of total assets, compared to non-distressed firms. This translates to around 15.38% (0.0082/0.052) of one standard deviation (0.052) of investment efficiency of financially distressed firms before IBC. Thus, IBC has an economically significant effect in improving investment efficiency. The coefficients of control variables are in a direction similar to those in Biddle et al. (2009) and Chay et al. (2023). Overall, these results indicate that managers and shareholders of financially distressed firms improve investment efficiency compared to non-distressed firms, likely due to the fear of harsh penalties in the event of insolvency under IBC.

5.2. Pre-trends Analysis

The analysis in Table 2 relies on the assumption that there is no change in the investment efficiency

[12] We report both firm and year fixed effects and firm and industry-year fixed effects to give range of estimates and make it possible for readers to compare the coefficients across papers in this literature.

of financially distressed firms vis-à-vis non-distressed firms before the announcement of IBC. To check whether this assumption is satisfied, we conduct a pre-event trend analysis. We re-estimate Equation 2 but now replacing '*IBC*Distress*' with separate time dummies for each year before and after IBC and their interaction with '*Distress'*. The model is as follows:

$$(InvEff)_{i,j,t} = \alpha_1 + \beta_{year}\left[Distress_{i,j}\right] * [Year] + \beta_n X_{i,j,t-1} + \gamma_i + \delta_j * \varphi_j + \varepsilon_{i,j,t} \quad (3)$$

where, $InvEff_{i,j,t}$ is our dependent variable obtained from the deviations between actual and optimal investment. $Distress_{i,t}$ is 1 for firms in the lowest quartile of interest coverage ratio within the industry in the year 2014, 0 otherwise. $Year$ denotes year dummies for the years from 2011 to 2020. The base year for the analysis is 2014, year just before IBC. All other specifications are same as in Equation 2. To satisfy the parallel trend assumption, the '*Distress*Year*' dummy should be significant only for the post-IBC period, i.e., 2015 to 2020, and not the earlier years.

In Figure 1, we plot the dynamic trends of investment efficiency for treatment versus control firms from year t-4 (2011) to t+4 (2020) surrounding the announcement of IBC (2015) and find that the improvement in investment efficiency is concentrated in treatment firms in the post-IBC period.[13] The bars around the coefficients indicate 90% confidence intervals. These results indicate that the investment efficiency of distressed and non-distressed firms followed no trends in the years leading up to IBC and this difference began to increase only after IBC. This suggests that our results are attributable to the announcement of IBC and not to any pre-existing trends.

5.3. Overinvestment and Underinvestment

Next, we examine investment efficiency separately for the overinvesting and underinvesting samples to understand which side of investment efficiency is impacted by IBC. We classify firm-year observations with positive deviations in the overinvesting firm sample ($OverI_{i,j,t}$), and firm-year

[13] The regression table is reported in Appendix C.

observations with negative deviations in the underinvesting firm sample ($UnderI_{i,j,t}$). We run separate regression analyses for overinvestment and underinvestment samples using Equation 2 but replacing $InvEff_{i,j,t}$ with $OverI_{i,j,t}$, and $UnderI_{i,j,t}$, respectively. As before, the primary variable of interest is β_1, which captures the effect of IBC on overinvestment and underinvestment in the financially distressed firms vis-à-vis the non-distressed firms.

Insert Table 3

Table 3 presents the results. In Column 1, the dependent variable is $OverI_{i,j,t}$ and in Column 2 it is $UnderI_{i,j,t}$. Both models include firm and industry*year fixed effects. For the overinvesting sample in Column 1, β_1 is positive (0.19) and significant at the 1% level. These indicates that after the announcement of IBC overinvesting financially distressed firms reduced overinvestment more in comparison to non-distressed firms. In particular, there is a reduction of overinvestment by 1.9% of total assets, which is around 22.35% (0.019/0.085) of one standard deviation (0.085) of overinvesting in the distressed firms in the pre-IBC period.[14] For the underinvesting (Column 2), we find insignificant effects. Thus, the penalties under IBC improve the investment efficiency of distressed firms by reducing overinvestment but do not impact the under-investment of these firms.

6. Robustness Tests

6.1. Placebo Test

If the change in investment efficiency is due to the announcement of IBC, we should not see any impact on investment efficiency in the absence of IBC. To verify that our results are related to IBC and that distressed firms would not increase investment efficiency in comparison to non-distressed firms in the absence of IBC, we conducted a placebo test on a sample period before IBC. We use the model in Equation 2 but change the period of analysis from 2011 to 2014. We assume that the

[14] The descriptive statistics for overinvesting and underinvesting subsamples are provided in Appendix B.

reform took place in 2013 and define financially distressed firms in the year 2011-2012 – just before the false shock year. If coefficients on the interaction of '*IBC*Distress*' are insignificant, that should provide further validity to our main results and rule out the possibility that our findings may be due to the influence of any other economic events.

Insert Table 4

The results of this placebo test are reported in Table 4. The results for the overall investment efficiency of all firms are reported in Column 1, while Columns 2 and 3 show results for the overinvestment and underinvestment samples, respectively. In Columns 1 and 2, the coefficient on the interaction term of '*IBC*Distress*' are statistically insignificant. Note that these are the two models where our main results obtain. Thus, the placebo test provides a strong validity for our main results.[15]

6.2. Propensity Weighting Analysis

Other (unobserved) differences in firm characteristics in the treatment and control sample may drive our results instead of the announcement of IBC. To rule out this possibility, we employ propensity scores based on firm characteristics for weighting the observations. Our methodology consists of two steps: first, we calculate a propensity score for every firm in the treatment (P_t) and control (P_c) samples by considering several firm characteristics that can influence the probability of getting selected into these groups. Next, we utilize these propensity scores to apply weights to each observation. We employ the inverse probability weighting method to assign weights. For the treatment sample, each observation is weighted by, $w_t = \frac{1}{P_t}$, whereas in the control sample, it is weighted by, $w_c = \frac{1}{1-P_c}$ (Austin, 2011; Ganesh et al., 2024). This exercise makes the propensity

[15] Note, however, that in Column 3 the coefficient on the interaction term of '*IBC*Distress*' is negative and statistically significant. This could be because of the higher power of the test (Hartman, 2021). In untabulated bootstrapped placebo, where we randomly assign observations to treatment and controls during pre- and post-period in the underinvestment sample, a significant effect of the intervention (at 95% confidence) is obtained in 64 out of 1000 iterations just by pure chance.

scores of the treatment and control groups more comparable. In the second step, we use these inversely weighted observations to estimate the effect of IBC using Equation 2 and β_1 captures the effect of IBC on the investment efficiency of financially distressed firms compared to non-distressed firms after weighting the observations in treatment and control by the estimated inverse probability weights.

Insert Table 5

The results are presented in Table 5. We report results for the overall investment efficiency of all firms in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment samples, respectively. In both Columns 1 and 2, the coefficient of the interaction term of '*IBC*Distress*' is positive and significant, while Column 3 has an insignificant coefficient. These magnitude of the coefficients in this analysis are comparable to those in our previous tables (Tables 2 and 3). This analysis reinforces that our findings are attributable to IBC rather than underlying firm characteristics.

6.3. Alternate measurement of variables

6.3.1. Alternate measure of Investment

To rule out that our results arise from measurement choices, we perform the next batch of tests. First, in our main model, we followed Biddle et al (2009) and calculated optimal investment by regressing investments on growth opportunities, where we measure investments as the sum of expenditure on the purchase of fixed assets, mergers and acquisitions, research and development expenses, and subtracting proceeds from the sale of fixed assets, scaled by the previous year's total assets for a firm. This measure of investments is based on actual cash expenditures by firms on investments. Here we use a different measure of investments. We follow Badertscher et al. (2013) and calculate the change in the level of gross fixed assets from the gross fixed assets of the previous year and scale it by lagged total assets of a firm.

Insert Tables 6A

The results are presented in Panel A of Table 6. We report results for the overall investment efficiency of all firms in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment sample of firms, respectively. Results are consistent with our previous findings. In Columns 1 and 2, β_1 is positive and significant while in Column 3 it is insignificant. These findings provide evidence that the results are not sensitive to the measure of investment.

6.3.2. Alternate measure of growth opportunities

The literature shows that apart from Tobin's Q, growth opportunities of firms can also be proxied using sales growth of firms (Badertscher et al., 2013; Biddle et al., 2009; Chay et al., 2023). To ensure that our findings are not sensitive to the measure we use for growth opportunities, we re-estimate residuals for measuring investment efficiency using sales growth rate as an alternate measure of growth opportunities. Sales growth rate is calculated as the change in the level of sales value from the previous year scaled by the previous year's sales value.

Insert Tables 6B

Panel B of Table 6 presents the findings. Results for the overall investment efficiency of all firms are shown in Column 1, and findings for the underinvestment and overinvestment samples are shown in Columns 2 and 3, respectively. In Column 1, we find that the coefficient of the '*IBC*Distress*' is positive and significant at 1%, suggesting an overall improvement in the investment efficiency of firms. Separately, analysing the overinvestment and underinvestment samples in Columns 2 and 3, respectively, we find positive and statistically significant coefficients in Column 2 while negative and weakly significant coefficient in Column 3. These results reinforce that IBC reduced overinvestment by firms.

6.3.3. Alternate measure of financial distress

In our main analysis, we use the interest coverage ratio to measure financial distress. To ensure that our results are not driven by this measure of distress, we use two alternate measure of financial distress – Altman's Z score (Altman, 1968) and Distance to default (Bharath and Shumway (2008)). A higher value of z-score indicates a lower probability of default, so we classify firms as distressed if the firm's z-score is in the lowest quartile (lowest 25%) of the z-score for all firms in the same industry in the year 2014, and otherwise classify firms as non-distressed. Following Altman's (1968) suggestion that firms with z-score below 1.81 are distressed, we create another measure of distress classifying firms with z-score below 1.81 as distressed and remaining as non-distressed. For both the analysis, all the variables and regression models are as in Equation 2 but now defining the dummy for distress using z-score. The effect of IBC on the investment efficiency of financially distressed firms compared to non-distressed firms is captured by the coefficient β_1.

The results are reported in Panel C (quartiles of z-score) and Panel D (z-score below 1.81) of Table 6. Results for the overall investment efficiency of all firms are in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment samples, respectively. In panel C, the coefficient in all Columns of the term '*IBC*Distress*' is positive and significant. However, in panel D of Table 6 with classification into distress based on z-score below 1.81, we find the interaction coefficient is positive and significant in Column 1 and 2, while insignificant in Column 3. These results are consistent with our main findings.

Insert Panel C, D and E of Table 6

For another measure of distress, we use naïve distance to default by Bharath and Shumway (2008) also used by Favara et al. (2017). Firstly, we calculate the distance to default for firms in year 2014 and classify firms in the highest quartile of distance to default in the industry as financially distressed, and otherwise classify firms as non-distressed. All the variables and regression models

are as in Equation 2 except now the distressed-firms dummy is based on distance to default. The results are reported in Panel E of Table 6. We find positive and significant coefficient on the term '*IBC*Distress*' for aggregate investment efficiency, and overinvestment but an insignificant coefficient for underinvesting samples. These findings are similar to our main findings and provide evidence that our results are not sensitive to the measure of distress.

6.4. Other Robustness Tests

6.4.1. Alternate classification of firms

For our main analysis, we denoted firms as financially distressed if their interest coverage ratio is in the bottom quartile of all firms in the same industry in the year 2014. To ensure that our results are not due to the classification we use to divide firms into distressed and non-distressed groups, we classify firms based on two other criteria. First, we conducted a similar analysis but now by dividing the sample into terciles based on the interest coverage ratio of all firms in the same industry in the year 2014. We denote firms in the bottom 33rd percentile of this distribution as financially distressed firms and remaining as non-distressed. Second, we classify firms using the median interest coverage ratio and classify firms below the median as financially distressed firms and remaining as non-distressed. Results are reported in Panels A and B of Table 7. We present results for the overall investment efficiency of firms in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment samples, respectively. In both Columns 1 and 2 of Panel A and B, the coefficients on '*IBC*Distress*' are positive and significant, while Column 3 has insignificant coefficients. This analysis suggests that our results are robust to alternate classification of firms.

Insert Table 7- Panels A, B, and C

6.4.2. Alternate reform window

In our main analysis, we have used a reform window from the period 2011-2020. To make sure that the results are not sensitive to the reform period, we conduct another analysis using the period from year 2012 to 2018. All other variables, models, and estimation processes are the same as in Equations 1 and 2. The effect of IBC on the investment efficiency of financially distressed firms compared to non-distressed firms is captured by the coefficient of '*IBC*Distress*' i.e., β_1.

The results are reported in Panel C of Table 7. We present results for the overall investment efficiency of firms in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment samples, respectively. In both Columns 1 and 2, the coefficient on the term '*IBC*Distress*' is positive and significant, while Column 3 has an insignificant coefficient. This analysis suggests that our results are not sensitive to the reform period used in the analysis.

7. Economic mechanisms

Now, we explore the possible underlying mechanism that drives our results of reduction in overinvestment and improvement in investment efficiency of distressed firms after IBC. We posit that stronger creditor rights in IBC would incentivize shareholders and managers to reduce inefficiencies in investment decisions. To test the validity of this argument, in the following sections, we document the impact of various proxies that capture the ex-ante differences in shareholders' and managers' incentives to reduce inefficiencies across various subsamples.

7.1. Stronger creditor rights and shareholders' cost of bankruptcy

Recent literature has identified that the impact of strong creditor rights in bankruptcy laws on investment is driven by the personal cost of bankruptcy for shareholders of the firms (Schoenherr and Starmans, 2022). It is argued that bankruptcy laws that dismiss the existing board and transfer

the ownership of the firm to other investors after the declaration of bankruptcy create fear of loss of personal benefits in shareholders, especially when these shareholders are large and under-diversified (e.g., in family firms). If the increase in the personal cost of shareholders after IBC due to penalties and loss of personal benefits drives the improvement in investment efficiency, we expect greater impact for firms with shareholders who face a higher ex-ante personal cost of bankruptcy.

We measure the ownership of shareholders with higher ex-ante personal costs of bankruptcy using multiple variables. First, following Schoenherr and Starmans (2022), we measure ownership concentration using the Herfindahl index of a firm's ownership. They argue that firms with concentrated ownership are usually controlled by under-diversified owners exposed to higher idiosyncratic bankruptcy risk. Moreover, large controlling shareholders also have private benefits of control, and the loss of these benefits in case of bankruptcy generates a higher personal cost. Second, a significant number of firms in India are family-owned, where promoters hold significant ownership in the firm (large and under-diversified). Various provisions like allowing bankruptcy initiation on a simple default, immediate dismissal of the board of directors on initiation of bankruptcy, and disqualifying defaulting promoters from filing resolution plans in IBC can impose heavy personal costs of bankruptcy on these shareholders. Thus, we use the ownership of shares held by Indian Individuals and Hindu Undivided Family (HUF) promoters and expect that the impact of IBC on investment efficiency will be higher among firms with higher ownership of individuals and HUF. Third, we use the number of block holders (ownership > 5%) to measure ownership concentration in firms. We expect that firms with large numbers of blockholders have more concentrated ownership, leading to a higher cost of bankruptcy for these firms. Lastly, we use the classification of firms into standalone firms and firms affiliated with business groups. The cost of bankruptcy is higher for shareholders of standalone firms as they stand to lose all their investments due to the bankruptcy of their firm. However, owners of firms affiliated with business groups own multiple firms, and business groups exert efforts and provide resources to distressed firms to avoid bankruptcy leading to lower costs of bankruptcy for these firms.

Following Schoenherr and Starmans (2022), we divide our sample based on these variables- ownership concentration, percentage of shares held by Indian Individuals and HUF, and the number of block holders- into quartiles and compare the lowest and highest quartiles. We also use classification based on the absolute value of ownership of individuals and HUF as promoters, and classify firms with greater than 50% ownership by these shareholders as 'High PCB' and others as 'Low PCB'. Lastly, we classify firms into standalone and business groups. We create these variables according to their values in 2014 and estimate separate regressions for each sub-sample, with the model specified in Equation 2. The results are reported in Panels A through E of Table 8 with Columns 1 and 2 for overall investment efficiency (InvEff), Columns 3 and 4 for the overinvesting sample (OverI), and Columns 5 and 6 for the underinvesting sample (UnderI).

Insert Table 8

In Panel A, using ownership concentration as the partitioning variable, we find a significant coefficient on '*IBC*Distress*' for aggregate investment efficiency and overinvestment, and no significant impact on the underinvestment sample. The difference in coefficients between high and low-ownership concentration firms is statistically significant for the overinvestment sample (p-value = 0.029) but is insignificant for aggregate investment efficiency (p-value = 0.323) and underinvestment (p-value = 0.346). In Panel B, dividing the sample based on the percentage of shares owned by Indian individuals and HUF as promoters, we document a significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment. The difference in the coefficients is also statistically significant for the aggregate investment efficiency (p-value = 0.091) as well as overinvestment (p-value = 0.039) but not for the underinvesting sample (p-value = 0.902). In panel C, using a classification based on ownership of Indian individuals and HUF as promoters greater than 50%, we again find a significant coefficient on the interaction of '*IBC*Distress'* for aggregate investment efficiency and overinvestment of 'High PCB' firms. The difference in the coefficients is also statistically significant for overinvestment (p-value = 0.045).

In Panel D, using a classification based on the number of block holders, we find a positive and significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment of firms with a higher number of block holders. The difference in the coefficients is statistically significant for the overinvestment firms (p-value = 0.091). In Panel E, we classify firms into Standalone and Business groups and find positive and significant coefficients on '*IBC*Distress'* for aggregate investment efficiency and overinvestment of standalone firms. The difference in the coefficients of standalone and business group samples is also statistically significant for the aggregate investment efficiency (p-value = 0.015) as well as overinvestment (p-value = 0.039). Collectively, these results strongly support the conclusion that shareholders' personal cost of bankruptcy drives the impact of strong creditor rights under IBC on investment efficiency.

7.2. Stronger creditor rights and managerial opportunism

Prior literature establishes that managers may engage in negative return investments and empire-building acquisitions (Jensen, 1986) and/or overconfidence (Myers and Majluf, 1984; Stein, 2003). Overconfident managers inflate returns while evaluating their investment projects and might overestimate their ability to rescue firms from distress (Ge et al., 2024), which not only destroy shareholder value but also increase the risk of non-repayment to creditors. Also, when firms are in distress, managers have incentives to increase their private benefits, like extracting perks and perquisites for personal gains, before the bankruptcy of the firm. Thus, there is a higher chance of misuse of funds in firms with lower monitoring of managers or weaker governance. Strong creditor rights in bankruptcy laws can discipline managers, increasing their caution in selecting investments and extracting private benefits by inducing reputational costs, career concerns, termination risks, and loss of financial incentives. Thus, we expect a higher impact on the investment efficiency of distressed firms where managers faced lower monitoring before implementation of IBC.

We measure the strength of monitoring of managers using multiple proxies. First, we use

the proportion of non-executive directors on the Board. Non-executive directors are free from the influence of management, which could interfere with their fair judgment of the manager's decisions (Dey, 2008). Thus, there is lower monitoring of the decisions of managers when the proportion of non-executive directors on the Board is lower. Second, we further refine non-executive directors and only use the proportion of non-executive independent directors.[16] The possibility of managers making poor decisions increases with fewer independent directors on the board (Dey, 2008). Third, prior literature argues that the presence of high-quality auditors exerts better governance and reduces expropriation by managers (Dey, 2008; Jiang et al., 2018). We measure auditor quality based on whether the firms are audited by Big 4 auditors or not, and expect more improvement in the investment efficiency of firms not audited by high-quality auditors. Fourthly, we classify firms based on whether they borrow exclusively from government-owned banks or not. Prior literature has shown that government-owned banks are less stringent in their monitoring of investment decisions of firms, leading to overinvestment bias compared to private sector banks (Firth et al., 2008). Thus, we expect more improvement in the investment efficiency of firms that borrow exclusively from government-owned banks. Lastly, we argue that competition also acts as a governance tool for regulating the decisions of managers because managers have strong incentives to maximize profits, which ensures efficient decisions (Chang et al., 2014). Thus, managers of firms facing lower competition are expected to make more inefficient investments, and if strong creditor rights under bankruptcy laws reduce managerial opportunism, we expect a higher impact on these firms.

Following Schoenherr and Starmans (2022), we divide our sample based on these variables- the proportion of non-executive directors on the board, and the proportion of independent directors on the board, competition faced by firms based on the HHI Index- into quartiles and compare the lowest and highest quartiles. For auditors' quality, we define firms not audited by a Big 4 auditor as

[16] Since, many firms in India are family-owned, there is a higher possibility that non-executive directors may have family or business relationships with the firm which can provide incentives to endorse wrong decisions of managers.

'No' and those with a Big 4 auditor as 'Yes'. Likewise, for partitioning based on borrowing from government-owned banks, we define firms in 'Yes' when borrowing exclusively from government-owned banks and 'No' for others. We create these dummies based on 2014 values immediately before the announcement of IBC, and run a separate regression for each sub-sample based on Equation 2. The results are reported in Panels A to E of Table 9 with Columns 1 and 2 for overall investment efficiency (InvEff), Columns 3 and 4 for the overinvesting sample (OverI), and Columns 5 and 6 for the underinvesting sample (UnderI).

Insert Table 9

In Panel A for non-executive directors partitioning, we find a positive and significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment but no impact on the underinvestment sample with the lower number of non-executive directors. However, we do not find any impact on the sample with the high number of non-executive directors. The difference in coefficients is significant for overinvestment (p-value = 0.003) but is insignificant for aggregate investment efficiency (p-value = 0.122) and underinvestment (p-value = 0.253). Using the ratio of independent non-executive directors as a partitioning variable in Panel B, we find no impact on aggregate investment efficiency, overinvestment, and underinvestment with low or high independent directors. In Panel C, using the presence of a Big4 auditor, we find a significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment, while no significant impact on the underinvestment of firms with non-Big4 auditors. We do not find any insignificant coefficients for the sample with the presence of a Big4 auditor. However, the difference in coefficients is not statistically significant for any of the samples of aggregate investment efficiency (p-value = 0.602), overinvestment (p-value = 0.256), and underinvestment (p-value = 0.927).

Further, classifying firms based on borrowing exclusively from government-owned banks, we find a higher positive and significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment, while no significant impact on the underinvestment of firms

borrowing exclusively from government-owned banks compared to the sample of firms not borrowing exclusively from government-owned banks. However, the difference in coefficients is not statistically significant for any of the samples of aggregate investment efficiency (p-value = 0.164) and overinvestment (p-value = 0.241). Lastly, dividing the sample based on competition faced by firms, we find no impact on aggregate investment efficiency, overinvestment, and underinvestment facing low or high competition. These results provide mixed evidence that firms, where managers are more likely to be impacted by creditors' monitoring during insolvency, drive the impact of strong creditor rights in bankruptcy laws on investment efficiency.

7.3. Stronger creditor rights and the threat of pre-mature liquidation

Shareholders may have a higher propensity to extract wealth from debt holders when firms are in financial distress (Jensen and Meckling, 1976; Myers, 1977) due to concerns about the recovery of their investment regardless of the firm's long-term recovery. Thus, stronger bankruptcy laws can increase the shareholders' concerns about the recoverability of their investment in a firm due to a higher likelihood of premature liquidation by creditors. If the threat of premature liquidation drives our results, we expect more improvement in the investment efficiency of distressed firms where this threat was higher ex-ante.

We capture the threat of pre-mature liquidation using multiple measures. First, we use the tangibility of assets as a measure of the threat of premature liquidation. Tangible assets are the most valuable assets for recovery during liquidation, and pre-mature liquidation is more likely when firms have higher tangibility. Second, we use leverage measured as the ratio of long-term debt scaled by total assets. Shareholders expect the lowest recovery during bankruptcy when firms have significant dues to creditors. Thus, pre-mature liquidation would be more costly for shareholders when firms have a higher amount of leverage (Antón and Lin, 2020). Last, we use the number of different banks a firm borrows from as a measure of the threat of premature liquidation. The lower number of

banking relationships reduces the coordination problems among creditors, leading to easy premature liquidation of the firm. However, a large number of banks creates coordination problems. Thus, premature liquidation is more likely in firms with a lower number of bankers.

We divide our sample based on these variables – tangibility, leverage, and number of bankers – into quartiles and compare the extreme quartiles. As before, dummies are based on 2014 values, and regressions for each subsample is based on the model in Equation 2. Results in Panel A and B of Table 10 show Columns 1 and 2 for overall investment efficiency (InvEff), Columns 3 and 4 for the overinvesting sample (OverI), and Columns 5 and 6 for the underinvesting sample (UnderI).

Insert Table 10

Using tangibility to measure the likelihood of premature liquidation in Panel A, we find an insignificant coefficient on '*IBC*Distress'* in the sample with both low as well as high tangible assets for overall, overinvesting, and underinvesting firms. The difference in the coefficients is also statistically insignificant for the aggregate investment efficiency (p-value = 0.548) as well as the overinvesting (p-value = 0.131), but significant for the underinvesting sample (p-value = 0.044). In Panel B, with the sample divided based on leverage, we document an insignificant coefficient on '*IBC*Distress'* for aggregate investment efficiency of firms with higher leverage, but a positive and significant coefficient for lower leverage firms. However, we do not find any significant impact on overinvestment or underinvestment in both high and low leverage. The difference in the coefficients is statistically insignificant for the aggregate investment efficiency (p-value = 0.163) as well as for the overinvesting (0.918), but significant for underinvesting firms (0.029). Lastly, by dividing the sample based on the number of bankers, we document a positive and significant coefficient on '*IBC*Distress'* for aggregate investment efficiency and overinvestment with the lower number of bankers compared to firms with the higher number of bankers. The difference in the coefficients is statistically insignificant for the aggregate investment efficiency (p-value = 0.363) as well as for the overinvesting firms (p-value = 0.169). These results indicate that the likelihood of pre-mature

liquidation does not drive the impact of strong creditor rights under IBC on investment efficiency.

8. Additional analysis

8.1. Capex and Non-Capex analysis

In computing investments for regressing on investment opportunities, we include both capital expenditures (purchase and sale of fixed assets) as well as non-capital expenditures (acquisitions, Research and Ddevelopment). To further explore the type of investments impacting investment efficiency, we decompose the overall investments into the Capex and Non-Capex categories. Following Biddle et al. (2009), we calculate Capex as the total expenditure on the purchase of fixed assets less the value of the sale of fixed assets scaled by lagged total assets, and Non-Capex as the sum of expenditure on acquisitions and research and development, scaled by lagged total assets. We measure investment efficiency as deviations of actual Capex and Non-Capex investments from optimal Capex and Non-Capex investments obtained from the regression model of the respective investment measures on Tobin's Q. We define $InvEff_{i,j,t}$, $OverI_{i,j,t}$, $UnderI_{i,j,t}$ similarly, as done in our main analysis and use these new deviations as dependent variables. The regression model is Equation 2. The effect of IBC on the investment efficiency of financially distressed firms compared to non-distressed firms is captured by the coefficient on '*IBC*Distress*' i.e., β_1.

Insert Tables 11A

The results are presented in Panel A of Table 11. Columns 1 to 3 report results for Capex investments while Columns 4 to 6 for Non-Capex investments. For, Capex expenditures, β_1 is positive and significant for aggregate investment efficiency (Column 1) and overinvestment (Column 2) and insignificant for underinvestment (Column 3). However, we document no impact on investment efficiency in Columns 4 to 6 for non-capital expenditures. These findings provide evidence that improvement in investment efficiency and reduction in overinvestment after IBC is

driven by changes in capital expenditures by distressed firms, consistent with the expectation that distressed firms focus more on capital expenditures to improve investment efficiency.

8.2. Performance analysis

Our analysis thus far indicates that strong creditor rights under bankruptcy law improve investment efficiency and reduce the overinvestment of financially distressed firms. We next ask if this translates into improvement in overall firm performance. To answer this question, we measure firm performance as the return on assets (ROA), calculated as the ratio of profit before interest and taxes scaled by lagged total assets. Since investments are long-term decisions, we expect that the impact of changes in investment efficiency on performance might reflect in the next 2 to 3 years, so we estimate the ROA changes for the next one to three years after the change in investment efficiency.

Firstly, we define $InvEff_{i,j,t}$, $OverI_{i,j,t}$, $UnderI_{i,j,t}$ as in our main analysis. Then we estimate the following difference-in-difference model:

$$(ROA)_{i,j,t+1;t+2;t+3} = \alpha_1 + \beta_1 \left[Distress_{i,j}\right] * \left[IBC_t\right] + \beta_n X_{i,j,t-1} + \gamma_i + \delta_j * \varphi_j + \varepsilon_{i,j,t} \quad (4)$$

All the variables and regression specifications are as in Equation 2 except that the dependent variable is now ROA. The effect of IBC on the performance of financially distressed firms compared to non-distressed firms is captured by the coefficient β_1. We estimate the impact for the overall sample as well as separately for the overinvesting and underinvesting sample.

Insert Tables 11B

The results are reported in Panel B of Table 11. Results for the overall investment efficiency are in Column 1, while Columns 2 and 3 report results for the overinvestment and underinvestment samples, respectively. The coefficient on '*IBC*Distress*' is not significant for year one, but is positive and significant for years two and three. This indicates that improvement in investment efficiency

and reduction in overinvestment improve overinvesting firms' performance after IBC.

9. Conclusion

We provide new evidence on how bankruptcy laws that shift controls rights to creditors affect the optimality of investments. We leverage the IBC announcement as a plausibly exogenous shift in bargaining power toward creditors and show that financially distressed firms improve their investment efficiency relative to non-distressed peers, by curbing overinvestment, and not by alleviating underinvestment. This is consistent with classic agency arguments that creditor discipline reins in value-destroying empire building (Jensen, 1986) while not necessarily undoing the debt overhang frictions that generate underinvestment (Myers, 1977). It also supports the idea that the threat of value-reducing liquidation can discipline insiders when creditor rights strengthen (Acharya and Subramaniam, 2009).

Our mechanism tests show that concentration of effects is among firms with higher personal costs to shareholders and weaker managerial monitoring. This aligns with theories which posit that control threats and career concerns can reduce wasteful spending (Jensen, 1986). In particular, our results also resonate with evidence that although distress can induce risk-shifting and "gambling for resurrection," creditor power can counterbalance this (Eisdorfer, 2008).

Our economic estimates come from models that adopt a difference-in-difference design specification, and findings are robust to a number of alternative constructs for all key variables in our tests. Together, these strengthen the case that the post-IBC improvement in investment efficiency is not an artifact of measurement, sample composition, or model choices, but reflects a real shift in behavior among distressed firms. More broadly, our evidence complement work (Jensen, 1986; Myers, 1977) showing that information frictions and agency problems drive investment distortions, and that legal rules over control rights can be effective in moving firms towards optimal investment efficiency.

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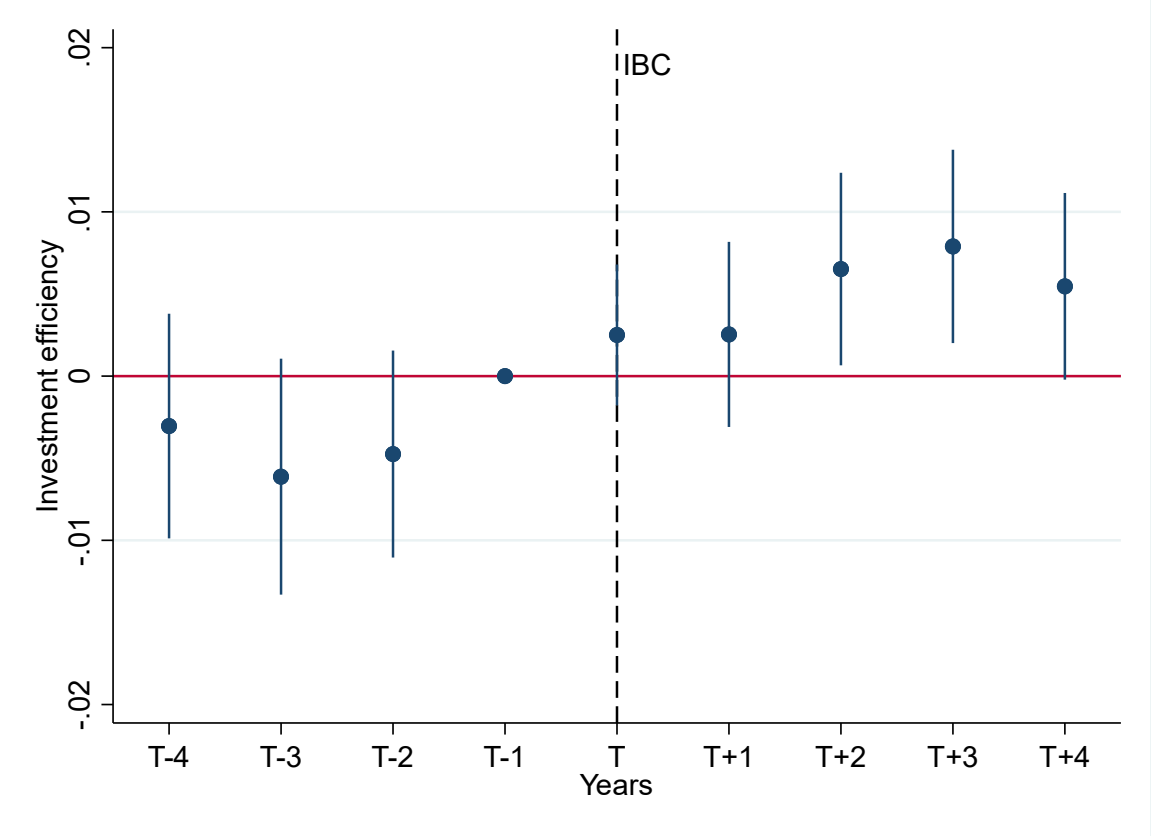
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Figure 1 – Pre-Trends analysis



Notes: The figure plots the difference-in-difference estimates of the dynamic trends of investment efficiency for treatment and control firms for years t-4 to t+4 (2011 to 2020) surrounding the announcement of IBC, with year t-1 as baseline. The coefficients are shown with 90% confidence intervals. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from a regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. All control variables are lagged by 1 year and winsorized at the 1st and 99th percentiles. Appendix A defines all other variables in detail.

Table 1 – Descriptive Statistics

Panel A – Main regression variables in the full sample

Variable	Obs.	Mean	S.D.	0.25	Median	0.75
InvEff $_{i,j,t}$	14,030	-0.045	0.050	-0.054	-0.032	-0.015
Investments/TA $_{i,t}$	14,030	0.052	0.071	0.007	0.029	0.072
Tobin Q $_{i,t-1}$	14,030	0.834	1.139	0.201	0.425	0.934
Size $_{i,t-1}$	14,030	8.020	1.830	6.665	7.889	9.227
SD_CFO $_{i,t-1}$	14,030	0.082	0.066	0.041	0.064	0.100
SD_SALES $_{i,t-1}$	14,030	0.211	0.206	0.087	0.152	0.253
SD_INV $_{i,t-1}$	14,030	0.087	0.120	0.023	0.050	0.102
Tangibility $_{i,t-1}$	14,030	0.299	0.185	0.150	0.284	0.426
CFO/Sales $_{i,t-1}$	14,030	0.077	0.178	0.016	0.069	0.133
Slack $_{i,t-1}$	14,030	0.406	1.099	0.028	0.082	0.272
Dividend $_{i,t-1}$	14,030	0.564	0.496	0.000	1.000	1.000
Age $_{i,t-1}$	14,030	32.986	18.707	22.000	28.000	37.000
Operating cycle $_{i,t-1}$	14,030	5.061	0.795	4.625	5.014	5.412
Loss $_{i,t-1}$	14,030	0.063	0.243	0.000	0.000	0.000
Cash $_{i,t-1}$	14,030	0.041	0.056	0.009	0.021	0.046
K structure $_{i,t-1}$	14,030	0.266	0.262	0.034	0.185	0.439
Industry K structure $_{i,t-1}$	14,030	0.300	0.129	0.202	0.281	0.390

Panel B – Main regression variables for Distressed and Non-distressed firms in Pre and Post IBC

	IBC = 0 (2011-2014)					IBC = 1 (2015-2020)				
	Distressed firms		Non-distressed firms		Test of difference in mean	Distressed firms		Non-distressed firms		Test of difference in mean
	Mean	S.D.	Mean	S.D.	t-value	Mean	S.D.	Mean	S.D.	t-value
InvEff $_{i,j,t}$	-0.052	0.052	-0.053	0.055	0.550	-0.036	0.038	-0.041	0.048	4.600
Investments/TA $_{i,t}$	0.051	0.077	0.067	0.079	-6.650	0.029	0.054	0.051	0.067	-13.900
Tobin Q $_{i,t-1}$	0.381	0.557	0.726	0.993	-12.250	0.521	0.778	1.095	1.329	-18.650
Size $_{i,t-1}$	8.023	1.775	7.765	1.818	4.550	8.155	1.819	8.135	1.836	0.400
SD_CFO $_{i,t-1}$	0.088	0.063	0.094	0.073	-2.700	0.071	0.057	0.078	0.063	-4.600
SD_SALES $_{i,t-1}$	0.214	0.186	0.234	0.222	-3.000	0.186	0.187	0.205	0.204	-3.700
SD_INV $_{i,t-1}$	0.099	0.118	0.107	0.143	-1.800	0.076	0.108	0.075	0.105	0.550
Tangibility $_{i,t-1}$	0.311	0.191	0.311	0.18	-0.100	0.311	0.197	0.286	0.181	5.450
CFO/Sales $_{i,t-1}$	0.063	0.192	0.076	0.174	-2.500	0.082	0.198	0.079	0.169	0.650
Slack $_{i,t-1}$	0.354	0.921	0.407	1.093	-1.650	0.340	1.061	0.437	1.148	-3.400
Dividend $_{i,t-1}$	0.439	0.496	0.686	0.464	-16.750	0.250	0.433	0.613	0.487	-30.250
Age $_{i,t-1}$	31.741	19.337	30.928	18.196	1.400	35.141	19.392	33.841	18.531	2.750
Operating cycle $_{i,t-1}$	5.188	0.82	4.972	0.733	9.150	5.212	0.897	5.042	0.782	8.250
Loss $_{i,t-1}$	0.095	0.293	0.027	0.161	10.750	0.145	0.353	0.053	0.225	13.950
Cash $_{i,t-1}$	0.036	0.048	0.047	0.06	-6.250	0.028	0.043	0.042	0.058	-10.100
K structure $_{i,t-1}$	0.446	0.268	0.274	0.246	22.000	0.387	0.289	0.185	0.223	33.350
Industry K structure $_{i,t-1}$	0.358	0.128	0.343	0.123	3.700	0.288	0.129	0.264	0.120	7.900
Observations	1,372		4,051			2,063		6,544		

The table reports the descriptive statistics for our sample of listed firms. All variables are defined in Appendix A. The sample includes observations from year 2011 to 2020. We exclude financial firms, government-owned firms, and firm-year observations with missing or negative values for the dependent and independent variables.

Table 2 – Effect of IBC on investment efficiency

	(1)	(2)
	InvEff	InvEff
IBC*Distress	0.008***	0.008***
	(3.636)	(3.839)
$Size_{i,t-1}$	0.018***	0.019***
	(7.856)	(8.179)
$SD_CFO_{i,t-1}$	0.007	0.001
	(0.612)	(0.092)
$SD_SALES_{i,t-1}$	-0.001	-0.001
	(-0.347)	(-0.208)
$SD_INV_{i,t-1}$	0.016**	0.016**
	(2.322)	(2.365)
$Tangibility_{i,t-1}$	0.086***	0.091***
	(9.267)	(9.879)
$CFO/Sales_{i,t-1}$	-0.003	-0.003
	(-1.020)	(-1.022)
$Slack_{i,t-1}$	0.002**	0.002***
	(2.552)	(2.609)
$Dividend_{i,t-1}$	-0.001	-0.002
	(-0.928)	(-1.096)
$Age_{i,t-1}$	0.002*	0.002**
	(1.868)	(2.197)
Operating $cycle_{i,t-1}$	0.004***	0.004***
	(3.228)	(3.030)
$Loss_{i,t-1}$	0.000	0.000
	(0.246)	(0.164)
$Cash_{i,t-1}$	-0.040**	-0.037**
	(-2.495)	(-2.280)
$Leverage_{i,t-1}$	0.023***	0.021***
	(5.414)	(5.067)
Industry $Leverage_{i,t-1}$	-0.006	-0.009
	(-0.547)	(-0.750)
Observations	14,030	14,030
R-squared	0.330	0.343
Firm FE	YES	YES
Year FE	YES	NO
Year*Industry FE	NO	YES
SE cluster by Firm	YES	YES

The table presents the parallel trend analysis of investment deviations of firms before and after IBC. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments and these deviations are multiplied by -1. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. All explanatory variables are lagged by 1 year and winsorized at the 1st and 99th percentiles. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 3 - Effect of IBC on Overinvestment and Underinvestment

	(1)	(2)
	OverI	UnderI
IBC*Distress	0.019***	0.000
	(2.819)	(0.146)
$Size_{i,t-1}$	0.050***	-0.003*
	(8.016)	(-1.958)
SD_CFO $_{i,t-1}$	-0.002	-0.008
	(-0.063)	(-1.307)
SD_SALES $_{i,t-1}$	-0.009	-0.000
	(-0.631)	(-0.142)
SD_INV $_{i,t-1}$	0.009	0.003
	(0.489)	(0.739)
Tangibility $_{i,t-1}$	0.186***	-0.009**
	(8.992)	(-2.002)
CFO/Sales $_{i,t-1}$	-0.001	-0.003**
	(-0.074)	(-2.136)
Slack $_{i,t-1}$	0.004*	0.001*
	(1.814)	(1.838)
Dividend $_{i,t-1}$	0.003	0.002***
	(0.618)	(2.773)
Age $_{i,t-1}$	-0.005	0.000
	(-1.587)	(0.453)
Operating cycle $_{i,t-1}$	0.011**	-0.001
	(2.163)	(-1.027)
Loss $_{i,t-1}$	0.007	-0.003***
	(0.768)	(-2.668)
Cash $_{i,t-1}$	-0.133***	-0.001
	(-3.294)	(-0.078)
Leverage $_{i,t-1}$	0.055***	0.000
	(4.618)	(0.039)
Industry Leverage $_{i,t-1}$	-0.010	-0.004
	(-0.290)	(-0.669)
Observations	4,901	9,129
R-squared	0.552	0.538
Firm FE	YES	YES
Year*Industry FE	YES	YES
SE cluster by firm	YES	YES

The table presents the difference-in-difference analysis of investment deviations of firms after IBC. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 4 – Placebo Test (2011 to 2014 with 2013-2014 as the shock period)

	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC_2013*Distress	0.003	-0.004	-0.004**
	(1.021)	(-0.228)	(-2.089)
Size $_{i,t-1}$	0.052***	0.121***	-0.006*
	(7.388)	(5.149)	(-1.669)
SD_CFO $_{i,t-1}$	0.024	0.065	0.011
	(0.772)	(0.803)	(0.875)
SD_SALES $_{i,t-1}$	-0.006	-0.008	-0.006
	(-0.634)	(-0.280)	(-1.392)
SD_INV $_{i,t-1}$	-0.008	-0.056	0.003
	(-0.529)	(-1.085)	(0.531)
Tangibility $_{i,t-1}$	0.152***	0.280***	-0.032**
	(7.006)	(6.466)	(-2.479)
CFO/Sales $_{i,t-1}$	-0.004	0.041	-0.004*
	(-0.551)	(1.115)	(-1.943)
Slack $_{i,t-1}$	0.005**	-0.010	0.001
	(2.405)	(-0.743)	(0.907)
Dividend $_{i,t-1}$	0.003	0.016	0.006***
	(0.816)	(1.180)	(3.579)
Age $_{i,t-1}$	0.002	-0.005	0.002
	(0.602)	(-0.452)	(0.830)
Operating cycle $_{i,t-1}$	0.003	0.015	-0.002
	(0.755)	(1.117)	(-0.884)
Loss $_{i,t-1}$	0.005	0.057**	-0.001
	(1.060)	(2.246)	(-0.638)
Cash $_{i,t-1}$	-0.081**	-0.123	-0.002
	(-2.159)	(-1.197)	(-0.100)
Leverage $_{i,t-1}$	0.032***	0.125***	0.000
	(3.543)	(4.623)	(0.012)
Industry Leverage $_{i,t-1}$	-0.009	-0.063	0.002
	(-0.434)	(-0.867)	(0.173)
Observations	5,759	1,985	3,774
R-squared	0.485	0.702	0.667
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES

The table presents the difference-in-difference analysis of investment deviations of firms after false IBC in 2013. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2014 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2012 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC_2013* is a categorical variable that takes a value of one for the years 2013-2014 and 0 otherwise. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 5 – Propensity weighting analysis

	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.008***	0.020***	0.000
	(3.683)	(2.894)	(0.241)
Size $_{i,t-1}$	0.020***	0.051***	-0.003**
	(8.178)	(8.099)	(-1.980)
SD_CFO $_{i,t-1}$	0.003	0.003	-0.007
	(0.220)	(0.092)	(-1.182)
SD_SALES $_{i,t-1}$	-0.002	-0.009	-0.001
	(-0.355)	(-0.663)	(-0.378)
SD_INV $_{i,t-1}$	0.015**	0.007	0.003
	(2.285)	(0.384)	(0.776)
Tangibility $_{i,t-1}$	0.091***	0.187***	-0.009*
	(9.945)	(9.020)	(-1.956)
CFO/Sales $_{i,t-1}$	-0.005	-0.009	-0.003**
	(-1.460)	(-0.683)	(-2.240)
Slack $_{i,t-1}$	0.002***	0.004*	0.001*
	(2.916)	(1.763)	(1.916)
Dividend $_{i,t-1}$	-0.002	0.003	0.002***
	(-1.119)	(0.578)	(2.854)
Age $_{i,t-1}$	0.003**	-0.005	0.000
	(2.358)	(-1.531)	(0.481)
Operating cycle $_{i,t-1}$	0.004***	0.011**	-0.001
	(2.775)	(2.168)	(-1.123)
Loss $_{i,t-1}$	0.001	0.007	-0.003**
	(0.443)	(0.795)	(-2.530)
Cash $_{i,t-1}$	-0.037**	-0.140***	0.002
	(-2.040)	(-3.371)	(0.214)
Leverage $_{i,t-1}$	0.022***	0.056***	0.000
	(5.246)	(4.770)	(0.092)
Industry Leverage $_{i,t-1}$	-0.015	-0.023	-0.002
	(-0.991)	(-0.609)	(-0.299)
Observations	14,030	4,901	9,129
R-squared	0.343	0.553	0.536
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES

The table presents the Propensity weighted difference-in-difference analysis of investment deviations of firms after IBC. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 6 – Alternate measurement of variables

Panel A - Alternate measure of Investments (Investment2)			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.006*	0.021***	0.000
	(1.751)	(2.674)	(0.135)
Observations	14,017	5,569	8,448
R-squared	0.279	0.527	0.477
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel B –Alternate measure of Investments opportunities using Sales growth			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.007***	0.017**	-0.002*
	(3.349)	(2.309)	(-1.788)
Observations	13,907	4,821	9,086
R-squared	0.348	0.541	0.538
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel C –Alternate measure of financial distress using Z score based on quartiles			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.007***	0.012*	0.003**
	(2.866)	(1.677)	(2.091)
Observations	12,951	4,514	8,437
R-squared	0.326	0.540	0.530
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel D –Alternate measure of financial distress using Z score<1.81			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.006**	0.013*	0.000
	(2.399)	(1.819)	(0.185)
Observations	12,951	4,514	8,437
R-squared	0.325	0.540	0.530
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel E –Alternate measure of financial distress using Distance to default			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.006***	0.020***	0.002
	(2.902)	(3.253)	(1.547)
Observations	13,070	4,536	8,534
R-squared	0.327	0.541	0.533
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

The table presents the difference-in-difference analysis of investment deviations of firms after IBC. Panel A includes an alternate definition of investments, Panel B includes an alternate definition of investment opportunities, Panel C and Panel D includes an alternate measure of distress using the Z score and Panel E includes an alternate measure of distress using the Distance to default, all defined in Appendix A. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. All explanatory variables are lagged by 1 year and winsorized at the 1st and 99th percentile. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 7 – Other Robustness Tests

Panel A – Alternate classification of firms into treatment and control using Tercile of Interest coverage			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.006***	0.011*	0.001
	(3.234)	(1.816)	(0.555)
Observations	14,030	4,901	9,129
R-squared	0.343	0.551	0.538
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel B – Alternate classification of firms into treatment and control using Median of Interest coverage			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.007***	0.010**	0.000
	(3.719)	(2.067)	(0.237)
Observations	14,030	4,901	9,129
R-squared	0.343	0.551	0.538
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

Panel C – Alternate period for analysis 2012-2018			
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.008***	0.016**	0.001
	(3.757)	(2.231)	(0.644)
Observations	9,856	3,389	6,467
R-squared	0.395	0.616	0.579
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by the firm	YES	YES	YES
Controls	YES	YES	YES

The table presents the difference-in-difference analysis of investment deviations of firms after IBC. Panel A includes an alternate classification of firms into treatment and control based on the tercile of interest coverage ratio of 2014, where the 'Distress' variable takes a value of 1 for firms in the lowest tercile and otherwise 0. Panel B includes an alternate classification of firms into treatment and control based on the median of interest coverage ratio of 2014 where the 'Distress' variable takes a value of 1 for firms below median and otherwise 0. Panel C includes an alternate reform window of 2012-2018. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. *IBC* is a categorical variable that takes a value of one for years after 2015 and 0 otherwise. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentile. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 8 – Economic Mechanism – Stronger Creditor rights and shareholders' cost of Bankruptcy

Panel A – Role of Ownership Concentration

	Ownership Concentration					
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	High	Low	High	Low
	InvEff		OverI		UnderI	
IBC*Distress	0.009*	0.004	0.035*	-0.001	-0.002	0.001
	(1.729)	(1.062)	(1.929)	(-0.082)	(-0.593)	(0.444)
Diff in coefficients (p-value)	0.323		0.029		0.346	
Observations	2,940	3,694	932	1,351	2,008	2,343
R-squared	0.354	0.391	0.635	0.616	0.556	0.588
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel B – Ownership of Promoters

	Ownership of Indian Individuals and HUF promoters					
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	High	Low	High	Low
	InvEff		OverI		UnderI	
IBC*Distress	0.015***	0.005	0.034***	0.002	0.001	0.001
	(3.095)	(1.111)	(2.611)	(0.160)	(0.315)	(0.215)
Diff in coefficients (p-value)	0.091		0.039		0.902	
Observations	2,765	3,095	996	1,087	1,769	2,008
R-squared	0.360	0.396	0.556	0.632	0.580	0.565
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel C – Ownership of Promoters

	Ownership of Indian Individuals and HUF promoters>50%					
	(1)	(2)	(3)	(4)	(5)	(6)
	>50%	<50%	>50%	<50%	>50%	<50%
	InvEff		OverI		UnderI	
IBC*Distress	0.012**	0.006**	0.036***	0.011	-0.001	0.001
	(2.449)	(2.160)	(2.895)	(1.332)	(-0.198)	(0.925)
Diff in coefficients (p-value)	0.168		0.045		0.463	
Observations	2,795	9,011	1,027	3,121	1,768	5,890
R-squared	0.379	0.331	0.578	0.556	0.602	0.533
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel D – Number of block holders

	Number of Block holders					
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	High	Low	High	Low
	InvEff		OverI		UnderI	
IBC*Distress	0.021***	0.011***	0.047***	0.021*	-0.001	0.000
	(3.492)	(2.966)	(2.694)	(1.689)	(-0.434)	(0.033)
Diff in coefficient (p-value)	0.102		0.091		0.605	
Observations	2,154	4,486	767	1,484	1,387	3,002
R-squared	0.441	0.322	0.684	0.601	0.589	0.574
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel E –Standalone firms vs Firms owned by Business Group

	Standalone or Business Group firms					
	(1)	(2)	(3)	(4)	(5)	(6)
	Standalone	Business Group	Standalone	Business Group	Standalone	Business Group
	InvEff		OverI		UnderI	
IBC*Distress	0.012***	0.004	0.026***	0.005	0.000	-0.000
	(4.245)	(1.243)	(3.134)	(0.486)	(0.146)	(-0.086)
Diff in coefficient (p value)	0.015		0.039		0.8389	
Observations	8,276	5,754	2,906	1,995	5,370	3,759
R-squared	0.356	0.357	0.575	0.584	0.542	0.562
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

The table presents the triple difference-in-difference analysis of investment deviations of firms after IBC to identify the economic mechanism driving our results. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. In Panel A, we create another measure of the personal cost of bankruptcy i.e. ownership concentration, a Herfindahl index of a firm's ownership. We classify firms in the highest quartile of OC as 'High PCB' firms and in the lowest quartile as 'Low PCB' firms. In Panel B, we partition the sample based on the proportion of shares held by individuals and HUF as promoters and classify firms in the higher quartile as 'High PCB' and in the lowest quartile as 'Low PCB.' In Panel C, we classify firms with the proportion of shares held by individuals and HUF as promoters greater than 50 percent as 'High PCB' and others as 'Low PCB'. In Panel D, we classify firms based on the number of block holders and classify firms in the higher quartile as 'High PCB' and in the lowest quartile as 'Low PCB.' In panel E, we classify firms as 'Standalone' if not affiliated to any business group and 'Business Group' if affiliated to a business group. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% (***), 5% (**), and 10% (*).

Table 9 – Economic Mechanism – Stronger Creditor rights and managerial opportunism

Panel A –Role of Non-executive Directors

	Proportion of Non-executive Directors in BOD					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	High	Low	High	Low	High
	InvEff		OverI		UnderI	
IBC*Distress	0.017**	0.007	0.063***	0.006	-0.003	0.001
	(2.561)	(1.522)	(2.653)	(0.434)	(-0.794)	(0.380)
Diff in coefficients (p-value)	0.122		0.003		0.253	
Observations	1,954	3,727	725	1,325	1,229	2,402
R-squared	0.480	0.369	0.714	0.574	0.651	0.564
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel B – Role of Independent Directors

	The proportion of Independent Directors in BOD					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	High	Low	High	Low	High
	InvEff		OverI		UnderI	
IBC*Distress	0.006	0.011**	0.012	0.017	0.001	0.002
	(0.868)	(2.455)	(0.523)	(1.412)	(0.297)	(0.602)
Diff in coefficients (p-value)	0.428		0.820		0.932	
Observations	1,783	3,893	645	1,393	1,138	2,500
R-squared	0.455	0.357	0.737	0.564	0.663	0.544
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel C – Big 4 Audit

	Firm audited by Big 4 auditors					
	(1)	(2)	(3)	(4)	(5)	(6)
	No	Yes	No	Yes	No	Yes
	InvEff		OverI		UnderI	
IBC*Distress	0.009***	0.006	0.023***	0.007	-0.000	-0.000
	(3.682)	(1.313)	(3.067)	(0.403)	(-0.155)	(-0.138)
Diff in coeff (p-value)	0.602		0.256		0.927	
Observations	11,805	2,198	4,053	830	7,752	1,368
R-squared	0.350	0.399	0.572	0.594	0.539	0.621
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel D – Borrowing exclusively from Government Owned Banks

	Government Owned Banks exclusive					
	(1)	(2)	(3)	(4)	(5)	(6)
	Yes	No	Yes	No	Yes	No
	InvEff		OverI		UnderI	
IBC*Distress	0.012***	0.006**	0.029**	0.013	-0.003	0.000
	(2.926)	(2.040)	(2.283)	(1.609)	(-1.155)	(0.187)
Diff in coefficients (p-value)	0.164		0.241		0.177	
Observations	3,468	8,782	1,129	3,145	2,339	5,637
R-squared	0.324	0.348	0.598	0.549	0.550	0.549
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel E – Competition

	Competition using the HHI index					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	High	Low	High	Low	High
	InvEff		OverI		UnderI	
IBC*Distress	0.005	0.006	0.011	0.004	0.001	-0.002
	(0.978)	(1.500)	(0.556)	(0.416)	(0.529)	(-0.719)
Diff in coefficients (p-value)	0.871		0.684		0.291	
Observations	3,531	3,698	1,238	1,246	2,293	2,452
R-squared	0.342	0.312	0.536	0.542	0.499	0.509
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

The table presents the triple difference-in-difference analysis of investment deviations of firms after IBC to identify the economic mechanism driving our results. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. In Panel A, we use the proportion of non-executive directors on the Board of Directors and classify firms in the lowest quartile as 'Low' and in the highest quartile as 'High. In Panel B, we use the proportion of independent directors on the Board of Directors and classify firms in the lowest quartile as 'Low' and in the highest quartile as 'High. In Panel C, we use 'Big 4 auditor', which is defined as 'No' for firms not having any of the Big 4 companies as auditors, and 'Yes' for firms having Big 4 companies as auditors. In Panel D, we use 'Borrowing exclusively from government owned banks', and is defined as 'Yes' for firms borrowing exclusively from government owned banks and 'No' for other firms. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% (***), 5% (**), and 10% (*).

Table 10 – Economic Mechanism – Stronger creditor rights and the threat of Pre-mature liquidation

Panel A – Role of Tangible Assets

	Total tangible assets scaled by total assets					
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	High	Low	High	Low
	InvEff		OverI		UnderI	
IBC*Distress	0.009*	0.005	0.000	-0.036	-0.003	0.003
	(1.733)	(1.226)	(0.032)	(-1.074)	(-0.980)	(1.268)
Diff in coefficient (p-value)	0.548		0.131		0.044	
Observations	3,724	2,976	1,744	523	1,980	2,453
R-squared	0.385	0.381	0.594	0.800	0.549	0.605
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel B – Role of Leverage

	Total Long-term debt scaled by total assets					
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	High	Low	High	Low
	InvEff		OverI		UnderI	
IBC*Distress	0.000	0.008**	0.010	0.008	-0.005	0.002
	(0.021)	(2.306)	(0.732)	(0.461)	(-1.457)	(0.890)
Diff in coefficients (p-value)	0.163		0.916		0.029	
Observations	2,572	3,342	1,038	931	1,534	2,411
R-squared	0.428	0.377	0.643	0.661	0.599	0.552
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel C –Number of bankers

	Number of bankers					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	High	Low	High	Low	High
	InvEff		OverI		UnderI	
IBC*Distress	0.009*	0.004	0.031*	0.007	-0.002	-0.000
	(1.92431)	(0.945)	(1.869)	(0.614)	(-0.807)	(-0.050)
Diff in coefficients (p-value)	0.363		0.169		0.447	
Observations	3,575	2,915	1,172	1,077	2,403	1,838
R-squared	0.351	0.411	0.609	0.656	0.575	0.586
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by the firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

The table presents the triple difference-in-difference analysis of investment deviations of firms after IBC to identify the economic mechanism driving our results. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the

period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. *IBC* is a categorical variable that takes a value of one for the years 2015-2020 and 0 otherwise. In Panel A, we use 'Tangibility' is defined as the ratio of tangible assets to total assets, and firms in the highest quartile are classified as 'High' and 'Low' for firms in the lowest quartile. In Panel B, we use the 'Leverage' defined as the proportion of long-term debt as a ratio of total assets and classify firms in the highest quartile as 'High' and 'Low' for firms in the lowest quartile. In Panel C, we use the 'number of bankers' and classify firms in the lowest quartile as 'Low' and 'High' for firms in the highest quartile. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Table 11 – Additional Analysis

Panel A: Capex and Non-Capex Analysis

	Capex Investment			Non-Capex Investments		
	(1)	(2)	(3)	(4)	(5)	(6)
	InvEff	OverI	UnderI	InvEff	OverI	UnderI
IBC*Distress	0.009***	0.022***	0.000	0.000	0.000	-0.000
	(4.270)	(3.300)	(0.058)	(0.025)	(0.029)	(-0.900)
Observations	14,030	4,828	9,202	14,030	3,292	10,738
R-squared	0.337	0.536	0.523	0.692	0.825	0.924
Firm FE	YES	YES	YES	YES	YES	YES
Year*Industry FE	YES	YES	YES	YES	YES	YES
SE cluster by firm	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Panel B: Performance Analysis

	Return on Assets (0,1)		
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.008	0.006	0.017
	(0.649)	(0.652)	(0.814)
Observations	13,386	4,723	8,663
R-squared	0.389	0.628	0.395
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

	Return on Assets (0,2)		
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.012**	0.035***	0.005
	(2.073)	(3.087)	(0.783)
Observations	11,772	4,137	7,635
R-squared	0.509	0.612	0.550
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

	Return on Assets (0,3)		
	(1)	(2)	(3)
	InvEff	OverI	UnderI
IBC*Distress	0.014**	0.028**	0.012
	(2.377)	(2.525)	(1.563)
Observations	10,232	3,603	6,629
R-squared	0.526	0.647	0.561
Firm FE	YES	YES	YES
Year*Industry FE	YES	YES	YES
SE cluster by firm	YES	YES	YES
Controls	YES	YES	YES

The table presents the triple difference-in-difference analysis of investment deviations and returns on assets of firms before and after IBC. In Panel A, we divide Investments into two components - Capital expenditure (purchase and sale of fixed assets) and non-capital expenditures (acquisition and research and development expenses) and regress them

separately on lagged growth opportunities (Tobin's Q) with industry and year fixed effects. Investment efficiency is defined as the absolute value of deviations of actual investment from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of these *Capex and Non-Capex Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments multiplied by -1 for the complete sample as well as the overinvesting (OverI) and underinvesting (UnderI) sample. 'InvEff' includes a complete sample and measures aggregate investment efficiency. *OverI* includes firm-year observations when investment residuals are greater than zero while *UnderI* includes firm-year observations when investment residuals are smaller than zero. In Panel B, we estimate the impact of IBC on the return on assets of the next 1 to 3 years of distressed firms. We classify firms into over and under-investments following a similar process as in the main analysis. In panel B, we use return on assets as a dependent variable in the regression. All explanatory variables are lagged by 1 year and are winsorized at the 1st and 99th percentiles and lagged 1 year. Appendix A defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Appendix A: Description of variables

Variable name	Description
Investments	The sum of expenditure on the purchase of fixed assets, mergers and acquisitions, research and development expenses less the sale of fixed assets scaled by lagged total assets for a firm.
Tobin's q	tTe ratio of market value of total assets to book value of total assets of firm *i* in year *t-1*.
Distress	Takes a value of 1 for firms in the lowest quartile of interest coverage ratio within the industry in the year 2014, and otherwise 0.
IBC	Dummy variable that takes a value of one for years 2015-2020 and 0 for years 2011 to 2014.
Size	Log of total assets of the firm.
SD CFO	The standard deviation of cash flow from operations scaled by the average book value of total assets, calculated using the data from year t-5 to t-1.
SD_SALES $_{i,t-1}$	The standard deviation of sales scaled by the average book value of total assets, calculated using the data from year t-5 to t-1.
SD_INV $_{i,t-1}$	The standard deviation of investments measured as change in net fixed assets plus research and development expense scaled by the lagged book value of total assets, calculated using the data from year t-5 to t-1.
Tangibility $_{i,t-1}$	The ratio of net PPE to book value of total assets.
CFO/Sales $_{i,t-1}$	The ratio of cash flow from operating activities to sales.
Slack $_{i,t-1}$	The ratio of cash to PPE.
Dividend $_{i,t-1}$	A dummy variable that takes a value of 1 for the firm paying dividend and 0 otherwise.
Age $_{i,t-1}$	Firm age is measured as the number of years after incorporation.
Operating cycle $_{I,t-1}$	Defined as the natural logarithm of the sum of the ratio of receivables to sales and the ratio of inventory to cost of goods sold multiplied by 360.
Loss $_{i,t-1}$	A dummy variable that takes a value of 1 if profit before interest and tax is negative and otherwise 0.
Cash $_{i,t-1}$	The ratio of cash to book value of total assets.
Leverage $_{i,t-1}$	The ratio of long-term debt to the sum of long-term debt and the market value of equity.
Industry Leverage $_{i,t-1}$	Mean of leverage for firms in the same NIC 3-digit industry
Investments2	change in gross fixed assets from the previous year scaled by lagged total assets.
Sales growth ratio	Annual growth in revenue from the previous year scaled by the previous year's revenue.
Altman Z score	Altman's Z score, calculated as (1.2*(Working capital/TA) + 1.4*(Retained earnings/TA) + 3.3*(EBIT/TA) + 1*(Sales/TA)).
Number of block holders	Number of shareholders who own more than 5% capital.
Independent Directors	The proportion of independent directors in BOD.
Big 4 auditor	Firms having any of the Big 4 companies as auditors.
Ownership of individual and HUF	Proportion of shares held by Indian individuals and HUF as promoters.
Ownership concentration	A Herfindahl index of a firm's ownership.
GOB	The dummy variable equals 1 for firms borrowing exclusively from government owned banks in 2016 otherwise 0.

Appendix B: Descriptive statistics for Overinvesting and Underinvesting firm

Panel A: Descriptive Statistics of Overinvesting Subsample

	IBC = 0 (2011-2014)					IBC = 1 (2015-2020)				
	Distressed firms		Non-distressed firms		Test of difference in mean	Distressed firms		Non-distressed firms		Test of difference in mean
	Mean	S.D.	Mean	S.D.	t-value	Mean	S.D.	Mean	S.D.	t-value
InvEff $_{i,j,t}$	-0.079	0.085	-0.078	0.080	-0.200	-0.048	0.064	-0.058	0.069	3.000
Investments/TA $_{i,t}$	0.141	0.090	0.143	0.085	-0.550	0.088	0.074	0.105	0.079	-4.450
Tobin Q $_{i,t-1}$	0.422	0.413	0.695	0.855	-6.100	0.674	0.762	1.106	1.181	-8.000
Size $_{i,t-1}$	7.999	1.812	7.947	1.744	0.500	8.247	1.855	8.254	1.822	-0.100
SD_CFO $_{i,t-1}$	0.087	0.062	0.083	0.060	1.050	0.071	0.055	0.071	0.052	0.200
SD_SALES $_{i,t-1}$	0.215	0.205	0.217	0.202	-0.150	0.182	0.185	0.187	0.176	-0.550
SD_INV $_{i,t-1}$	0.105	0.105	0.114	0.142	-1.150	0.075	0.094	0.074	0.097	0.300
Tangibility $_{i,t-1}$	0.350	0.173	0.355	0.159	-0.550	0.315	0.188	0.317	0.175	-0.300
CFO/Sales $_{i,t-1}$	0.075	0.179	0.092	0.130	-2.100	0.101	0.189	0.089	0.134	1.650
Slack $_{i,t-1}$	0.200	0.360	0.214	0.531	-0.500	0.377	1.189	0.342	0.901	0.750
Dividend $_{i,t-1}$	0.581	0.494	0.767	0.423	-7.400	0.364	0.482	0.665	0.472	-13.250
Age $_{i,t-1}$	30.687	18.406	30.571	17.778	0.100	33.561	18.077	32.692	16.826	1.050
Operating cycle $_{i,t-1}$	4.943	0.708	4.835	0.600	3.000	5.106	0.976	4.953	0.740	4.050
Loss $_{i,t-1}$	0.041	0.199	0.010	0.101	4.250	0.071	0.257	0.016	0.126	7.300
Cash $_{i,t-1}$	0.040	0.052	0.043	0.053	-1.000	0.030	0.045	0.042	0.057	-4.400
K structure $_{i,t-1}$	0.434	0.243	0.293	0.235	10.400	0.325	0.265	0.178	0.203	14.250
Industry K structure $_{i,t-1}$	0.363	0.127	0.348	0.119	2.250	0.268	0.125	0.265	0.120	0.500
Observations	387		1,454			522		2,538		

Panel B: Descriptive Statistics of Underinvesting Subsample

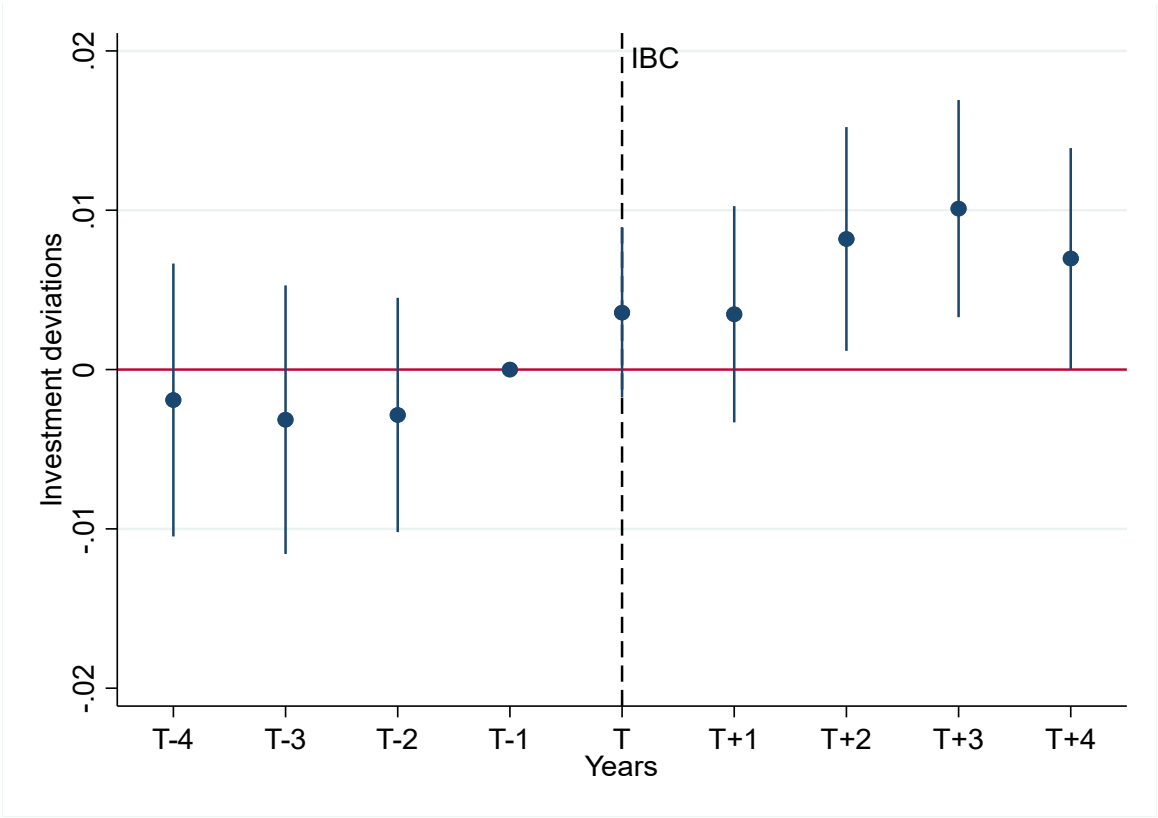
	IBC = 0 (2011-2014)					IBC = 1 (2015-2020)				
	Distressed firms		Non-distressed firms		Test of difference in mean	Distressed firms		Non-distressed firms		Test of difference in mean
	Mean	S.D.	Mean	S.D.	t-value	Mean	S.D.	Mean	S.D.	t-value
InvEff $_{i,j,t}$	-0.042	0.025	-0.040	0.026	-2.500	-0.031	0.022	-0.030	0.021	-1.950
Investments/TA $_{i,t}$	0.016	0.024	0.025	0.027	-9.050	0.008	0.021	0.017	0.022	-13.400
Tobin Q $_{i,t-1}$	0.364	0.603	0.744	1.062	-10.600	0.469	0.777	1.087	1.416	-16.250
Size $_{i,t-1}$	8.032	1.761	7.664	1.851	5.400	8.124	1.806	8.060	1.842	1.150
SD_CFO $_{i,t-1}$	0.088	0.064	0.099	0.078	-4.100	0.071	0.057	0.083	0.069	-6.000
SD_SALES $_{i,t-1}$	0.213	0.178	0.243	0.232	-3.700	0.187	0.187	0.216	0.219	-4.550
SD_INV $_{i,t-1}$	0.096	0.122	0.102	0.144	-1.150	0.077	0.112	0.076	0.110	0.300
Tangibility $_{i,t-1}$	0.295	0.195	0.287	0.186	1.200	0.310	0.200	0.265	0.182	7.950
CFO/Sales $_{i,t-1}$	0.058	0.197	0.068	0.194	-1.400	0.076	0.201	0.073	0.188	0.500
Slack $_{i,t-1}$	0.414	1.058	0.516	1.293	-2.200	0.328	1.014	0.497	1.277	-4.700
Dividend $_{i,t-1}$	0.383	0.486	0.641	0.480	-14.350	0.212	0.409	0.579	0.494	-26.000
Age $_{i,t-1}$	32.154	19.685	31.129	18.426	1.450	35.676	19.794	34.569	19.502	1.900
Operating cycle $_{i,t-1}$	5.284	0.841	5.049	0.787	7.850	5.247	0.866	5.099	0.803	6.050
Loss $_{i,t-1}$	0.116	0.320	0.036	0.186	9.250	0.171	0.376	0.077	0.266	10.400
Cash $_{i,t-1}$	0.034	0.046	0.049	0.064	-6.750	0.028	0.042	0.043	0.059	-9.100
K structure $_{i,t-1}$	0.451	0.278	0.262	0.251	19.500	0.408	0.294	0.189	0.235	28.950
Industry K structure $_{i,t-1}$	0.356	0.128	0.341	0.125	3.100	0.295	0.130	0.263	0.120	8.700
Observations	985		2,597			1,541		4,006		

Appendix C: Pre-Trends Analysis

	(1)
	InvEff
2011*Distress	-0.003
	(-0.732)
2012*Distress	-0.006
	(-1.403)
2013*Distress	-0.005
	(-1.240)
2014*Distress	Omitted
	-
2015*Distress	**0.003**
	(0.962)
2016*Distress	**0.003**
	(0.742)
2017*Distress	**0.007***
	(1.830)
2018*Distress	**0.008****
	(2.208)
2019-2020*Distress	**0.005**
	(1.583)
Observations	14,030
R-squared	0.343
Firm FE	YES
Year*Industry FE	YES
SE cluster by firm	YES
Controls	YES

The table presents the parallel trend analysis of investment deviations of firms before and after IBC. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments these deviations are multiplied by -1 for the complete sample. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. Instead of an *IBC* dummy, year dummies for different year periods are used. All explanatory variables are lagged by 1 year and winsorized at the 1st and 99th percentiles. Appendix 1 defines all other variables in detail. T-statistics based on standard errors clustered by the firm are presented in parentheses. Statistical significance is denoted as 1% *(***), 5% (**), and 10% (*).*

Appendix D: Graph for Pre-trends analysis after weighting



Notes: The figure plots the difference-in-difference estimates of the dynamic trends of investment efficiency for treatment and control firms for years t-4 to t+4 (2011 to 2020) surrounding the announcement of IBC, with year t-1 as baseline after weighting observations by inverse propensity score. Propensity scores are calculated based on four firm characteristics namely Size, Tangibility, Age and Cash. The coefficients are shown with 90% confidence intervals. The dependent variable 'investment efficiency' is the absolute value of deviations of actual investments from optimal investments. The optimal investment is measured using all firm-year observations for the period 2011 to 2020 from regression of *Investments* in a year to lagged growth opportunities (Tobin's Q) with industry and year fixed effects. For identifying treatment firms, we divide our sample into quartiles using interest coverage in 2014 and classify firms in the lowest quartile (lowest 25 percentile) as 'distress' and 'Distress' dummy takes a value of 1 for such firms and otherwise 0. All control variables are lagged by 1 year and winsorized at the 1st and 99th percentiles. Appendix 1 defines all other variables in detail.