Report of Study
on
Effectiveness of the Resolution Process: Firm Outcomes in the Post-IBC Period

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Executive Summary

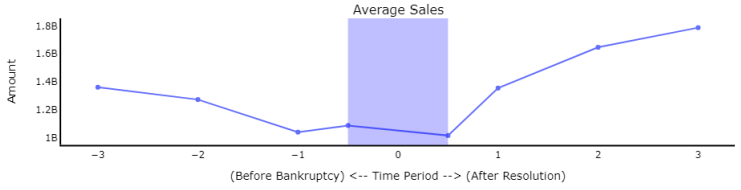
The Insolvency and Bankruptcy Code, 2016 (IBC) has remarkably altered how distressed and defaulting businesses are handled by their stakeholders. One of the paths offered by the IBC is that of 'resolution', allowing a firm to continue as a going concern, despite the default. By focusing on the revival and continuity of financially distressed entities, the IBC seeks to preserve jobs, protect investments, and maintain the operational viability of such businesses. According to data from the Insolvency and Bankruptcy Board of India (IBBI), creditors have, on average, realised 32% of the admitted claims and 168% of the liquidation value in cases resolved under IBC. This data primarily reflects the outcomes in terms of financial recovery. However, it is essential to recognize that the success of resolution goes beyond these recovery figures. Now, as seven years have passed since the implementation of the legislation, it is an opportunity to review the functioning of firms that have undergone resolution under the IBC.

To understand the impact of the resolution process on the firms, a multi-pronged approach is adopted. The report looks at the performance of the firms both before and after the resolution process, to understand if the firms have been able to find their feet in the market. The report also compares the performance of the resolved firms against their peers by sector and size. This comparison tells us the magnitude of the gap and separates the changes that have arisen due to market forces, compared to changes brought about by better management.

Some of the key findings are:

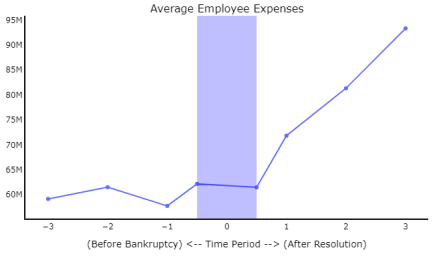
- Average sales have shown an increase of 76% in three years since resolution. While the net margins continue to remain negative, the resolved firms have operationally broken even in the post-resolution period (operating margin of

4% as of T+3), which is a significant improvement from the pre-resolution period



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that B refers to Billions and M refers to Millions in the y-axes.

- There is around 50% increase in the average employee expenses in the three years post-resolution—indicating a higher employment intensity in the resolved firms (listed) in the post-resolution period. The total employment across listed firms have also shown a substantial increase in the post-resolution period.



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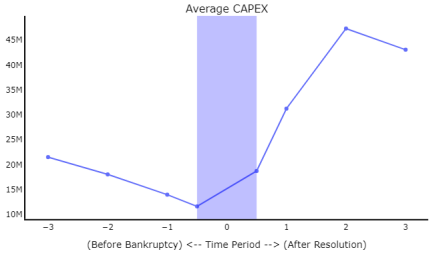
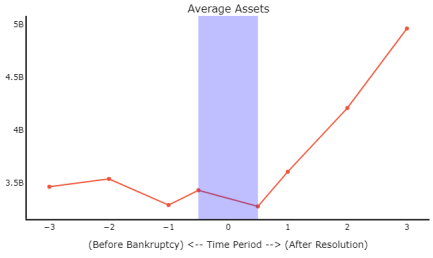
Note that k here refers to 1000. So 30k means 30,000.

- The trends indicate a significant increase of around 50% in the average total assets of resolved firms post resolution. This is coupled with 130% increase in the CAPEX, which indicate a build-up of tangible assets in the balance sheet of these firms in the post-resolution period.
- We find that there is convergence in the profitability ratios of the resolved firms with the benchmark averages in the post-resolution period (see Figure 2.5 for details).





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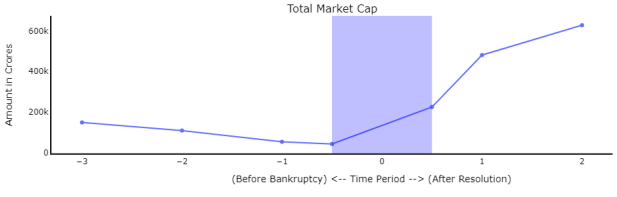
Note that M here refers to Million and B refers to Billion.

- The trends in the market capitalization of listed resolved firms indicate a significant revival in the average market valuations in the post-resolution period, which is expected given the growth opportunities that will accrue to these firms post the resolution with the creditors. A similar trend is seen for the aggregate market valuation of all the resolved firms which has increased from around INR 2 lakh crore to INR 6 lakh crore in the post-resolution phase. Overall, the results suggest that the market has priced and acknowledged the potential of these firms in the post-resolution period.



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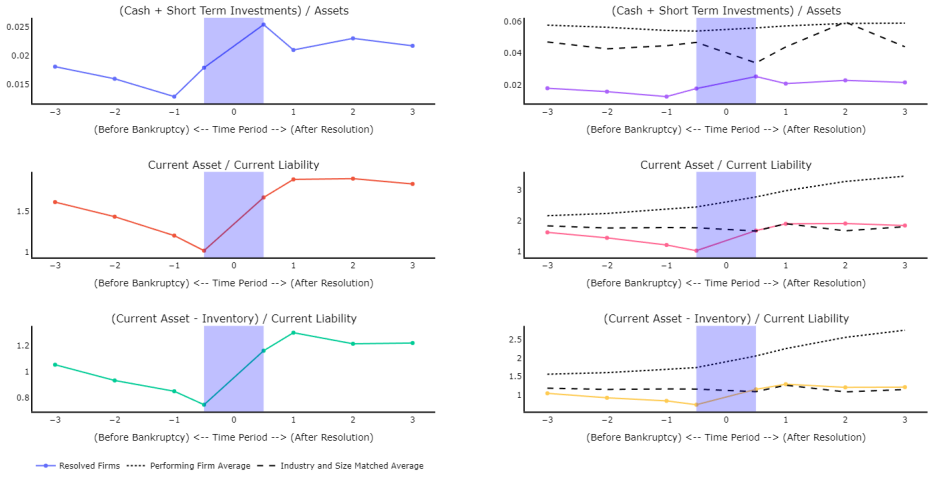
Note that k here refers to 1000. So 5k means 5,000.

- Liquidity has improved in the post-resolution period by about 80%. The trends indicate a significant increase in the liquidity of the resolved firms in the post-resolution period. For instance, the current assets to current liability has improved from 1.01 in the year of bankruptcy to 1.83 in the third year post-resolution.



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Note that the axis of some plots has been inverted for better representation.

The report is divided into three parts. Part 1 provides the background and the methodology. The report provides quantitative and qualitative analysis of the functioning of the resolved firms. Detailed empirical analysis has been undertaken and utilizes metrics for profitability, margins, capital expenditure, leverage, cash flow, employment, market ratios etc. These metrics are employed to gauge their change over time and compare the resolved firms with their peers in the industry. The classes of peers utilized are (a) Industry and Size Decile Matched and (b) Propensity Score Matched (PSM).

The detailed methodology provides the scope and sources of data and the empirical methods employed. The event-window analysis method facilitates comparison with like firms before the bankruptcy filing and after the conclusion of the resolution process. The COVID-19 pandemic during this period was a source of distress to a large number of firms in the country. The regression controls for time and industry-fixed effects to accommodate its impact. The qualitative analysis involved survey and in-depth interviews. They were undertaken to provide the context for the empirical findings.

Part 2 of the report consists of findings from the detailed empirical analysis. The profitability and margins of the resolved firms saw a sharp uptick post the conclusion of the statutory process under IBC. This analysis holds true when com-

pared with both industry size-decile matched and PSM firms. It is noteworthy that for all five profitability metrics, resolved firms showed a significant improvement when compared with PSM firms. Capital investments by firms indicate their investment in their future growth. For resolved firms, average capex saw an increase of approximately 130% in the three years post-resolution. There is a statistically significant increase in the Return on Capital Employed (ROCE) of resolved firms when compared to PSM firms in the post-resolution period. On liquidity and leverage, the situation is more nuanced. While liquidity and leverage ratios have improved, the change is not statistically significant in the post-resolution period for several metrics. For resolved firms, the interest coverage ratio is nearly at pre-bankruptcy levels, and the trend indicates convergence with average ratios seen by Industry and Size Decile Matched firms. Liquidity ratios, similarly, did not yield statistically significant results.

The issues relating to access to credit were taken up in the survey and interview to seek clarity on the subject. The uptake of labour by firms in the post-resolution period is also unclear. The data is limited to listed firms, and the firms show a total employee count nearly at pre-bankruptcy level. However, no significant difference can be drawn from the regression analysis. A trend analysis of Activity ratios that reflect operational functioning indicates an improvement in the activity ratio. Overall, we observe a statistically significant improvement in all the activity ratios in the post-resolution period except for the cash conversion cycle.

In this section, we also report the time value adjusted recovery rates along with analysis of industry-wise recovery rates and cost of resolution. For financial creditors, the highest recovery rates were observed in the Hotels and Restaurants and Construction industry and the lowest for Electricity, Gas And Water Supply. Whereas, for the operational creditors, the highest recovery rate was observed in the Wholesale & Retail Trade and Hotels and Restaurants industry and lowest for Transport, Storage And Communications Industry. One other service-based industry - Health and Social Work, showed high recovery rates. This challenges the traditional notion of asset-heavy industries having higher recovery rates. The role of auctioning might also have been crucial for price discovery for the service industry.

Part 3 discusses the findings of the survey and the interviews. Approximately

75% of those surveyed were happy with the post-resolution productivity levels. The participants identified access to financing as being a continuing problem, even post the resolution. Even when credit is available, the terms were not identified as being reasonable by those surveyed. Those interviewed indicated satisfaction with the working of the National Companies Law Tribunal. Post-resolution disputes with the Income tax, Customs and the RBI were flagged as being onerous, and a source of delay in obtaining clearances. Regarding the working of the Resolution Professionals, those interviewed felt that they needed skills for business and management.

Overall, based on the empirical analysis and the surveys conducted, we observe that:

- The resolved firms have significantly improved their performance across all important financial metrics in the post-resolution period. Several financial metrics of the resolved firms indicate a recovery to levels that is comparable to other healthy firms during the same period. Overall, the post-resolution activity and performance suggests an increase in the value addition by the resolved firms to the economy.

- Survey participants are largely satisfied with the resolution process and exuded confidence in their ability to meet the projected plans.

- Focus interviews validated the survey findings, however, it also revealed some room for improvements in the resolution process, especially with respect to the understanding of the resolution process across various stakeholders.

Chapter 1

Background of the study, objectives, and approach

1.1 Background of the study

The Insolvency and Bankruptcy Code (IBC) was enacted in 2016 to improve the efficiency of insolvency and bankruptcy proceedings of firms in India. While the act facilitated a consolidation of the legal framework and hastened the resolution process, it is imperative to understand the impact of the act on firms that went through the resolution process. This study examines whether the resolutions undertaken post the implementation of the act have resulted in better outcomes for firms coming out of the process.

1.2 Key Objectives

The key objectives of the study are as follows:

1. The study measures the effectiveness of the resolution process by analysing the performance of the resolved companies in the post-resolution period compared to the performance of performing firms during the same period.

2. Calculate the recovery rate for cases resolved under IBC

1.3 Data and Methodology of the study

The study adopts the following methodology to achieve each of the objectives outlined above.

1.3.1 Empirical approach

- The empirical analysis that involves a univariate trend analysis and a multivariate regression analysis covers the entire population of resolved firms with publicly available financial information.
- The research benchmarks the performance of the firms with the respective sector/industry as well as a suitable cohort within a specific industry. For instance, a medium-sized pharma company would be compared with the entire industry as well as those firms in the pharma sector with similar size (firms in the size quartile or quintile).
- In the benchmarking process, we cover the following metrics
  - Turnover and growth metrics
  - Profitability measures
  - Activity and Efficiency metrics
  - Operating ratios including labour cost and strength of labour force
  - Liquidity ratios
  - Leverage ratios
  - Market ratios (for firms that are publicly listed)
- Additionally, an analysis with a propensity score matched sample of performing firms is carried out.
- A trend analysis (univariate) was conducted to measure the pre and post-resolution changes in key metrics of firms in the sample.
- Costs incurred during the bankruptcy process and analysis of the recovery rates are also conducted in the study.

1.3.2 Data

We obtained the data on the resolved firms from IBBI. The data included the unique identification (CIN), the date of bankruptcy, the date of the resolution and the amount involved in the bankruptcy process. A total of 550 firms that underwent the resolution process were part of this database. Subsequently, we approached MCA to obtain the financials of the firms that underwent the resolution process. The data obtained from MCA contained the financials from FY 2013 onwards until FY 2022. The data on performing firms were obtained from the CMIE Prowess database, and again the time period was matched with the sample of resolved firms.

The analysis is conducted with an event year window rather than a calendar year to ensure that the performance and the impact of IBC can be measured consistently. For instance, a firm that went bankrupt in 2018 and got resolved in 2019 will be matched with another firm which went bankrupt in 2020 and got resolved in 2021 to track the resolution outcomes. Hence, the performance will be tracked on an event basis as one year and two years from resolution etc. As there is variation in the total time taken to resolve a firm, we have omitted the performance of firms during the resolution period from our analysis. For instance, if a firm has been admitted to the NCLT process in FY 2018 and the resolution has taken place in FY 2020, then we do not consider the performance of the firm during the interim period. As the firms' activities are hampered or suspended during the interim period and as the resolution timeline is not standard for the firms in the analysis, we have chosen to not consider the interim period.

The total number of resolved firms in our estimation sample after excluding financial services firms and firms with missing data is 431. Detailed criteria and the data waterfall is shown in Table 1.1.[1] Financial services firms are not comparable with non-financial firms as the business performance metrics of such firms are different. The total number of firms in the performing cohort (both listed and unlisted firms that were performing and not bankrupt) obtained from Prowess for the analysis after excluding financial services firms and firms with missing data

[1]The number of unique firms in the event time window t-3, t-2, t-1, Bankruptcy, Resolution year, t+1, t+2, and t+3 is 348, 324, 271, 205, 158, 121, 85, and 31 respectively.

is 5,085. A brief definition of the variables employed in the study is shown in Table 1.2. A brief summary of the resolved firms and performing firms sample is shown in Table 1.3 and Table 1.4. All the variables were winsorized at the 5^{st} and 95^{th} percentile to avoid outliers.

To understand the impact of the resolution, we employed a difference-in-differences analysis where the treated firms include those firms that went through the resolution process, and the control firms include the performing firms. We followed two approaches in selecting the control group firms. The first approach included a larger set of performing firms in the control group, and in the second, we included the industry and size decile-matched firms in the control group. The results of the analysis are presented in the subsequent section. The industry and size-decile classification match each treated firm with a control firm from the same industry and within the same size decile without replacement. We chose to do the approach without replacement as the number of control group firms available to match at the industry-size decile matched level is limited. In an additional analysis, we also conduct the empirical analysis with a propensity score matched control group. Details of the matching and analysis are shown in the next chapter.

Table 1.1: Data waterfall and exclusion criteria

Criteria	No. of unique firms
MCA data	550
Merging with IBBI recovery data	547
Restricting event window to three years before bankruptcy and after resolution	495
Removing financial intermediation firms	488
Removing firms with Sales as zero	431

Table 1.2: Definition of variables

Ratios	Definition
Asset Turnover	Measures the value of a firm's sales relative to its assets. Used as an indicator of the efficiency with which a company uses its assets to generate revenue.
Cashflow from Operations / Assets	Measures the operating cash flows generated by the firm as a proportion of its assets. It is used as an indicator of the operating performance of firms.
PAT/Assets	Measures the profit after tax relative to the assets of a firm.
Net Margin (PAT/Sales)	Measured as the ratio of net profit to total sales in a year.
EBITDA / Assets	Measures the earnings before interest, tax, depreciation and amortization scaled by the assets of a firm. It provides an indication of the performance of the core operations of a firm.
Operating Margin	Measured as the ratio of operating profits to total sales in a year.
Gross Margin	Gross profit a firm scaled by the total sales in a year.
Return On Capital Employed (ROCE)	Measures the earnings before interest and tax relative to the capital employed by the firm. Provides an indication of the operating returns of a firm.
Liquidity (Cash + Investments) / Assets	Proportion of cash and short-term investments in the total assets of a firm.
Liquidity (Current Assets / Current Liability)	Proportion of current assets to the current liability of a firm.
Liquidity (Current Assets - Inventory) / Current Liability	Commonly known as quick ratio, is measured as the proportion of highly liquid current assets relative to the current liability of a firm.
Leverage (Total Debt / Equity)	Ratio of total interest-bearing debt to total equity.
Leverage (Total Debt / Total Assets)	Ratio of total interest-bearing debt to total assets of a firm.
Leverage (Interest Coverage Ratio)	Measures the ratio of earnings before interest and tax to the interest expenses of a firm in a year.
Leverage (Total Debt / EBITDA)	Commonly referred to as solvency ratio, measures the ratio of total interest-bearing debt to the earnings before interest, tax, depreciation and amortization. It indicates the number of years it will take for a firm to repay the total debt outstanding.
Labour (Employee Expenses / Total Sales)	Proportion of revenues spent on labour expenses.
Labour (Employee Expenses / Total Assets)	Proportion of labour expense relative to the total assets of a firm.
CAPEX	Measures the capital investments made by a firm in a year. It is calculated as the ratio of cash outflow for capital expenditure to the net fixed assets of a firm.
Inventory Turnover	Ratio of the cost of goods sold to the total inventory outstanding of a firm. Measures the number of times the inventory has turned over in a year.
Days Sales Inventory	It calculates the number of days a product remains in inventory in a firm. It is computed as 365 divided by the inventory turnover measure.
Receivables Turnover	Ratio of the total sales to the total receivables outstanding of a firm. Measures the number of times the receivable has been collected in a year.
Days Sales Receivables	It calculates the number of days a firm takes to collect its receivables. It is computed as 365 divided by the receivable turnover measure.
Payables Turnover	Ratio of the cost of goods sold to the total payables of a firm. Measures the number of times, on average, the payables have been settled with suppliers in a year.
Days Sales Payables	It calculates the number of days a firm takes to pay its suppliers. It is computed as 365 divided by the payables turnover measure.
Operating Cycle	The operating cycle is the sum of days sales inventory and days sales receivables.
Cash Conversion Cycle	Cash conversion cycle is the difference between the operating cycle and the days sales payables. It gives an indication of the number of days the cash is stuck in working capital for a firm.

Table 1.3: Descriptive summary of the resolved firms

	Firms	Observations	Mean	Std	Min	25%	50%	75%	Max
Sales/Assets	431	1543.0	0.499	0.508	0.000	0.118	0.386	0.656	2.000
PAT/Assets	431	1543.0	-0.093	0.131	-0.435	-0.126	-0.052	0.001	0.037
Net Margin	431	1543.0	-0.772	1.417	-4.968	-0.689	-0.136	0.003	0.065
EBITDA/Assets	431	1543.0	-0.004	0.084	-0.185	-0.037	0.002	0.044	0.151
EBITDA/Sales	431	1543.0	-0.108	0.483	-1.343	-0.174	0.009	0.096	0.661
Gross Margin	431	1372.0	0.319	0.308	-0.253	0.116	0.337	0.497	0.884
Liquidity (Cash+short_term_instmnts)/Assets	431	1543.0	0.018	0.024	0.000	0.003	0.009	0.020	0.100
Liquidity (CA/CL)	431	1543.0	1.471	1.671	0.020	0.404	0.951	1.737	7.013
Liquidity (CA-Inv)/CL	431	1543.0	0.994	1.139	0.012	0.257	0.625	1.175	4.765
Leverage (TD/Equity)	431	1541.0	0.033	5.369	-8.808	-2.521	0.134	2.708	15.073
Leverage (TD/TA)	431	1543.0	0.659	0.478	0.081	0.344	0.542	0.819	1.938
Leverage (Interest coverage ratio)	431	1454.0	-33.831	104.961	-444.200	-3.467	-0.495	0.948	9.531
Leverage (TD/EBITDA)	431	1543.0	-6.621	66.919	-470.460	-14.654	0.513	11.856	110.156
Labour (Emp.expense/Sales)	431	1543.0	0.129	0.145	0.002	0.034	0.065	0.176	0.511
Labour (Emp.expense/Assets)	431	1543.0	0.036	0.040	0.000	0.009	0.018	0.048	0.141
CAPEX (PTA/(FA-PTA))	431	1543.0	0.021	0.047	0.000	0.000	0.000	0.017	0.193
Cashflow from Ops/ Assets	431	1543.0	0.013	0.048	-0.072	-0.007	0.000	0.025	0.131
ROCE	431	1543.0	-0.036	0.097	-0.251	-0.078	-0.018	0.022	0.121
Inventory Turnover	431	1269.0	5.273	6.454	0.172	1.239	3.109	5.852	24.197
Day Sales Inventory	431	1269.0	329.563	521.152	15.084	62.369	117.398	294.516	2122.448
Receivables Turnover	431	1401.0	9.775	16.179	0.368	1.625	3.845	8.625	65.014
Day Sales Receivables	431	1401.0	207.073	274.581	5.614	42.320	94.928	224.683	991.496
Payables Turnover	431	1305.0	4.351	6.610	0.141	0.799	2.218	4.053	29.559
Day Sales Payables	431	1305.0	464.761	696.191	12.348	90.062	164.557	457.022	2595.408
Operating Cycle	431	1203.0	500.544	580.318	55.318	154.514	246.207	583.459	2165.693
Cash Conversion Cycle	431	1182.0	104.746	354.968	-520.971	-37.635	82.269	196.078	969.651

Table 1.4: Descriptive summary of performing firms

	Firms	Observations	Mean	Std	Min	25%	50%	75%	Max
Sales/Assets	5085	20345	1.024	1.370	0.000	0.431	0.827	1.267	110.751
PAT/Assets	5085	20345	0.039	0.075	-1.213	0.006	0.034	0.068	3.359
Net Margin	5085	20345	0.051	1.492	-52.579	0.007	0.037	0.079	146.744
EBITDA/Assets	5085	20345	0.116	0.091	-0.310	0.066	0.106	0.154	5.598
EBITDA/Sales	5085	20345	0.304	5.385	-4.798	0.073	0.133	0.234	494.150
Gross_Margin	5085	20345	0.271	0.168	0.000	0.158	0.252	0.344	1.000
Liquidity (Cash+short_term_instmnts)/Assets	5085	20345	0.055	0.085	0.000	0.006	0.025	0.065	0.922
Liquidity (CA/CL)	5085	20345	2.658	18.940	0.017	1.129	1.493	2.282	1911.938
Liquidity (CA-Inv)/CL	5085	20345	1.967	18.493	0.010	0.725	1.033	1.654	1906.875
Leverage (TD/Equity)	5085	20345	2.875	66.228	0.000	0.164	0.590	1.244	5501.000
Leverage (TD/TA)	5085	20345	0.264	0.198	0.000	0.093	0.252	0.385	2.491
Leverage (TD/EBITDA)	5085	20345	-0.447	145.522	-15066.000	0.598	2.138	4.161	3320.800
Levrage (Interest coverage ratio)	5085	20345	62.484	908.425	-27546.000	0.591	3.058	11.050	75974.000
Labour (Emp.expense/Sales)	5085	20345	0.124	0.143	0.000	0.045	0.092	0.154	5.125
Labour (Emp.expense/Assests)	5085	20345	0.097	0.123	0.000	0.031	0.063	0.121	2.247
CAPEX (PTA/(FA-PTA))	5085	20345	0.215	4.157	-171.571	0.000	0.053	0.191	346.346
Cashflow from Ops/ Assets	5085	20345	0.039	0.065	0.000	0.004	0.017	0.042	0.760
ROCE	5085	20345	0.095	0.100	-0.468	0.045	0.086	0.128	6.019
Inventory Turnover	5085	20345	7.998	6.732	2.007	2.958	4.919	10.753	21.390
Day Sales Inventory	5085	20345	83.852	56.467	17.064	33.943	74.196	123.375	181.902
Receivables Turnover	5085	20345	7.441	4.691	2.774	3.696	5.860	10.047	16.294
Day Sales Receivables	5085	20345	69.785	37.435	22.401	36.329	62.282	98.757	131.565
Payables Turnover	5085	20345	6.755	3.944	2.588	3.596	5.216	9.274	13.891
Day Sales Payables	5085	20345	74.200	38.858	26.275	39.357	69.974	101.512	141.013
Operating Cycle	5085	20345	165.401	81.621	70.887	95.430	144.458	220.614	310.575
Cash Conversion Cycle	5085	20345	88.251	68.238	3.856	30.157	71.470	138.915	204.106

1.3.3 Survey

- A questionnaire was employed to understand the post-resolution outcomes, challenges faced and guidance on future prospects of firms coming out of the resolution process.
- Response to the survey questionnaire was sought from the entire population of firms
- Focus interviews were conducted with a sample of firms from each cohort to supplement the survey findings.

Based on the analysis of the survey responses, the research offers insights into the outcomes of the resolution process. It also helps in cross-validating the survey findings with the empirical results.

Chapter 2

Results, findings and discussion

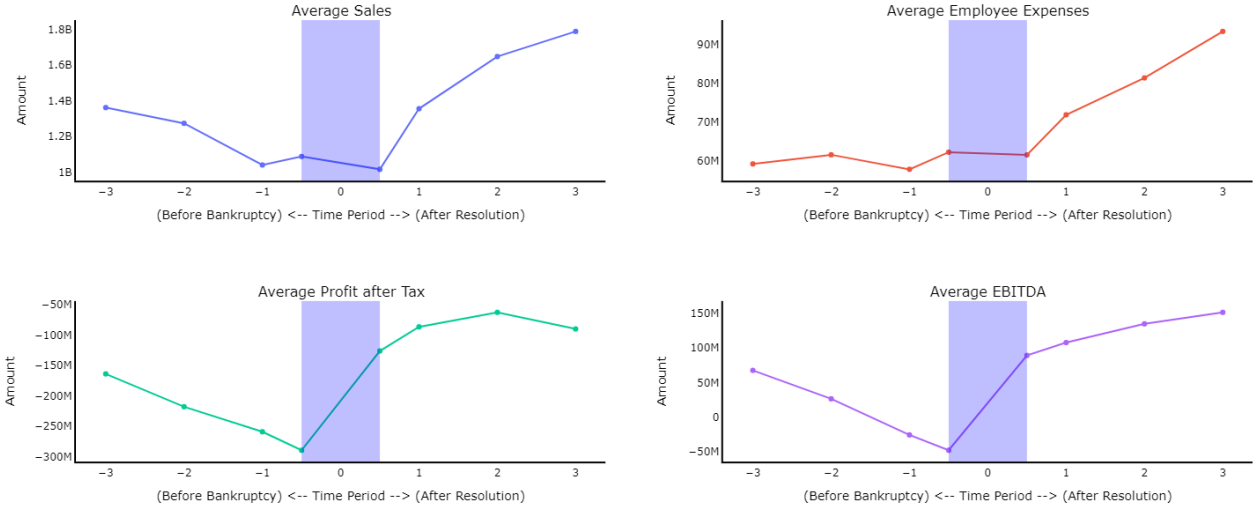
2.1 Empirical analysis and results

2.1.1 Financial performance of resolved firms

The results of the analysis of the performance of the resolved firms are described in this section. The trends on total sales, profit after tax (net income), operating profits before depreciation and amortization (EBITDA) and employee expenses are shown in Figure 2.1. The results indicate a sharp increase in aggregate values in the post-resolution period. There is a significant increase in average sales of 76% in the three years since the resolution. We see a similar trend in the profitability of the firms as well. We see a sharp increase in the average employee expenses—about 50% increase in the three years post-resolution—indicating a higher employment intensity in the resolved firms in the post-resolution period.

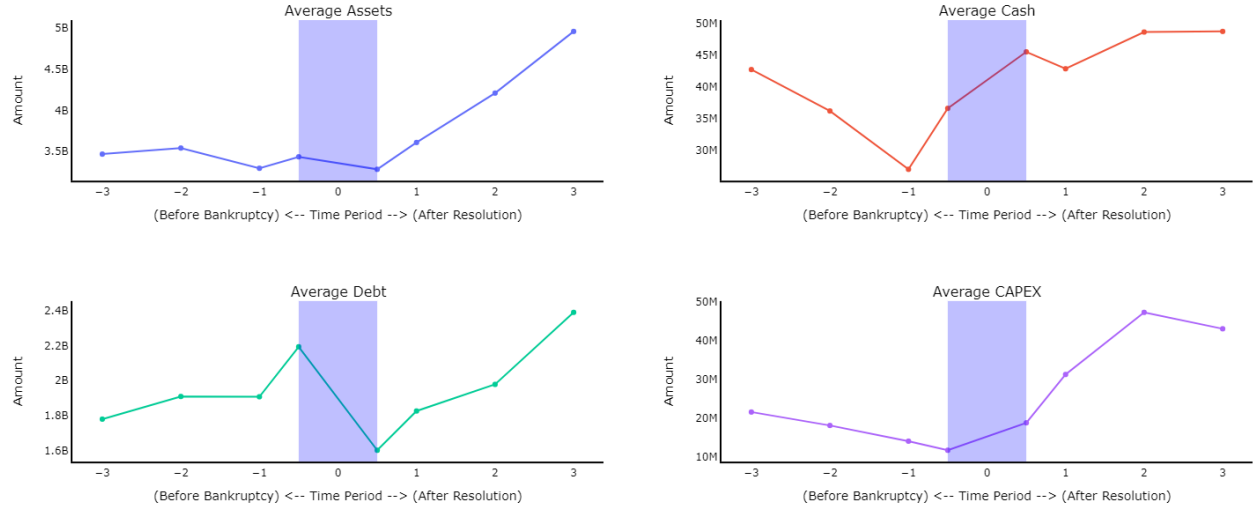
In Figure 2.2, we show the event-window trends of key balance sheet items and the capital expenditure trends of firms that underwent the resolution process. The balance sheet items include the total assets, cash, and debt. The trends indicate a significant increase in the average total assets and, coupled with the increase in the CAPEX, indicate a build-up of tangible assets in the balance sheet of these firms in the post-resolution period. Average CAPEX has increased by about 130% in the post-resolution period (over a three-year period). Although the increase in total debt is not as high as the increase in total assets, the trends indicate that firms were able to raise significant debt financing in the post-resolution period.

Figure 2.1: Performance metrics: Turnover and Profit



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that B refers to Billions and M refers to Millions in the y-axes.

Figure 2.2: Performance metrics: Balance sheet and Cash flow



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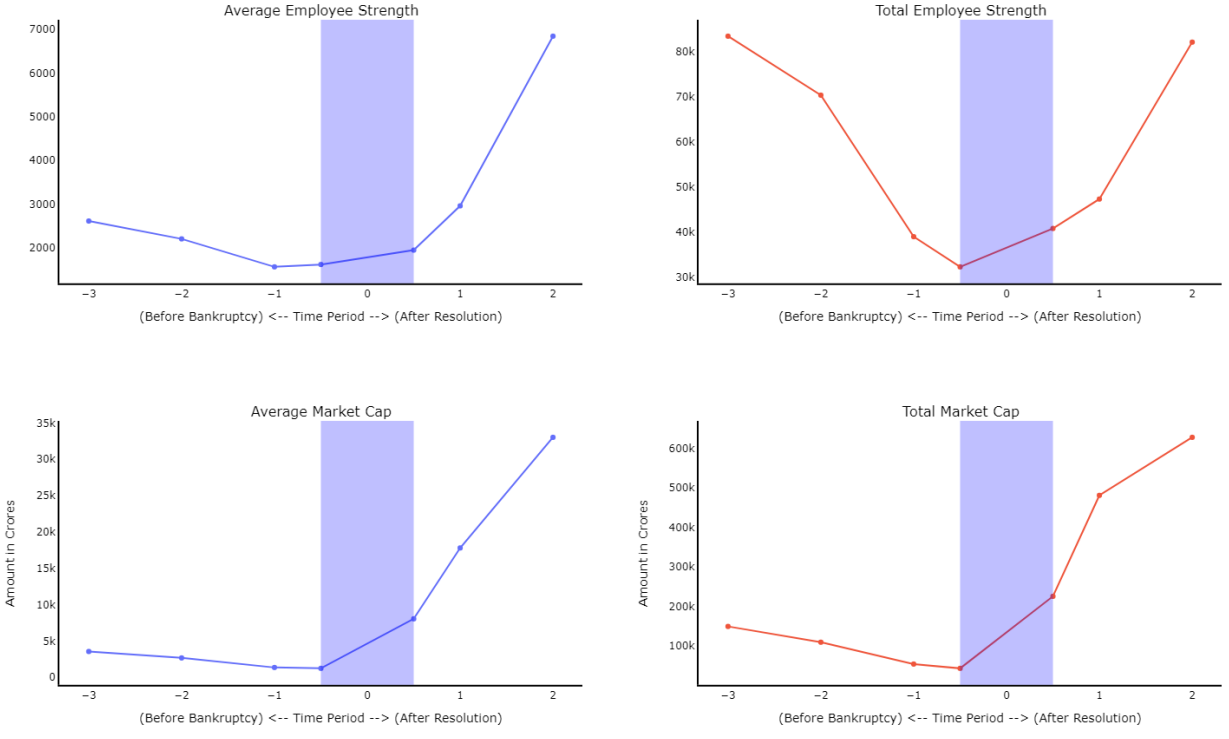
Note that B refers to Billions and M refers to Millions in the y-axes.

Figure 2.3: Employee strength and market capitalization of resolved listed firms



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that k here refers to 1000. So 5k means 5,000.

Next, we examine the change in employee strength during the resolution process. The data on the number of employees of all the resolved firms is unavailable as the disclosure of the employment figures is not mandatory. However, for listed firms, it is mandatory to disclose the employee strength as per the disclosure requirements. Hence, we conduct this analysis with a subsample of firms among the resolved firms. We obtain the total number of employees for the listed resolved firms (a total of 46 firms) from the CMIE Prowess database. The trends of the employee strength during the event window are shown in Figure 2.3. The results suggest a significant increase in employment figures in the post-resolution period. Both the average across the resolved firms and the total employment across firms have shown a substantial increase in the post-resolution period.

Finally, we also conducted an analysis of the market capitalization of the listed resolved firms. Data on market capitalization has been obtained from the CMIE Prowess database. The trends shown in Figure 2.3 indicate a significant revival in the average market valuations of the resolved firms in the post-resolution period, which is expected given the growth opportunities that will accrue to these firms post the resolution with the creditors. A similar trend is seen for the aggregate market valuation of all the resolved firms in the post-resolution phase (see Figure 2.3). Overall, the results suggest that the market has priced and acknowledged the potential of these firms in the post-resolution period.

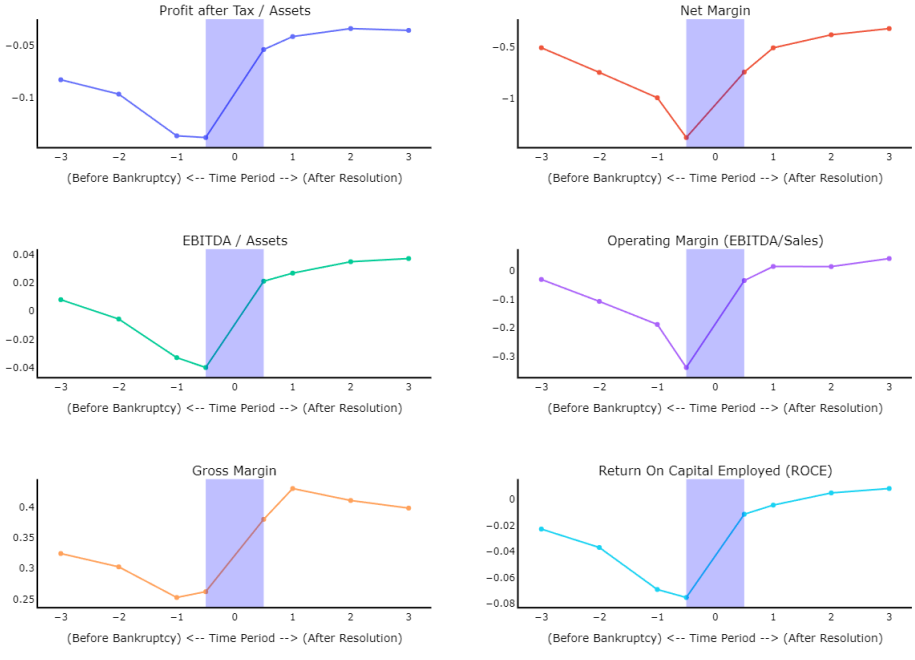
2.1.2 Ratio analysis

The results of the analysis are detailed in this section. We examined the firms' business outcomes using key ratios that included profitability, activity, turnover, liquidity, and leverage. We conducted both a univariate trend analysis and a regression analysis to benchmark the outcomes of the resolved firms with performing firms that didn't go through the resolution process.

Figure 2.4 shows the univariate trends of various profitability ratios such as Net and Gross Margin, EBITDA to assets and EBITDA margin and Return on capital employed (ROCE)—a measure of the operating profitability of the firms for each unit of invested capital. The results indicate that there has been a significant increase in the profitability of the resolved firms in the post-resolution

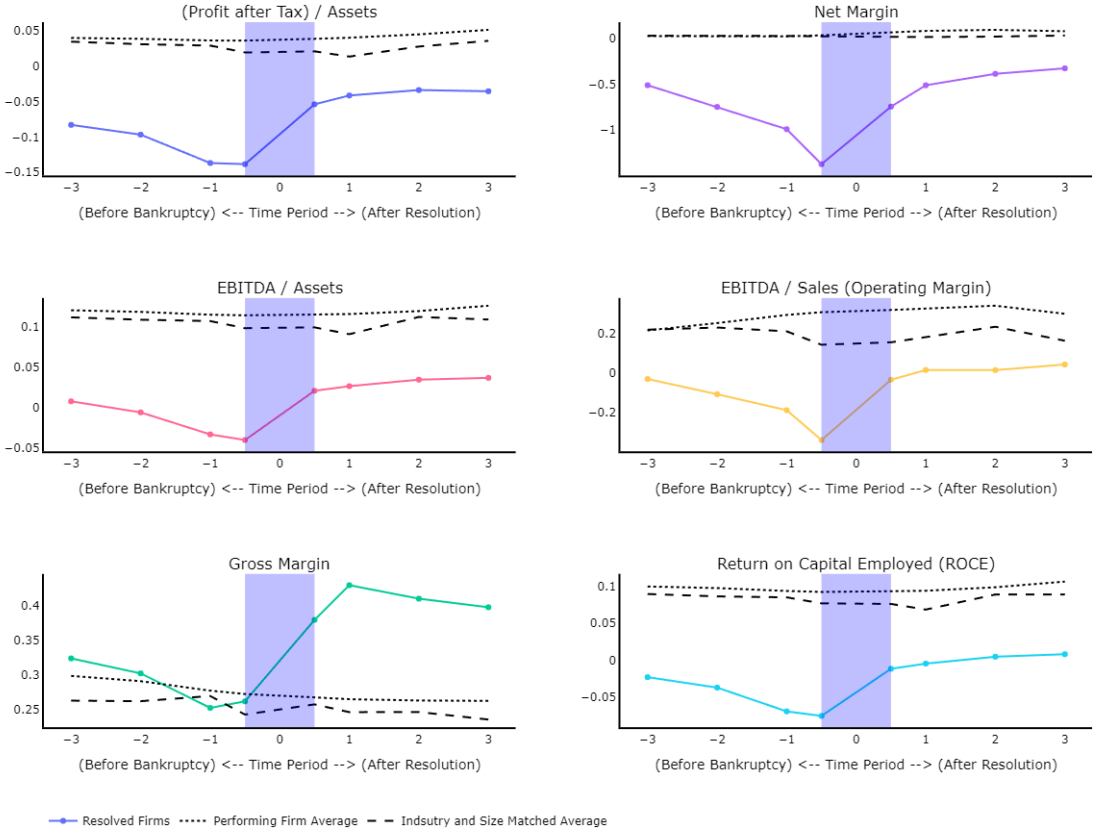
period. For instance, the operating margin has improved from -33% in the year of Bankruptcy to around 4% by the third year after resolution. Figure 2.5 compares the profitability of the treated firms with the control group firms, which are the performing firms. The trends indicate a significant convergence in the profitability ratios of the resolved firms to the benchmark averages. The trends indicate that the resolved firms have performed well in the post-resolution event window and have bridged the gap with the performing firms. While the net margins continue to remain negative, the resolved firms have operationally broken even in the post-resolution period (operating margin of 4% as of T+3), which is a significant improvement from the pre-resolution period.

Figure 2.4: Profitability ratios



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.5: Profitability ratios with industry and size comparison



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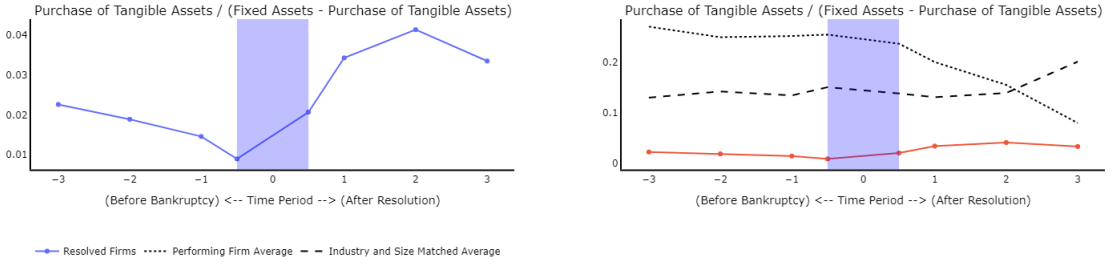
Note that the axis of some plots has been inverted for better representation.

Figure 2.6 shows the univariate trends of the capital investments made by the firms over the period. The results show an increase in capital investments of the resolved firms indicating an increase in asset growth and overall economic growth in the post-resolution period. The right panel in Figure 2.6 compares the capital investments of the resolved firms with the performing firms. The resolved firms have performed well in the post-resolution period and have reduced the gap with a steady increase in their investments.

Figure 2.6: CAPEX ratio

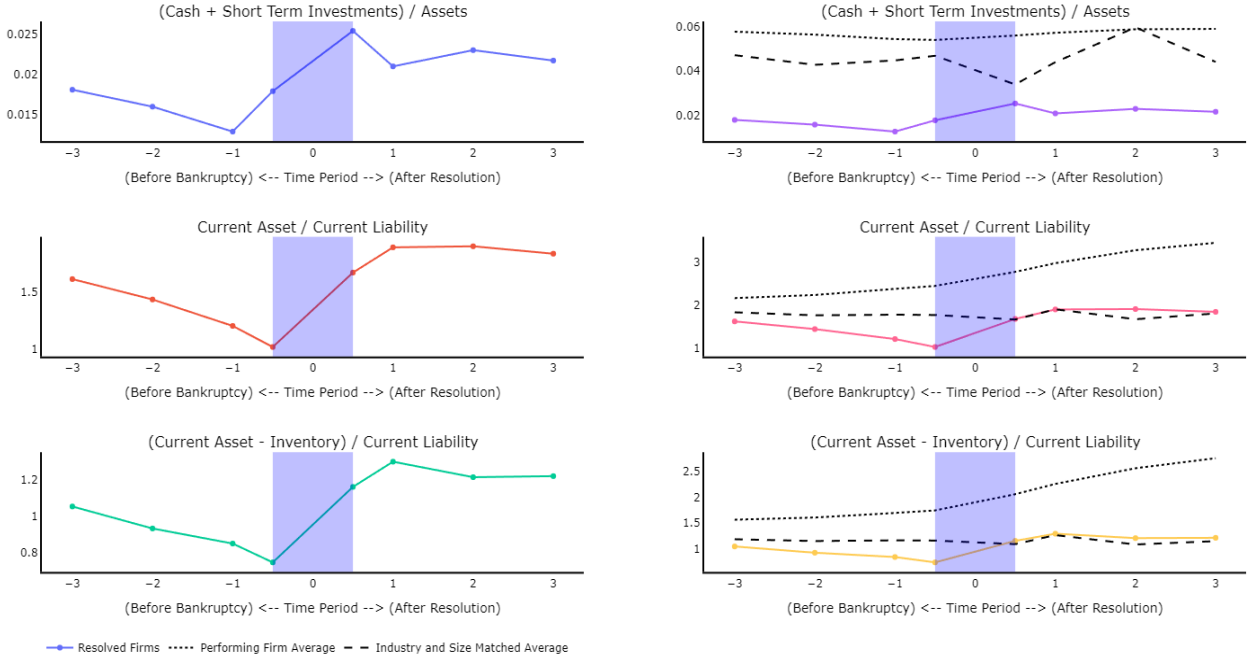


Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.7 shows the univariate trends of various Liquidity ratios such as Current Ratio and Quick Ratio (Current assets-inventory/Current liability). The results indicate a significant increase in the liquidity of the firms in the post-resolution period. For instance, the current assets to current liability has improved from 1.01 in the year of bankruptcy to 1.83 in the third year post-resolution. The right panel in Figure 2.7 compares the resolved firms' liquidity trends with performing firms. The resolved firms have recovered and the liquidity ratios are very close to the industry and size matched performing firm cohort.

Figure 2.8 shows the univariate trends of various Leverage ratios, such as the Solvency ratio and Interest Coverage Ratio. The results show an improvement in the performance of the resolved firms. The firms have achieved levels similar to the

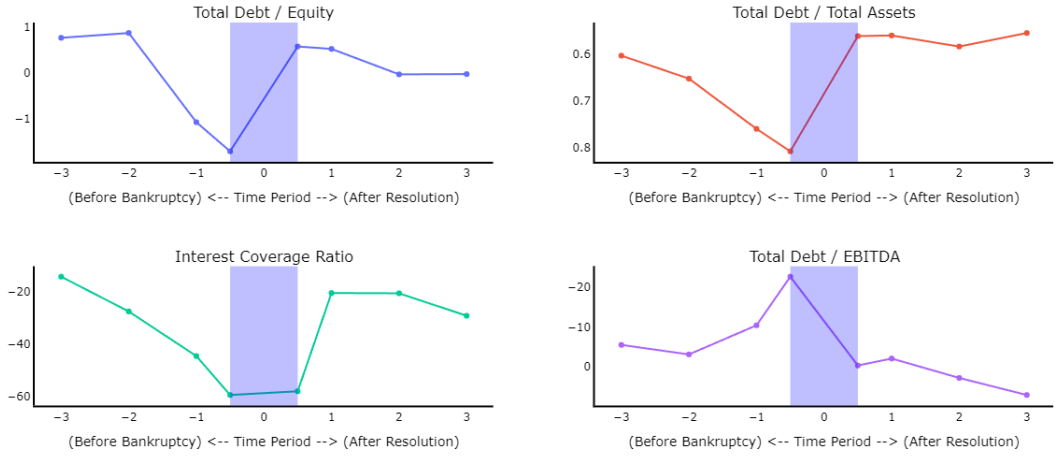
Figure 2.7: Liquidity ratios



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

pre-bankruptcy period. A rise in the leverage ratios indicates an improvement in the firm's cash flow and overall financial health. Figure 2.9 compares the resolved firms' trends with that of performing firms. The trends indicate that the resolved firms have performed well in the post-resolution period. The resolved firms have considerably reduced the gap to the benchmark averages by looking at Interest Coverage Ratio or Debt to EBITDA ratio.

Figure 2.8: Leverage ratios



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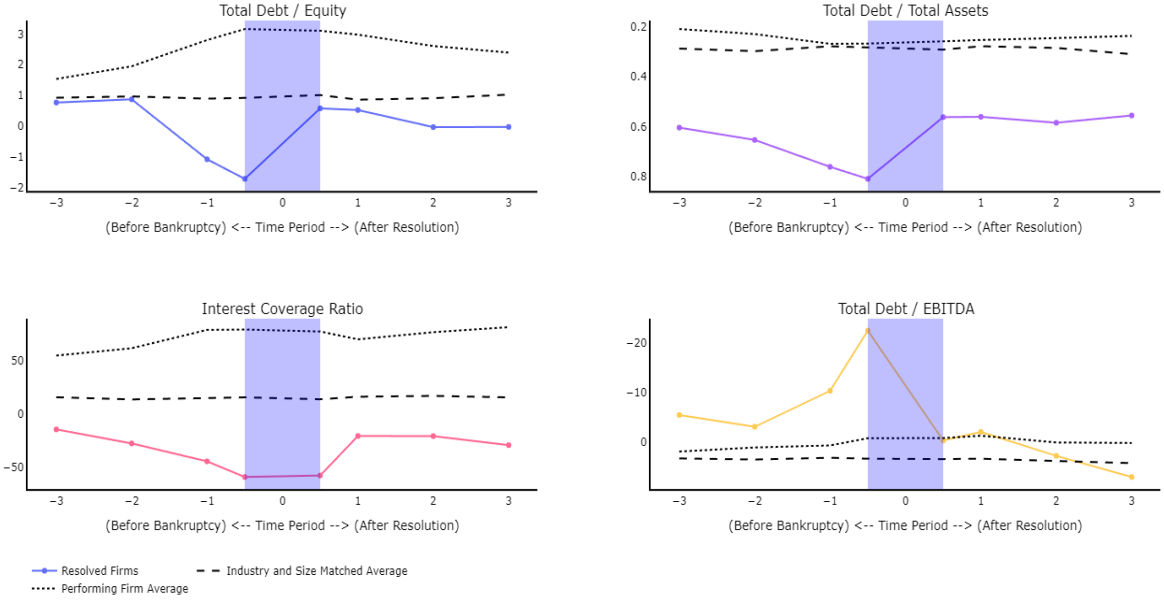
Note that the axis of some plots has been inverted for better representation.

Figure 2.10 shows the univariate trends of various Activity Ratios, such as Inventory Turnover, Day Sales Inventory, Operating Cycle, etc. The trends show a steady improvement in the performance of the resolved firms in the post-resolution event window. Figure 2.11 compares the performance of resolved firms with that of performing firms. The trends show a steady improvement and, in some cases, have closed the gap with the performing firms in the post-resolution period.

Figure 2.12 shows the univariate trends of Turnover Ratios, covering Asset

Figure 2.9: Leverage ratios with industry and size comparison



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy,and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.10: Activity ratios

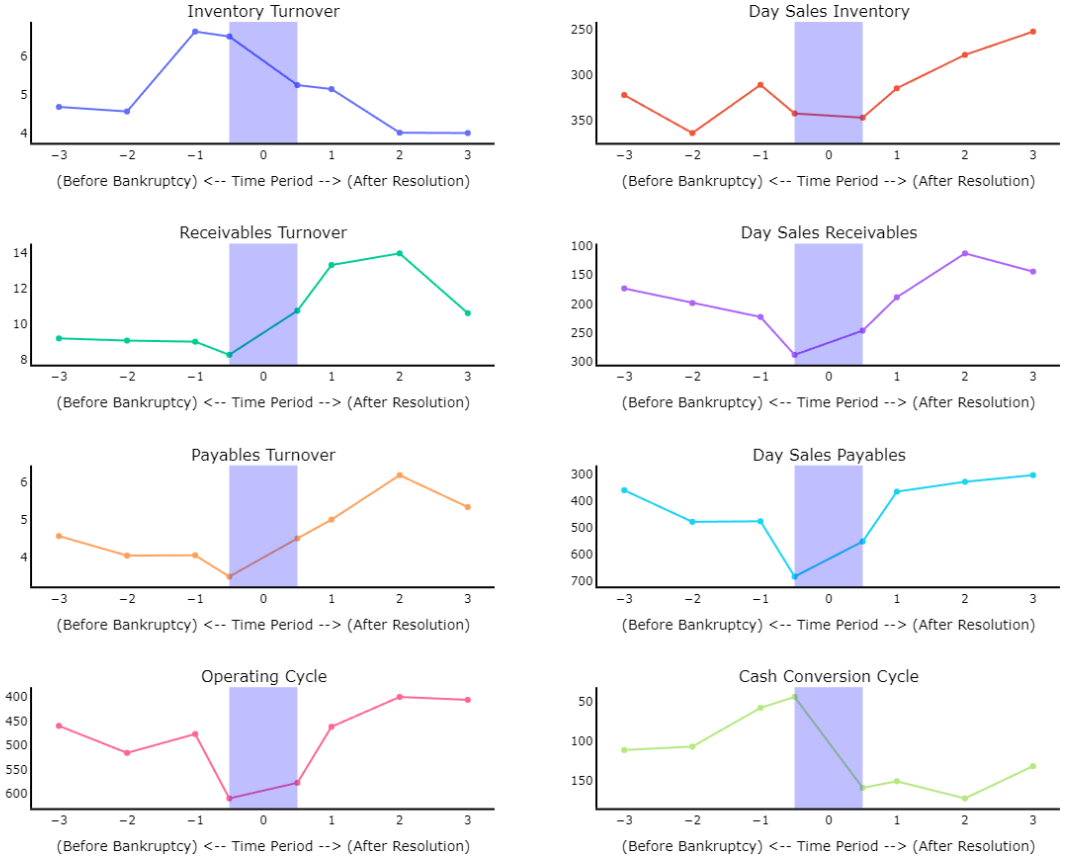


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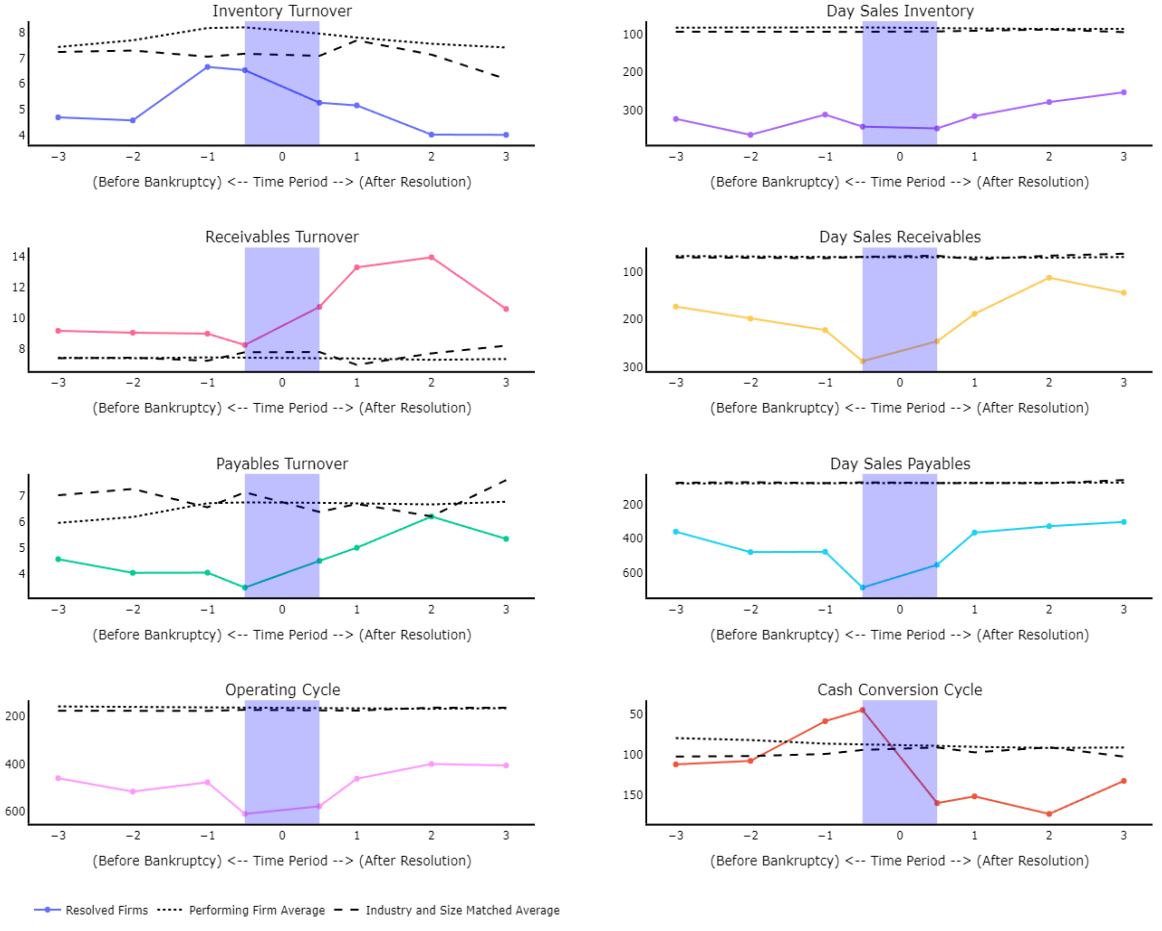
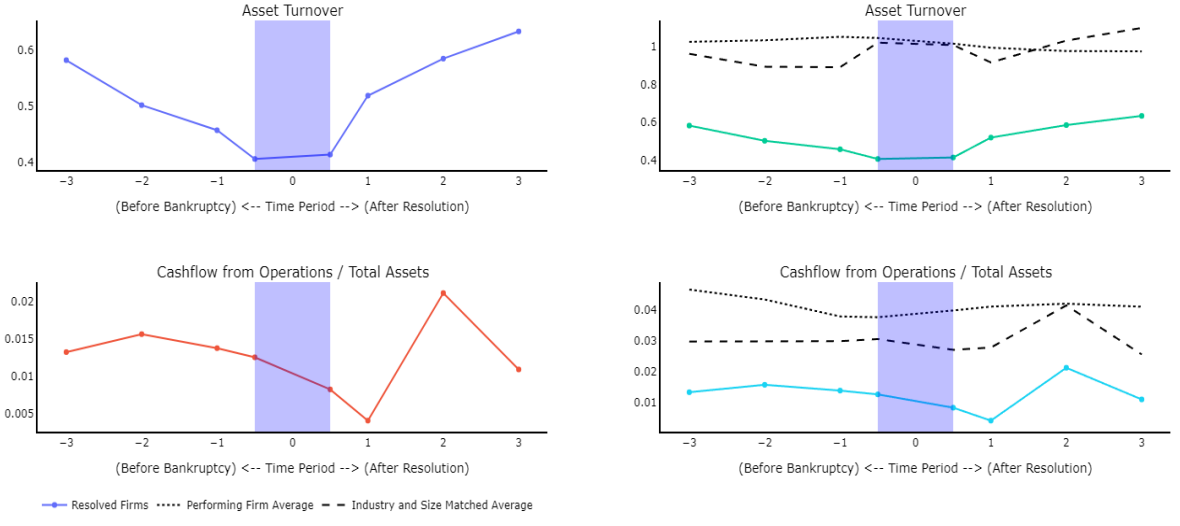
Figure 2.11: Activity ratios with industry and size comparison



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Turnover and Cashflow/Assets. The results of the Asset Turnover indicate a significant improvement in the performance of the resolved firms in the post-resolution period. We observe that the turnover has increased from 0.41 in the year of resolution to 0.63 in T+3, an increase of about 53% in the three years post-resolution. A higher Asset turnover indicates the firms are generating more revenue. Similarly, Cashflow/Assets ratio has also improved. The right panel in Figure 2.12 compares the performance of the resolved firms with that of performing or healthy firms. The results show that the resolved firms have closed the gap between the benchmark averages, bringing up revenue and better operating performance.

Figure 2.12: Turnover ratios

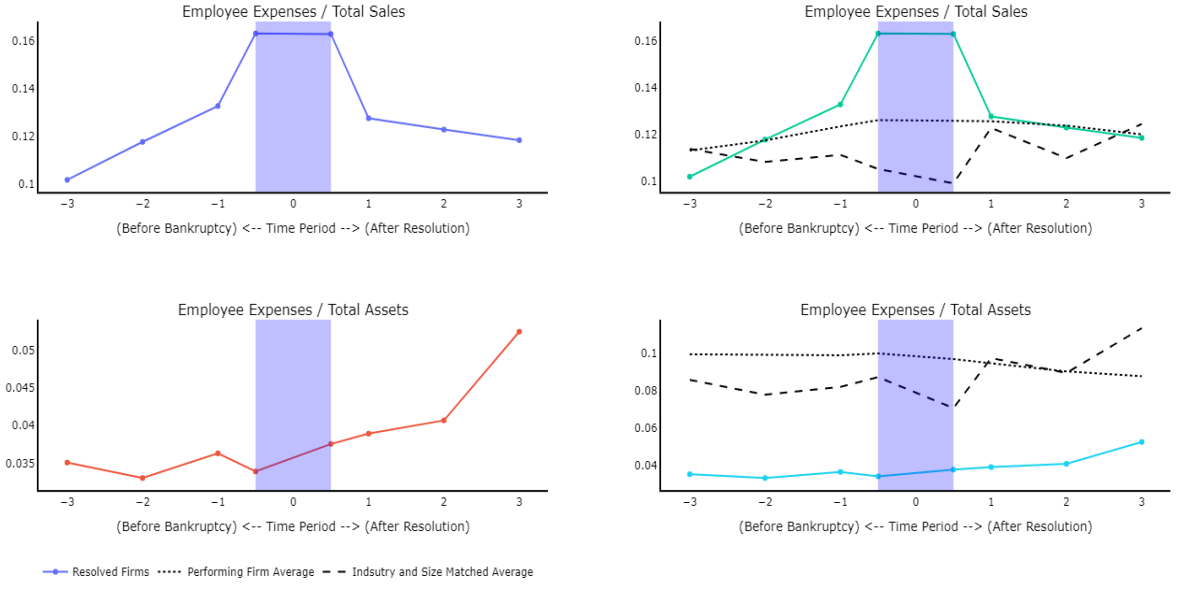


Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.13 shows the univariate trends of various Labour Ratios, such as Employee Expenses/ Total Sales and Employee Expenses/ Total Assets. These ratios are an indication of the labour expenses of the firm. The results show an

improvement in the trends in the post-resolution event window. The right panel of Figure 2.13 compares the Labour ratios of the resolved firms with that of the performing firms.

Figure 2.13: Labour ratios



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2.1.3 Regression analysis

In this section, we conduct a regression analysis to estimate whether there is an improvement in the performance of resolved firms in the post-resolution period compared to the performing firms. A multivariate regression analysis will control for other observed and unobserved factor that affects the performance of these

firms during the event window. The results of the analysis are shown in Table 2.1 to Table 2.8. The regression analysis controls for time-fixed effects—which are exogenous shocks affecting the sample firm in a particular year, industry fixed effects—any unobserved common shocks affecting the respective industry, and also controls for firm size. The coefficient of interest is the one for the interaction term Resolved_firms × Post_resolution_period. The interaction term captures the incremental impact on the resolved firms in the post-resolution period compared to the performing firms. For instance, the result in column (1) of Table 2.1 indicates that, on average, the resolved firms are less profitable compared to the performing firms (-0.15). However, in the post-resolution period, the wedge between the resolved firms and the performing firms decreased by 3.6 percentage points. Similarly, we find that all the profitability ratios have improved significantly in the post-resolution period.

Next, we estimate whether there is a significant change in the leverage levels of firms in the post-resolution period. As indicated in Table 2.2, we do not find a statistically significant variation in the post-resolution period for the resolved firms for most of the indicators. However, the Debt to Assets ratio has improved for the resolved firm in the post-resolution period. Neither has the liquidity ratios changed significantly in the post-resolution period. Although we do see a reduction in the leverage in the trend analysis, only one of the four indicators in the multi-variate analysis indicates a significant change.

Table 2.1: Profitability - Regression Results

	PAT/Assets	Net Margin	EBITDA/Assets	Gross Margin	ROCE
Resolved_firms	-0.154***	-0.980***	-0.135***	0.007	-0.147***
	(0.003)	(0.053)	(0.003)	(0.006)	(0.003)
Resolved_firms × Post_resolution_period	0.036***	0.178***	0.024***	0.071***	0.025***
	(0.002)	(0.047)	(0.003)	(0.006)	(0.003)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.189	0.022	0.147	0.092	0.135
Observations	21888	21888	21888	21717	21888

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.2: Liquidity and Leverage - Regression Results

	Liquidity CA/CL Ratio	Leverage (TD/Equity)	Leverage (TD/TA)	Leverage (Interest coverage ratio)	Leverage (TD/EBITDA)
Resolved_firms	-0.728	-3.915*	0.421***	-103.253***	-12.768**
	(0.641)	(2.253)	(0.008)	(34.752)	(4.997)
Resolved_firms × Post_resolution_period	-0.106	0.337	-0.064***	-0.166	6.519
	(0.568)	(1.999)	(0.007)	(33.319)	(4.433)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.016	0.005	0.207	0.004	0.001
Observations	21888	21886	21888	18463	21888

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.3: Labour and CAPEX - Regression Results

	Labour (Employee Exp./ TS)	Labour (Employee Exp./ TA)	CAPEX (PTA/(FA-PTA))	Cash flows (Cash flow from Ops/Assets)
Resolved_firms	0.024***	-0.054***	-0.214	-0.020***
	(0.005)	(0.004)	(0.142)	(0.002)
Resolved_firms × Post_resolution_period	0.001	0.005	0.036	-0.004*
	(0.004)	(0.003)	(0.126)	(0.002)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.103	0.141	0.000	0.043
Observations	21888	21888	21879	21888

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.4: Activity - Regression Results

	Day Sales Inventory (DSI)	Day Sales Receivables (DSR)	Day Sales Payables (DSP)	Operating Cycle (DSI +DSR)	Cash Conversion Cycle
Resolved_firms	263.973***	161.603***	458.713***	378.164***	-8.252**
	(5.291)	(2.844)	(6.609)	(6.235)	(4.199)
Resolved_firms × Post_resolution_period	-16.965***	-16.452***	-56.157***	-24.208***	42.549***
	(4.706)	(2.544)	(5.914)	(5.534)	(3.746)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.177	0.187	0.243	0.220	0.044
Observations	21614	21746	21650	21548	21527

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

In Table 2.3, we show the results of the estimations with employee expenses and capital expenditure as the dependent variable. We do not find any statistically significant change in the employee expense of the resolved firms in the post-resolution period (see columns (1) and (2)). We do not find a significant increase in the capital expenditure of the firms in the regression analysis (see column (3)).

In line with the trend analysis of the activity levels of the firm, the regression analysis in Table 2.4 indicates significant improvements in several activity ratios. The result in column (1) suggests that the inventory days have come down in the post-resolution period and similarly the result shown in column (2) suggests that the average receivable days have significantly reduced (about 16.5 days) in the post-resolution period for the resolved firms compared to the performing firms. Taken together, the firms have improved their operating cycle. One can infer that the working capital is better managed in the post-resolution period. It is likely that incoming management has improved the material purchase, production cycle, warehousing, and collection efforts of the firms to better manage the working capital requirements. We see a reduction in the payables also in the post-resolution period indicating faster repayment of dues to the suppliers by the resolved firms. Overall, the results indicate an improvement in the activity ratios, especially when we triangulate the trend analysis and the survey results.

2.1.4 Regression analysis with industry and size-decile matched sample

In Table 2.5 to Table 2.8, we re-estimate the regressions using an industry and size-decile-matched control group. This allows us to compare resolved firms with performing firms that are operationally similar. The matching reduces the overall sample size given the lack of suitable control firms at the matched levels. The results of the regressions with the narrow control group also align with the results observed with a larger set of control firms. Overall, we do see a significant improvement in the profitability, activity and employment metrics in the regression analysis. However, we do not see any statistically significant improvement in the liquidity metrics in the post-resolution period.

Table 2.5: Profitability - Regression Results for Sample Control Group

	PAT/Assets	Net Margin	EBITDA/Assets	Gross Margin	ROCE
Resolved_firms	-0.153***	-0.942***	-0.131***	0.016	-0.143***
	(0.005)	(0.065)	(0.004)	(0.012)	(0.004)
Resolved_firms × Post_resolution_period	0.038***	0.241***	0.027***	0.072***	0.028***
	(0.003)	(0.045)	(0.003)	(0.008)	(0.003)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.315	0.151	0.352	0.123	0.352
Observations	3763	3763	3763	3592	3763

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.6: Liquidity and Leverage - Regression Results for Sample Control Group

	Liquidity CA/CL Ratio	Leverage (TD/Equity)	Leverage (TD/TA)	Leverage (Interest coverage ratio)	Leverage (TD/EBITDA)
Resolved_firms	-2.161	-2.990***	0.434***	-98.313***	-8.593**
	(1.747)	(0.443)	(0.017)	(22.840)	(3.733)
Resolved_firms × Post_resolution_period	-1.309	0.975***	-0.083***	-0.705	5.653**
	(1.214)	(0.308)	(0.012)	(16.793)	(2.593)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.002	0.023	0.287	0.011	0.014
Observations	3763	3761	3763	3250	3763

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.7: Labour and CAPEX - Regression Results for Sample Control Group

	Labour (Employee Exp./ TS)	Labour (Employee Exp./ TA)	CAPEX (PTA/(FA-PTA))	CAPEX (Cash flow from Ops/Assets)
Resolved_firms	0.018**	-0.057***	-0.127	-0.019***
	(0.007)	(0.005)	(0.117)	(0.003)
Resolved_firms × Post_resolution_period	0.000	0.008**	0.074	-0.005**
	(0.005)	(0.004)	(0.081)	(0.002)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.118	0.191	0.006	0.102
Observations	3763	3763	3759	3763

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.8: Activity - Regression Results for Sample Control Group

	Day Sales Inventory (DSI)	Day Sales Receivables (DSR)	Day Sales Payables (DSP)	Operating Cycle (DSI +DSR)	Cash Conversion Cycle
Resolved_firms	241.497***	154.564***	464.867***	370.769***	-16.109
	(16.607)	(8.570)	(21.805)	(18.401)	(11.864)
Resolved_firms × Post_resolution_period	-15.888	-19.112***	-67.835***	-33.319**	37.379***
	(11.827)	(6.058)	(15.535)	(13.189)	(8.538)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.194	0.222	0.239	0.253	0.040
Observations	3489	3621	3525	3423	3402

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for size of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

2.1.5 Analysis with propensity score matched sample

The earlier analysis relied on a control group that included performing firms and an industry-size matched cohort to understand whether the resolved firms have improved on the performance metrics. However, to understand the benefits of IBC, the best identification would entail comparing the performance of the firms that underwent resolution with firms that didn't undergo resolution but had similar performance in the pre-resolution period. Hence, in this section, we conduct a propensity score-matched analysis to examine whether IBC-based resolution had an impact on the performance of firms in the post-resolution period compared to firms that had similar financial characteristics in the pre-resolution period but were able to avoid the bankruptcy process.

In this analysis, we match the treated firms (resolved firms) with control firms using a propensity score matching (PSM) algorithm. The PSM matching relies on a nearest neighbour matching method without replacing the matched firms. The matching process was done using the logit model that has an outcome variable that takes the value 1 if the firm has entered the insolvency process and 0 otherwise. The propensity is estimated on the following five characteristics include log of assets, EBITDA/Assets, Debt/Assets, Cash flow from operations/Assets and Working capital/Assets. All these variables broadly cover financial ratios that are shown to be factors that affect the propensity to default for a firm (see Altman Zscore for details). A comparison of the characteristics for the treated and control firms is shown in Table 2.9. The comparison shows that the characteristics of these firms are very close to each other. This suggests that the chosen control group is highly likely to default based on the matched propensity, but they have not entered the resolution process.

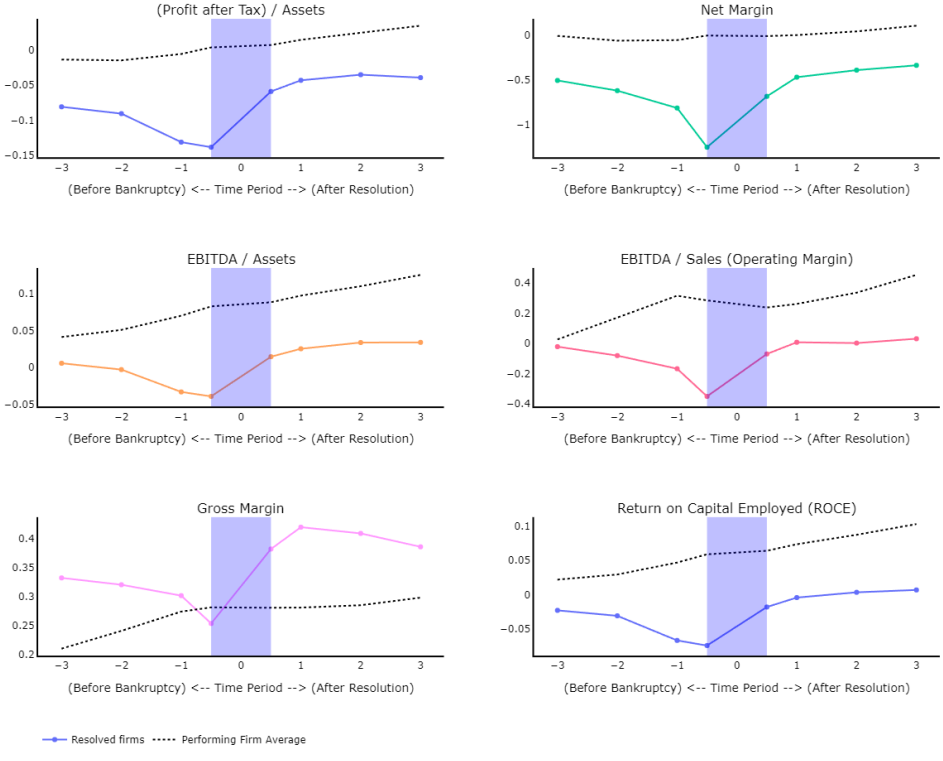
Based on the matched sample, we carry out the event window analysis, as shown in the earlier sections. The results are shown in Figure 2.14 to Figure 2.19. We find that the resolved firms (treated group) have reduced the wedge with the control group firms in the post-resolution period. This is true for most of the metrics– for instance, liquidity ratios, labour ratios and activity ratios, and in some metrics, the resolved firms have outperformed the matched firms (see-Liquidity ratios).

We also conducted a regression analysis with the PSM-matched sample. The

Table 2.9: Comparison of the average values of the characteristics used in the PSM analysis

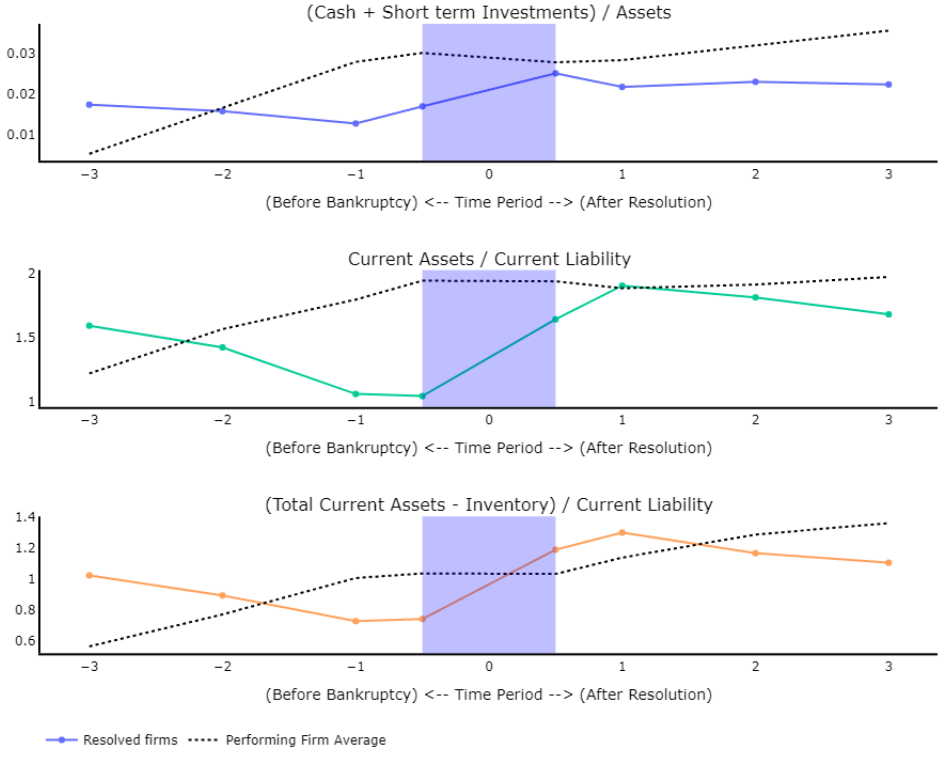
Parameter	Resolved Firms (mean)	Matched sample (mean)
EBITDA/Assets	-0.001	0.061
Debt/Assets	0.624	0.607
Cashflow from Operations/ Assets	0.010	0.021
Working Capital/Assets	0.145	0.000
Log(Assets)	20.961	21.764

Figure 2.14: Profitability - PSM analysis



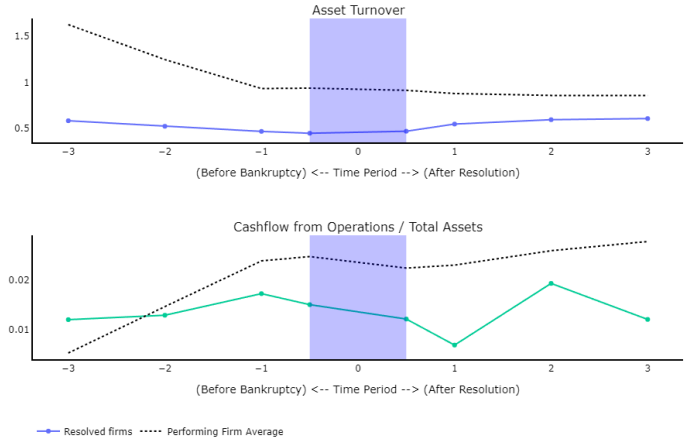
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.15: Liquidity - PSM analysis



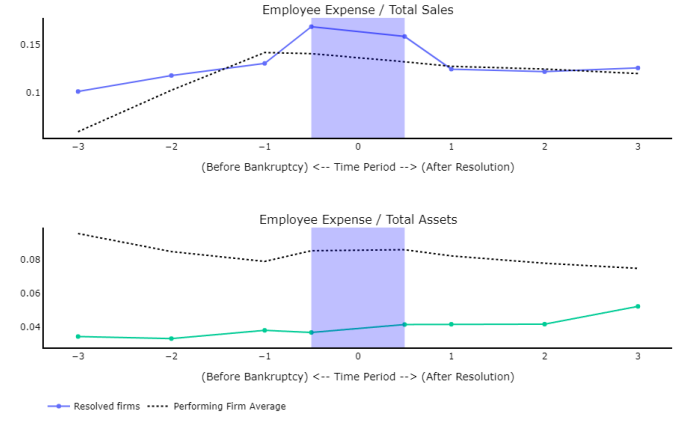
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.16: Turnover - PSM analysis



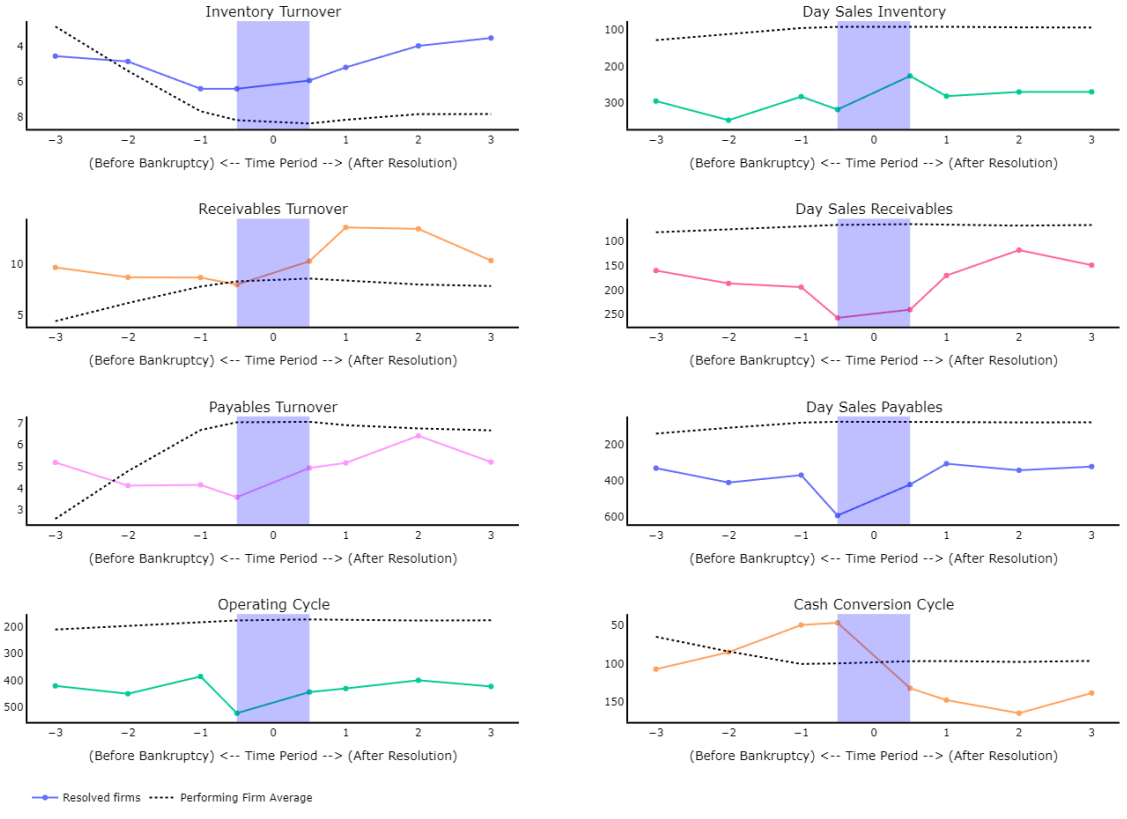
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.17: Labour expenses - PSM analysis



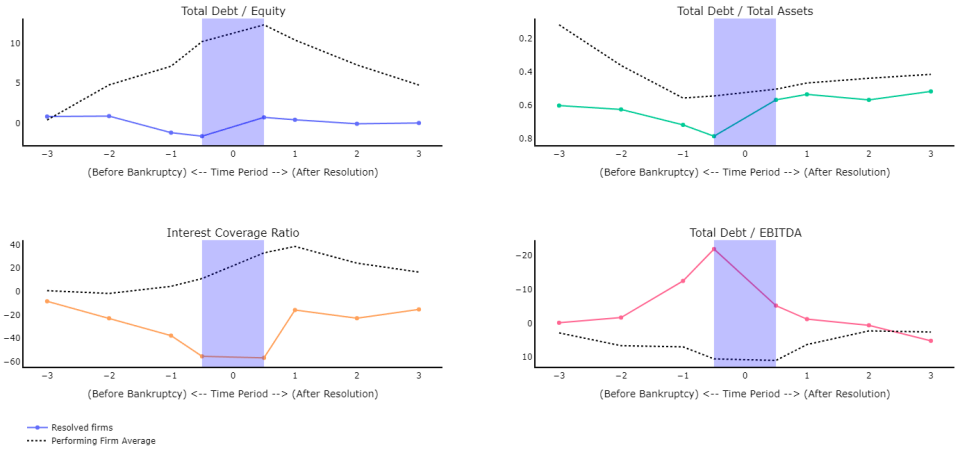
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.18: Activity indicators - PSM analysis



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = 0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

Figure 2.19: Leverage indicators - PSM analysis



Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one resolved in 2020 will be classified in the same event year. Also, t = -0.5 refers to the year of Bankruptcy, and t = 0.5 refers to the year of Resolution. The band in between during the resolution process is only indicative. For instance, firms may take less than two years to resolve or more than two years to resolve.
Note that the axis of some plots has been inverted for better representation.

results are shown in Table 2.10 to Table 2.13. The results suggest that the resolved firms have outperformed the control group firms in all five profitability indicators in the post-resolution period and have reduced the divergence between these two cohorts (see Table 2.10). In Table 2.11, we find that the resolved firms have bridged the gap with the propensity-matched cohort in the post-resolution period. The result shown in column (1) suggests that the resolved firms had on an average -0.5 lower current ratio than the performing firms in the pre-bankruptcy period. However, this wedge has reduced by 0.35 (see coefficient of Resolved_firms $\times$ Post_resolution_period) to -0.15 (-0.5+0.35) in the post-resolution period. Similarly, the leverage ratio has reduced by 4.6 percentage points (see column (3)), thereby reducing the gap with the performing firms' average. When we compare the performance of the activity ratios in Table 2.13, we find that the resolved firms have improved their payments to suppliers in the post-resolution period. However, we do not see any statistically significant difference in the collection efforts, inventory holding period or operating cycle in the post-resolution period. Overall, the empirical analysis indicates a significant recovery in the performance of the resolved firms in the post-resolution period.

Table 2.10: Profitability: regression results - PSM analysis

	PAT/Assets	Net Margin	EBITDA/Assets	Gross Margin	CAPEX (ROCE)
Resolved_firms	-0.128***	-0.914***	-0.106***	0.028	-0.115***
	(0.007)	(0.067)	(0.005)	(0.017)	(0.006)
Resolved_firms × Post_resolution_period	0.033***	0.203***	0.017***	0.059***	0.018***
	(0.005)	(0.047)	(0.004)	(0.012)	(0.004)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.256	0.257	0.309	0.179	0.304
Observations	1863	1863	1863	1780	1863

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for the size and industry of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.11: Liquidity and leverage: regression results - PSM analysis

	Liquidity CA/CL Ratio	Leverage (TD/Equity)	Leverage (TD/TA)	Leverage (Interest coverage ratio)	Leverage (TD/EBITDA)
Resolved_firms	-0.501*	-8.665***	0.152***	-36.851***	-17.624***
	(0.286)	(2.652)	(0.025)	(13.680)	(6.136)
Resolved_firms × Post_resolution_period	0.347*	0.447	-0.046***	-6.688	6.134
	(0.200)	(1.852)	(0.017)	(10.047)	(4.286)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.026	0.031	0.117	0.064	0.012
Observations	1863	1861	1863	1709	1863

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for the size and industry of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.12: Labour and CAPEX: regression results - PSM analysis

	Labour (Employee Exp./ TS)	Labour (Employee Exp./ TA)	CAPEX (PTA/(FA-PTA))	Cash flows (Cash flow from Ops/Assets)
Resolved_firms	0.012	-0.037***	0.016	-0.008***
	(0.012)	(0.004)	(0.147)	(0.003)
Resolved_firms × Post_resolution_period	0.001	0.001	-0.072	-0.001
	(0.008)	(0.003)	(0.102)	(0.002)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.147	0.359	-0.007	0.050
Observations	1863	1863	1863	1863

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for the size and industry of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

Table 2.13: Activity: regression results - PSM analysis

	Day Sales Inventory (DSI)	Day Sales Receivables (DSR)	Day Sales Payables (DSP)	Operating Cycle (DSI +DSR)	Cash Conversion Cycle
Resolved_firms	243.404***	155.913***	424.245***	312.174***	-36.981**
	(24.009)	(12.473)	(30.710)	(25.782)	(17.154)
Resolved_firms × Post_resolution_period	-11.555	-11.826	-53.458**	-1.722	49.859***
	(16.961)	(8.733)	(21.666)	(18.166)	(12.073)
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year
R-squared Adj.	0.188	0.242	0.226	0.238	0.087
Observations	1720	1781	1736	1676	1663

*Note:*p<0.1; **p<0.05; ***p<0.01. We control for the size and industry of the firm in all estimations. Resolved_firms is a dummy variable that takes the value 1 for firms that were resolved as per the insolvency process and 0 for performing firms. Post_resolution_period is a dummy variable that takes the value 1 for the post-resolution event window and 0 for the pre-bankruptcy event window. The interaction term captures the incremental impact on the resolved firm in the post-resolution period for the respective outcome variable.*

2.1.6 Analysis of the recovery rates

In this section, we analyze the recovery rates attained during the resolution process as per the IBC. The beneficiaries of the resolved amount from the bankruptcy process include financial and operational creditors. The analysis encompasses the recovery rates based on the accepted claims for the bankruptcy process and the resolved amount (also known as the realizable value). The resolved amount is net of the costs incurred during the process. The costs include the fees for the resolution professional, the registered valuer, and any other professionals and expenses incurred by the committee of creditors, including miscellaneous expenses, if any. As the resolution process has a lead time, we have also incorporated the opportunity costs of the time taken in the resolution process. The discount rate employed in the analysis is 7%, close to the 10-year GoI treasury yields in the market.

One of the prominent data sources for recovery rates in India thus far had been the World Bank Doing Business report.[1] The World Bank methodology for computing recovery rates in a country relies on a survey-based methodology. The survey considers the time, cost and outcomes of the resolution process in a country. The survey participant from a country is asked to respond to a hypothetical case study of a business that could go through the insolvency process. Such a methodology has several limitations. One, the small sample of survey participants would bias the results.[2] Second, the computation of the recovery rate is based on the perception of the insolvency process in a country rather than one that is based on empirical data.

Hence, we propose to analyse the recovery rates in the post-IBC period using empirical data that has accumulated over the last few years. We factor in the time and cost of the insolvency process in the analysis. The outcomes of the resolution process are known as the analysis done on resolved cases. The empirical analysis would help draw insights and can offer disaggregated analysis at an industry level to identify potential improvements.

[1]The annual report that captures the ease of doing business across countries has been discontinued by World Bank since 2021.

[2]Refer to section 6.2 in the final expert panel review report of the doing business surveys. The report can be accessed from https://www.worldbank.org/content/dam/doingBusiness/pdf/db-2021/Final-Report-EPR-Doing-Business.pdf.

The results are shown in Table 2.14, which has the total recovery rate and the disaggregated recovery rate by type of creditor—financial and operational creditor. The total number of firms in the recovery rate analysis is 542. We find that the average recovery rate is about 33.2%, of which the financial creditors have an average recovery of about 38.5% and the operational creditors at 23.8%. Furthermore, after accounting for the time value, the adjusted recovery rates are about 35% and 22%, respectively, for financial and operational creditors.

Table 2.14: Overall recovery rate

Type of creditor	Average Recovery (%)		Weighted Average (%)		IBBI Recovery Rate (%)
	Without Adj.	With Adj.	Without Adj.	With Adj.	
Financial Creditors	38.501	35.003	32.246	29.566	32.970
Operational Creditors	23.760	21.895	19.697	18.279	11.280
Combined	33.183	30.078	30.282	27.755	30.810

Note: Adj. refers to time value adjustment made to the recovery amount to factor in the number of months taken to complete the resolution process from the admission of claims by NCLT. IBBI recovery rate is based on the aggregate admitted claims and the aggregate realizable value from the resolution process. Aggregate recovery rates (shown in column (6)) are obtained from IBBI. The weighted average recovery rate employs the proportion of the admitted claims to the total claims as weights.

In Figure 2.20, we show the industry-wise split of the overall average recovery rate. The industry classification has been mirrored with the classification used by the IBBI. This will facilitate a consistency in the comparison with other reports released by the IBBI. The industry with the highest recovery rate is Hotels and Restaurants, and the industry with the lowest is Electricity, Gas and Water Supply. In the disaggregated analysis based on the type of creditor—financial and operational—the results are in line with the overall results. Among the recovery rates for financial creditors (shown in Figure 2.21), the highest and the lowest rates across industries continue to be the same as for the combined recovery analysis. Among the recovery rates for operational creditors (shown in Figure 2.22), the highest is for Hotels and Restaurants, and the lowest is for Electricity, Gas and Water Supply, and Transport, Storage and Communications industry. Interestingly, the highest recovery rates are not for asset-heavy industries but rather for asset-light industries with substantial intangible assets. It also highlights the importance of an auction to realize the going concern value of an entity.

Figure 2.20: Recovery rate by industry - overall

Figure 2.21: Recovery rate by industry (financial creditors)

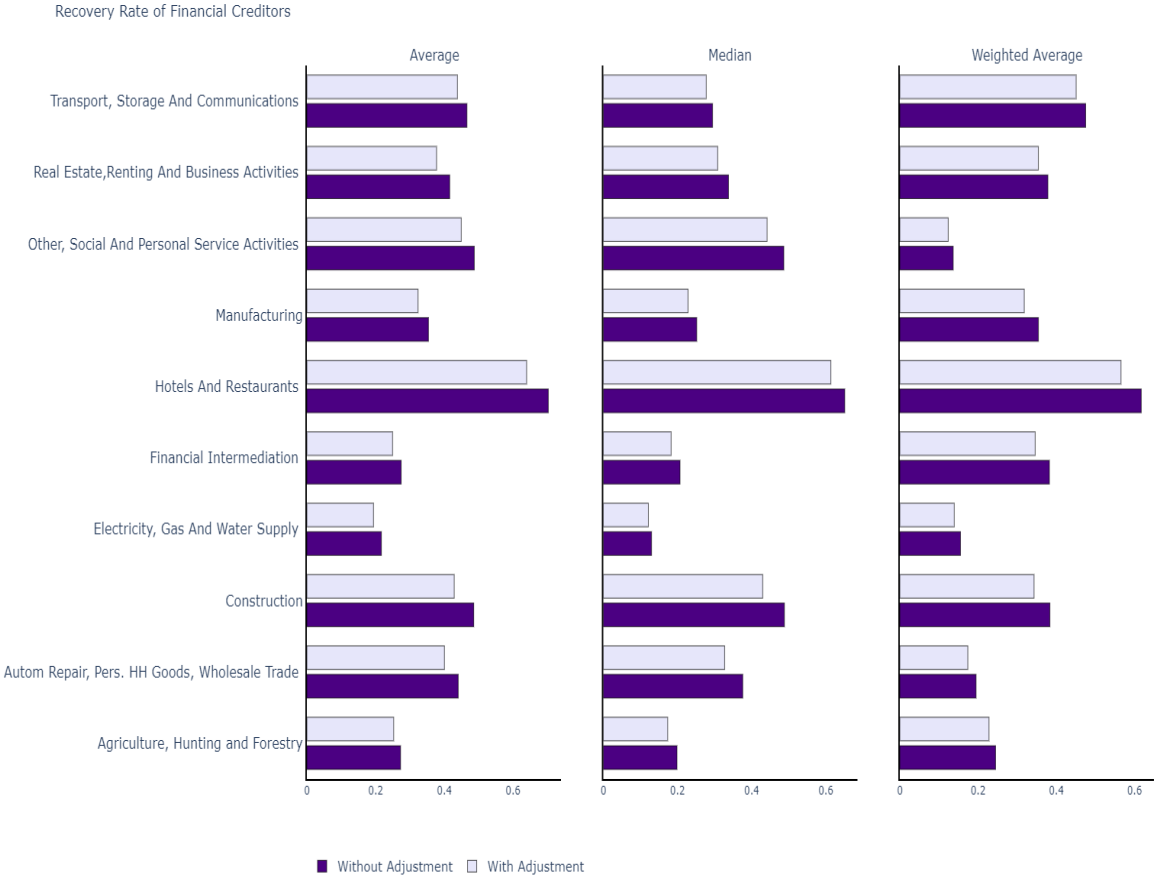
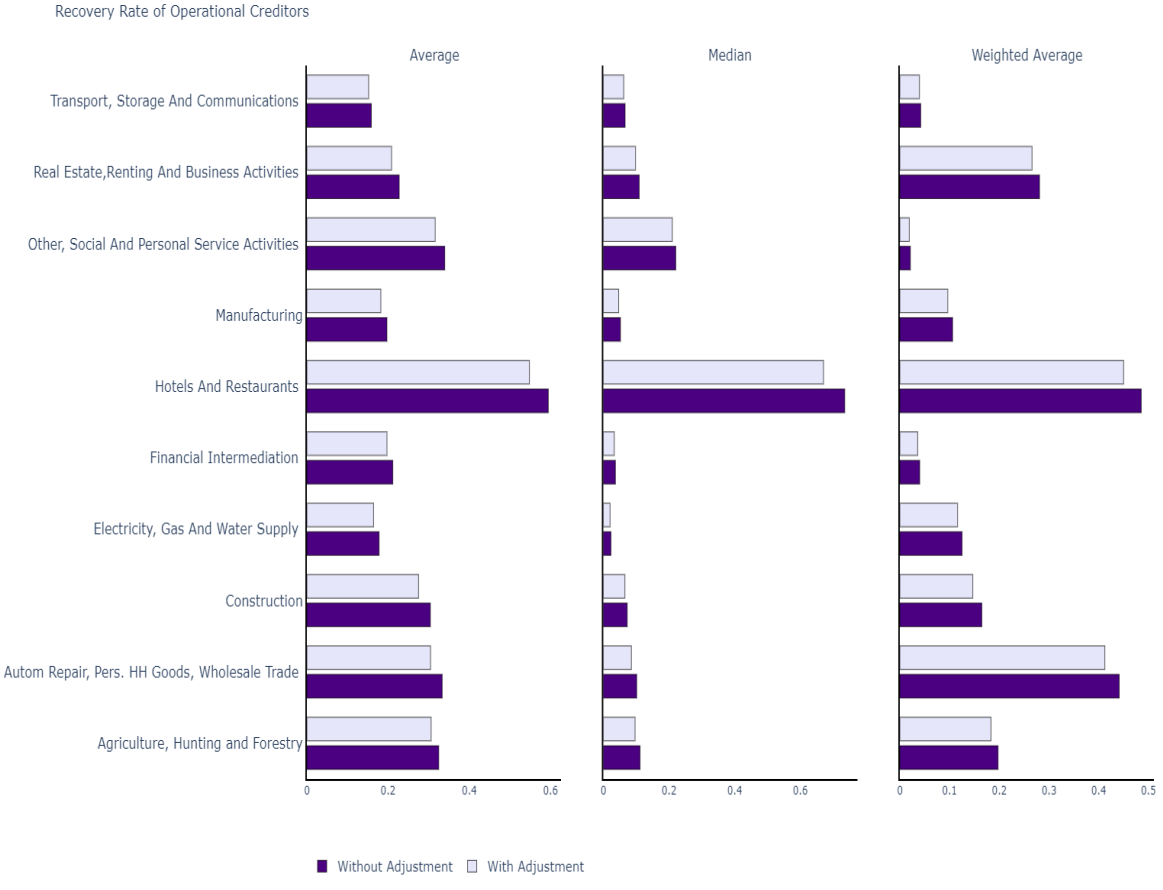


Figure 2.22: Recovery rate by industry (operational creditors)



An analysis of the expenses incurred during the resolution process is shown in Figure 2.23. The results suggest while the recovery rates of firms in the Other, Social and Personal Service activities industry are low (23.8% compared to overall average of 33.18%), the expense ratio is the highest when we consider both the median and the average (15.8% of the realizable amount compared to overall average of 9.2%). It is likely that the nature and complexity of the business would entail incurring a higher cost during the resolution process. We have also analysed the time cost relationship as shown in Figure 2.24. The scatter plot of the expenses incurred in the resolution process against the time taken to resolve—both variables taken in log scale with a base 10—indicate a non-linear relationship (although moderate) between the two. While the log scale allows us to accommodate outliers in a graph, it also allows us to examine the percentage increase rather than the absolute increase. The findings indicate that the expense incurred rises non-linearly to the delays in resolution. Hence, a time-bound resolution process can reduce inefficiencies and provide a higher realization of claims for creditors.

Figure 2.23: Resolution expense ratio by industry

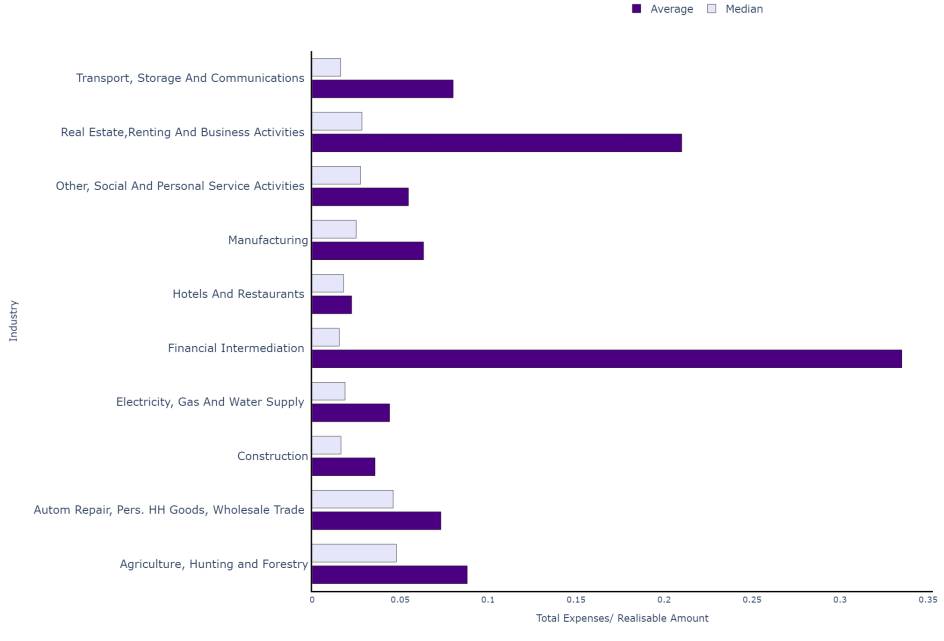
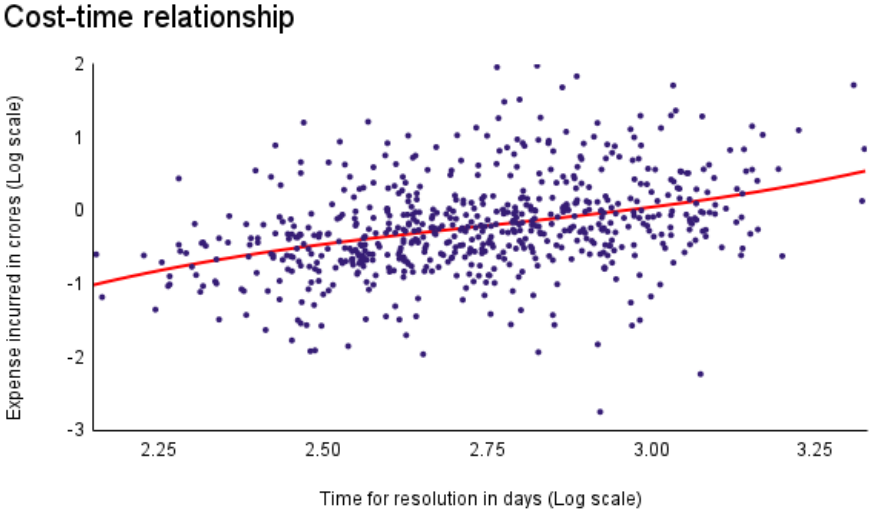


Figure 2.24: Resolution costs vs. time to resolve

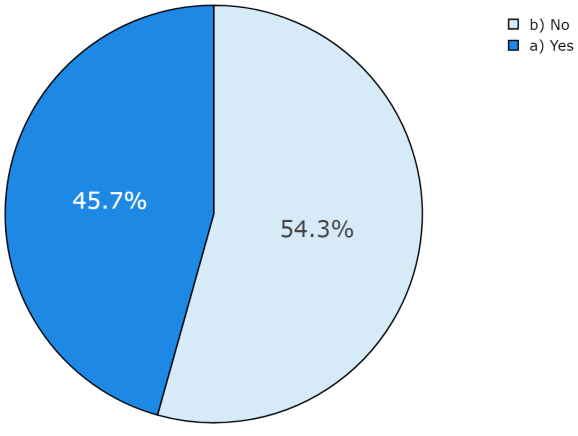


2.2 Survey results and analysis

To triangulate the findings of the empirical analysis, we conducted a survey with the management of the resolved firms. We obtained responses from 62 firms out of the 506 firms that were requested to participate in the survey. The participants were asked questions on the resolution process, the resolution outcomes, the post-resolution performance and stakeholder cooperation.

About half of the firms surveyed have indicated that they have achieved the pre-resolution production levels (see Figure 2.25), and about three in every four respondents conveyed that they are happy with the productivity levels.

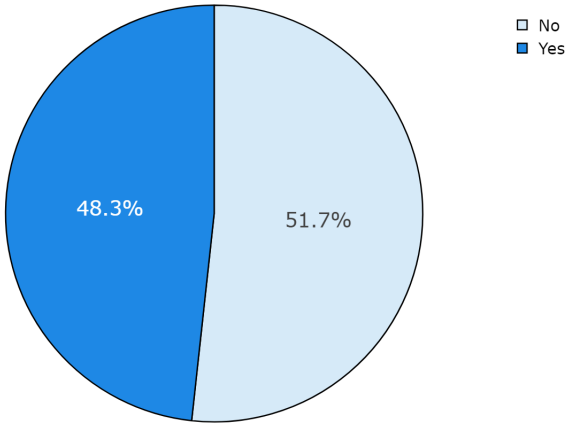
Figure 2.25: Has the firm reached the pre-resolution production/productivity levels?



Only half of the respondents have achieved the financial projections mentioned in the resolution plan (see Figure 2.26). In the survey, respondents indicated a significant increase in the GST input tax credit that shows the resumption of activity levels in the resolved firms. A similar trend is also seen for the sum of GST paid and payable.

Close to one-third of the participants have indicated that the profitability of the resolved firms is higher than the average in the pre-resolution phase (see Fig-

Figure 2.26: Have the financial projections, as mentioned in the resolution plan, been achieved?



ure 2.27). Only 20% of the resolved firms had retained the key management personnel from the pre-resolution period, as seen in Figure 2.29. More than a third of the respondents are able to obtain financing from banks. However, only 40% of those firms are able to obtain favourable terms from the creditors.

The resolved firms are able to obtain financing from both public sector and private sector banks and NBFCs (see Figure 2.30). However, only a minority of firms obtain financing from markets through commercial papers or bonds. About 50% of the firms have invested in working capital, and most have infused equity in the post-resolution period (see Figure 2.28).

Figure 2.27: Comparison of profitability in the last year (FY 22) with pre-resolution period

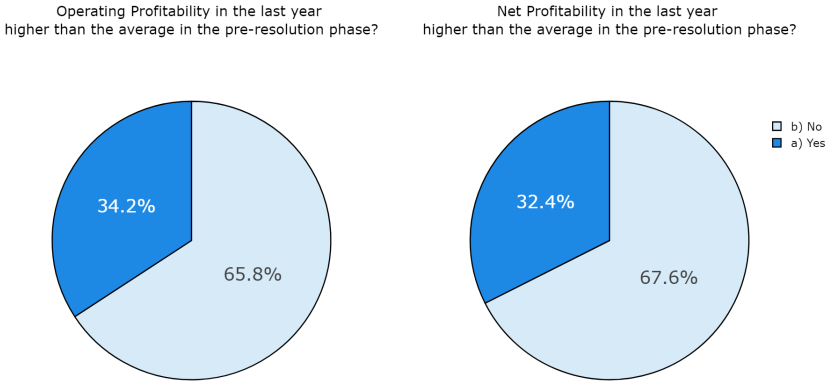


Figure 2.28: Equity and working capital infusion

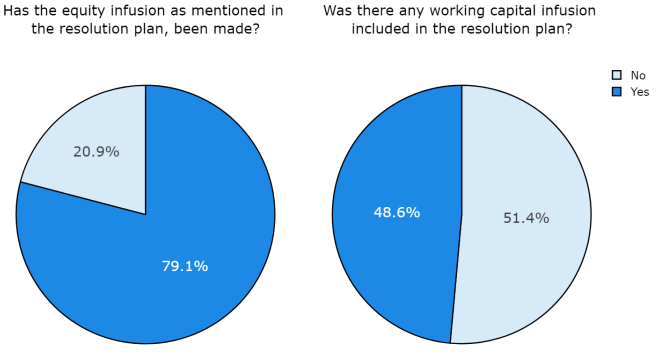


Figure 2.29: Financial support from bank

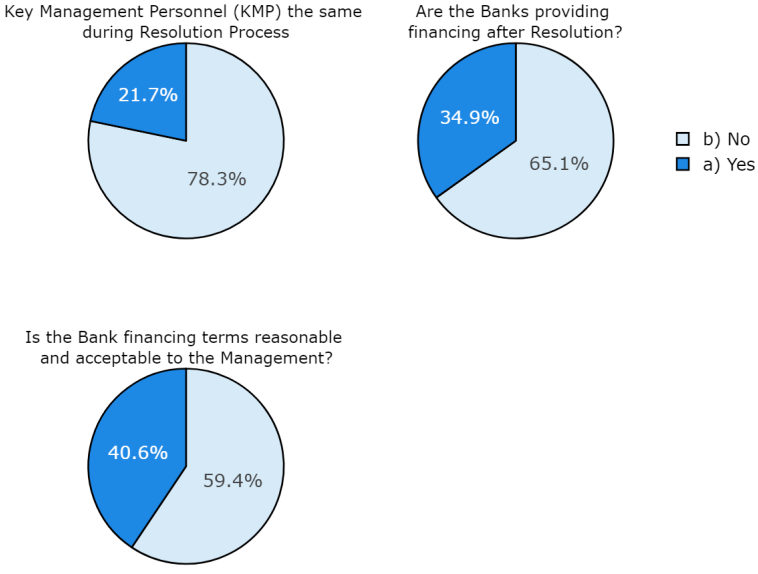
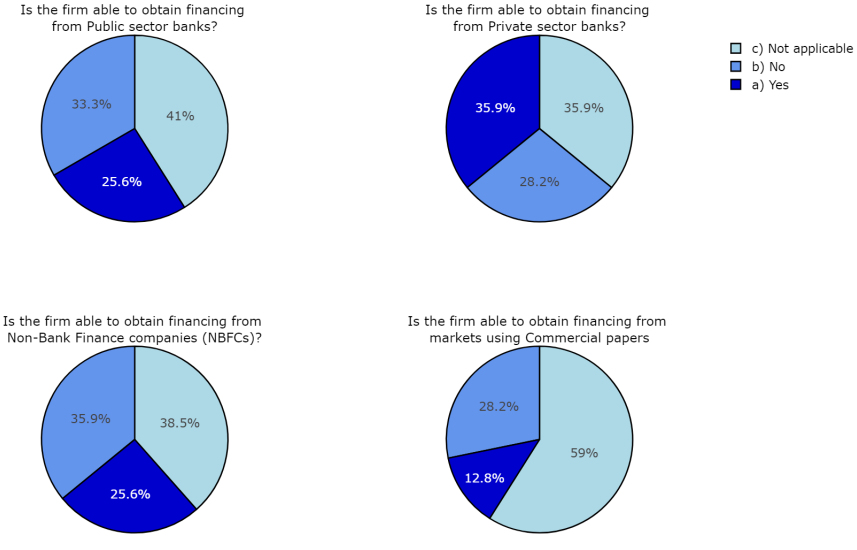
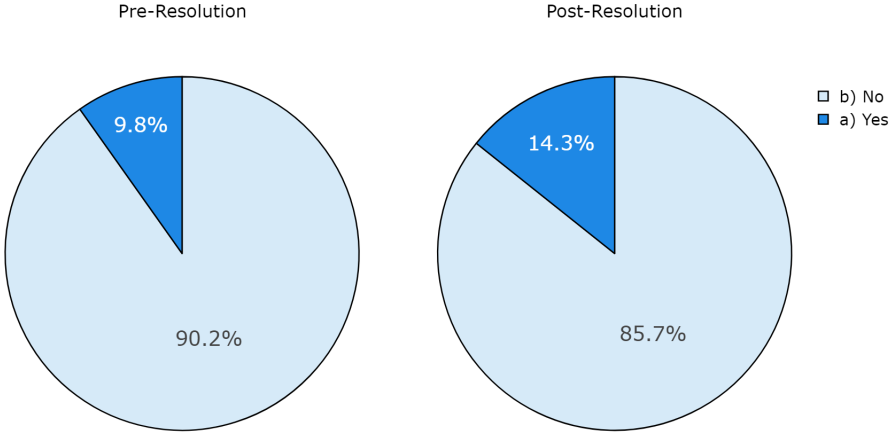


Figure 2.30: Financing from public and private banks



Only 10% of the survey firms had a credit rating in the pre-resolution phase, as shown in Figure 2.31. Although there is an improvement in the post-resolution period, which has around 14% of the survey firms with credit rating, most of them are still unrated (see Figure 2.31 for details).

Figure 2.31: Credit rating



Almost 95% of the respondents have repaid their creditors per the resolution plan (see Figure 2.33). About 29% of the respondents availed concessions such as tax benefits in the post-resolution period (see Figure 2.32).

Figure 2.32: Regulatory issues and tax benefits

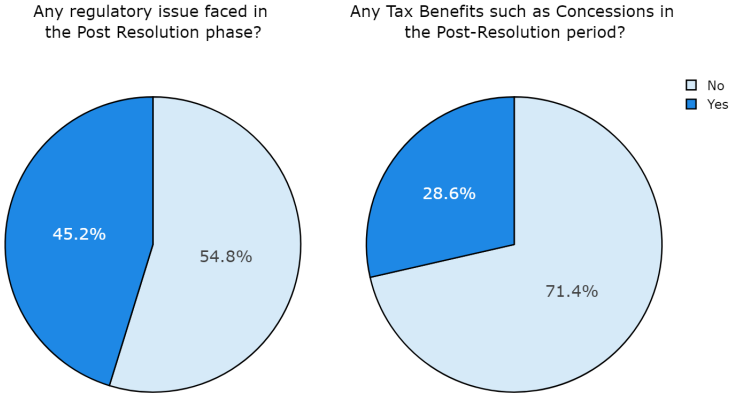
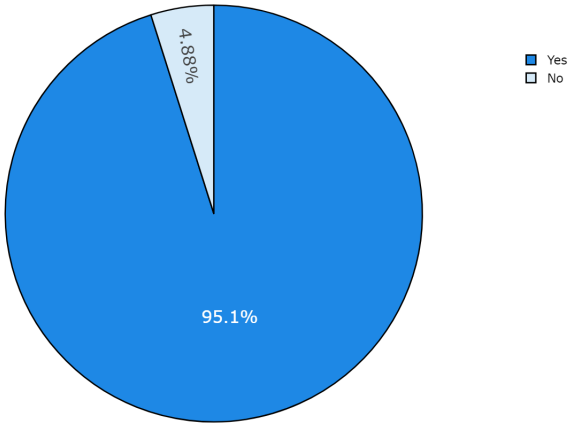


Figure 2.33: Has the firm repaid the creditors as per the resolution plan?



About 85% of the respondents indicated that they are either satisfied or very satisfied with the resolution process as indicated in Figure 2.34. The main reason cited to bid for the company was that it was in the same line of business (about 65% respondents). More than 70% of respondents felt the resolution was time-bound and 73% of the firms retained their organisation structure (see details in Figure 2.35).

Figure 2.34: Is the firm management satisfied with the resolution process?

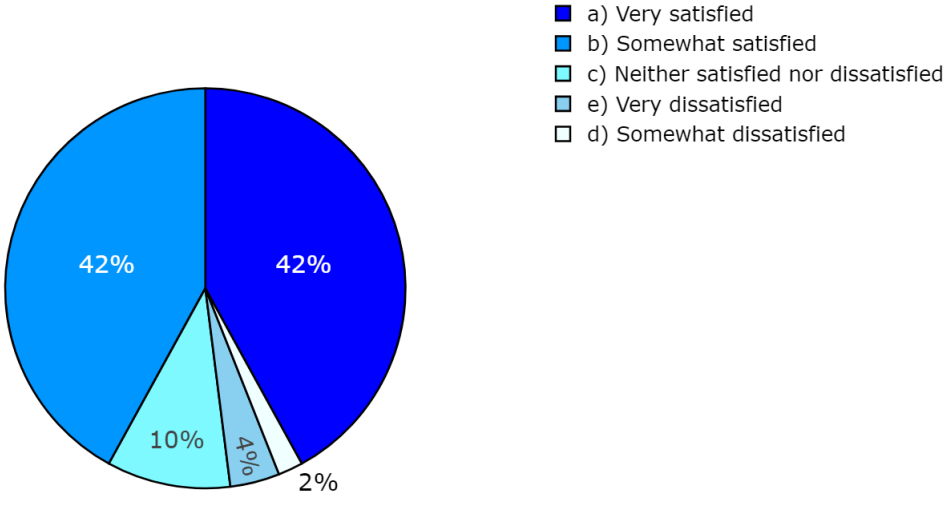
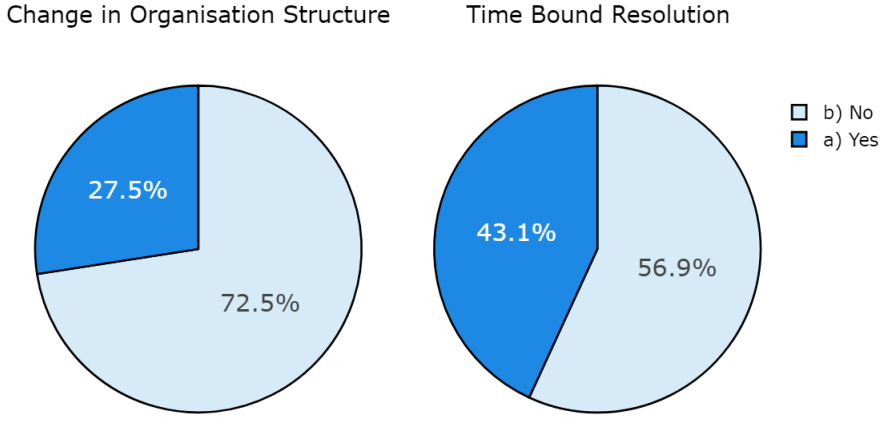


Figure 2.35: Organization structure and resolution timeline



2.3 Focus interviews with management of resolved firms

We conducted discussions with a few of the representatives of the resolved firms to get a detailed review and suggestions about the resolution process and the period after that. The representatives indicated satisfaction with the overall process post-IBC. The participants also conveyed that some improvements are desirable going forward. The firms found interactions with NCLT helpful. However, the participants raised process difficulties with other government institutions, such as the Income Tax Department, Customs Department and RBI. A lack of general awareness about the new resolution process by all stakeholders has been pointed out by the respondents. This has led to delays in getting necessary clearances from these departments and an overall delay in the resolution process. A transparent online mechanism was proposed to issue no dues claims once the process is completed as a step to solve the issue. This will enable the firms to engage freely with banks with a clean slate.

Suggestions were also made to improve the resolution process. Sometimes, claims are made, or bids are put in at the last moment, further delaying the process. The appeals filed prolong the resolution process; hence, some mechanisms to discourage such parties must be incorporated, as many of the participants still had pending litigation processes.

A few participants mentioned difficulty in obtaining bank financing even after the resolution process was over. The banks were very cautious and had not removed the label of "defaulter" until after the firms started performing well.

The respondents had varied opinions about the performance and guidance of the Resolution Professionals (RP) during the interim period. Most participants believed that the RPs' competence could be improved through training, as most of them do not have a business/managerial background. While the committee of creditors are entrusted with monitoring the RPs, it will be beneficial if there is a control mechanism through an additional internal auditor or similar arrangements.

Chapter 3

Conclusion

In this study, we examine the effectiveness of the resolution process by analyzing the firm outcomes post the implementation of the IBC. To conduct the impact study, we employed a mixed method analysis that includes an empirical analysis of the performance, a survey-based analysis to incorporate the views of the resolved firms, and a focused group discussion to draw insights on the resolution process.

The key findings of our study are as follows. *Firstly*, we find that overall the resolved firms that went through the resolution process have significantly improved their performance in the post-resolution period compared to the period prior to their insolvency. Specifically, we find that these firms' profitability, liquidity, activity, and turnover ratios have improved during the post-resolution period. Moreover, these findings are reinforced when we compare their performance with performing peers from the same industry and size decile. Furthermore, a propensity score-matched analysis indicates that the resolved firms have reduced the wedge with the comparable cohort of firms in the post-resolution period, especially in the profitability metrics.

Secondly, the survey responses broadly support our empirical findings. Most of the companies are satisfied with the resolution process and the post-resolution support provided by the various stakeholders. Specifically, the respondents indicate that productivity and profitability have improved and are in line with the projected plan. Around half of the respondents have met the projected performance benchmarks. More than a third of the respondents are able to obtain credit, of

which 40% are able to obtain bank financing on reasonable terms. Moreover, about half of the respondents have made significant investments in CAPEX and working capital.

Thirdly, the focus interviews with industry participants reveal that the resolution process has become much more efficient post the IBC. However, participants conveyed areas of improvement that can further help to streamline the process. For instance, while the respondents were satisfied with the interactions with the committee of creditors and NCLT, the spillover issues emanating from government institutions such as the Income tax, customs, and RBI for various clearances remain. While the industry participants were content with the performance of Resolution Professionals (RPs) they interacted with, however, highlighted the need of business and domain-specific knowledge training for RPs to ensure appropriate and timely decision-making.

Based on the study, we conclude that the overall performance of the resolved firms has reverted to being productive and efficient. Both the data-based analysis and the qualitative analysis suggest that firms contribute to the economy through job creation, capital investments, and efficient utilization of resources. However, there is scope for improvement, particularly in the ecosystem participant education and awareness of the IBC process. Specifically, a grievance redressal mechanism along with an integrated platform for the stakeholders to address concerns in the workflow would reduce the inefficiencies prevalent in the existing process.