Effectiveness of the Resolution Process: Firm outcomes in the post-IBC Period

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Acknowledgements

This study constitutes the second in a series aimed at examining the post-resolution performance of firms that have undergone resolution under the Insolvency and Bankruptcy Code, 2016. We acknowledge the commitment of the Insolvency and Bankruptcy Board of India (IBBI) in commissioning the study. We express our sincere appreciation to Shri Ravi Mital, Chairperson of IBBI; Shri Bhushan Kumar Sinha, Whole Time Member; Shri Ravinder Maini, Executive Director; Mr. Shiv Anant Shankar, Chief General Manager; Ms. Namisha Singh, Assistant General Manager, and Ms Anjali Priya, Research Associate for their support in conducting the study. We also acknowledge the Ministry of Corporate Affairs for providing the data necessary for the empirical analysis. We thank Mr. Vijay V. Venkitesh for his exceptional research assistance. Any errors or omissions remain the sole responsibility of the authors.

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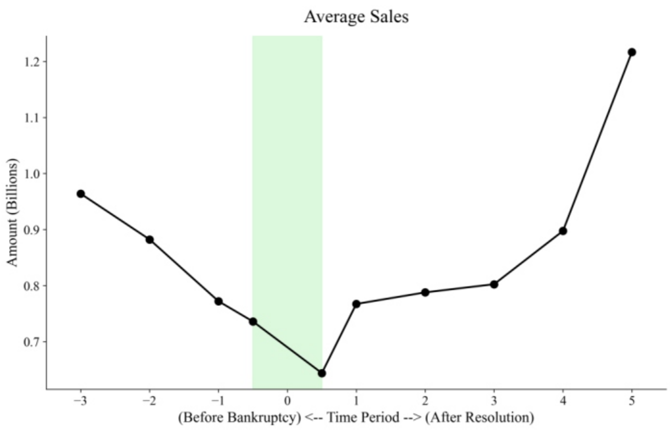
Executive Summary

The Insolvency and Bankruptcy Code, 2016 (IBC) has completed a decade since its enactment. Data from the Insolvency and Bankruptcy Board of India (IBBI) shows that, on average, creditors have realised 35% of admitted claims and 158% of liquidation value in cases resolved under the IBC. While these figures capture outcomes in terms of financial recovery, they do not fully reflect the broader success of the resolution process. As the IBC enters its tenth year and legislative amendments are being considered, this study evaluates the performance of the firms that have undergone resolution under the Code.

To assess the impact of the resolution process on firms, the study adopts a multi-pronged approach. It examines firm performance both before and after resolution to determine whether firms have been able to re-establish themselves in the market. The report also compares the performance of resolved firms with that of their peers, controlling for sector and size. This comparison helps quantify performance gaps and distinguish changes driven by broader market conditions from those resulting from improved management.

Some of the key findings are:

- Average sales have shown an increase of 89% in the five 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 8% as of T+5), which is a significant improvement from the pre-resolution period.



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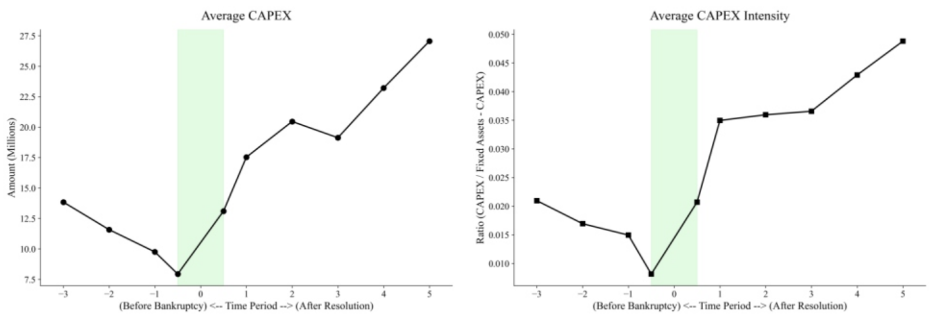
- The data reveals a substantial post-resolution surge in capital expenditure, with average CAPEX increasing by approximately 106%, indicating a recovery in asset growth and overall economic health. The observed trends in aggregate capital expenditure and capex intensity indicate that firms emerging from the resolution process undertake substantial investments in productive assets during the post-resolution period. This post-resolution increase in capital expenditure contributes meaningfully to aggregate capital formation in the economy. Although bankrupt firms exhibited higher levels of aggregate assets prior to resolution, a significant portion of these assets was unproductive or inefficient, casting doubt on their marginal contribution to economic output. Following resolution, the restructured firms operate with leaner balance sheets and redirect investment toward operating assets, resulting in improved allocative efficiency and enhanced value creation for the economy as a whole.



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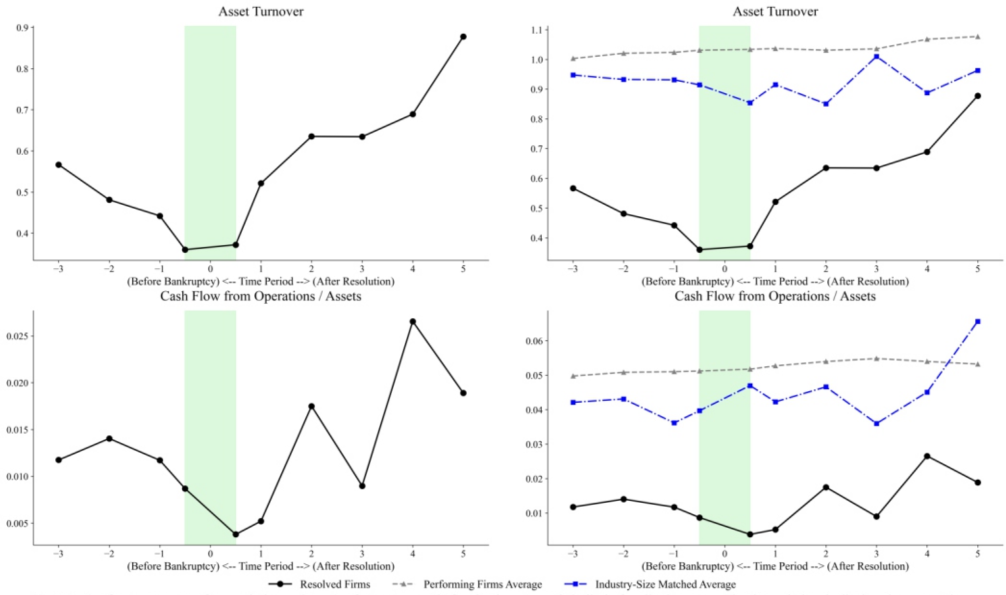
- Resolved firms demonstrate a significant recovery in asset utilization, with the Asset Turnover ratio increasing by approximately 131% (rising from 0.37

at resolution to 0.87 in T+5). As illustrated in figure, this improved revenue generation capability, alongside strengthening Cashflow-to-Assets ratios, has allowed resolved firms to narrow the performance gap with healthy benchmark firms.



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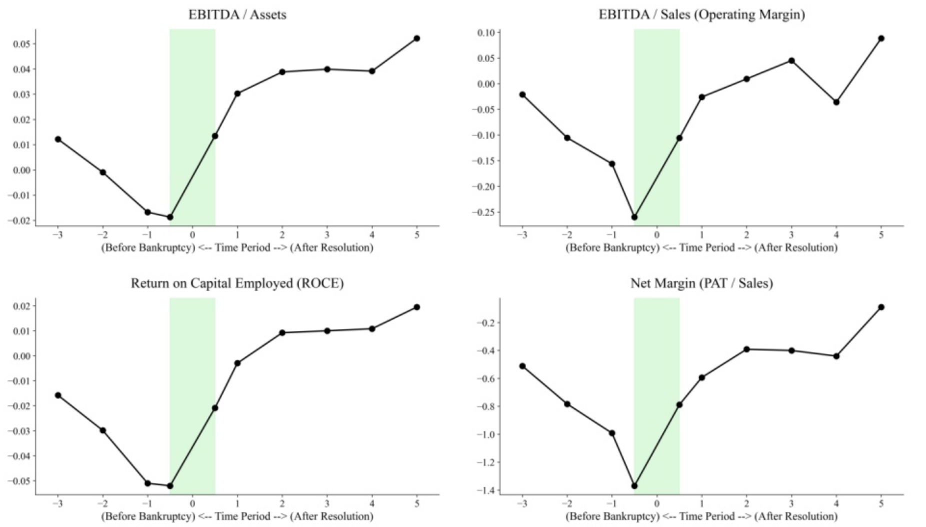
- We find evidence of convergence in the profitability ratios of resolved firms toward benchmark averages in the post-resolution period. Multiple measures of profitability-including net margin, EBITDA-to-assets, EBITDA margin, and return on capital employed (ROCE), which captures operating profitability per unit of invested capital-exhibit statistically and economically significant improvements following resolution. For example, the operating margin increases from -26% in the year of bankruptcy to approximately 8% by the fifth year after resolution (see Figure 2.5 for more details).



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When considered alongside the observed improvements in capex intensity, asset turnover, and aggregate sales, these findings suggest that post-resolution growth is value-enhancing rather than scale-driven. The restructured firms deploy assets more efficiently and are able to generate positive operating margins, despite the adverse effects of the COVID-19 pandemic and prevailing geopolitical headwinds. Although such macroeconomic shocks affect all firms in the economy, firms emerging from the bankruptcy process are particularly vulnerable to these disruptions. Accordingly, the observed improvements and the convergence of profitability toward that of performing firms provide strong evidence of the effectiveness of the resolution process.

- There is around 71.91% increase in the average employee expenses in the five years post-resolution—indicating a higher employment intensity in the resolved firms in the post-resolution period.

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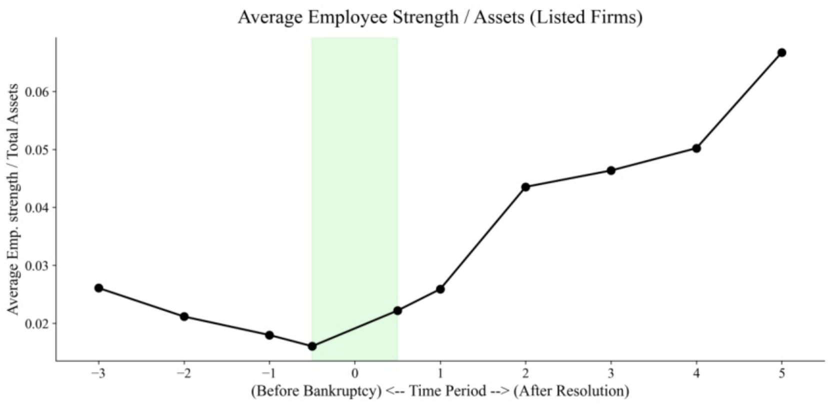
- The average employee strength per unit of total assets (employees per Lakh of assets) for listed firms, follows a declining trend in the pre-bankruptcy period, reaching its minimum at the year of bankruptcy. Post-resolution, the ratio rises steadily from approximately 0.022 at the year of resolution to around 0.066 at t = 5, representing an increase of 200% over the five years post-resolution.



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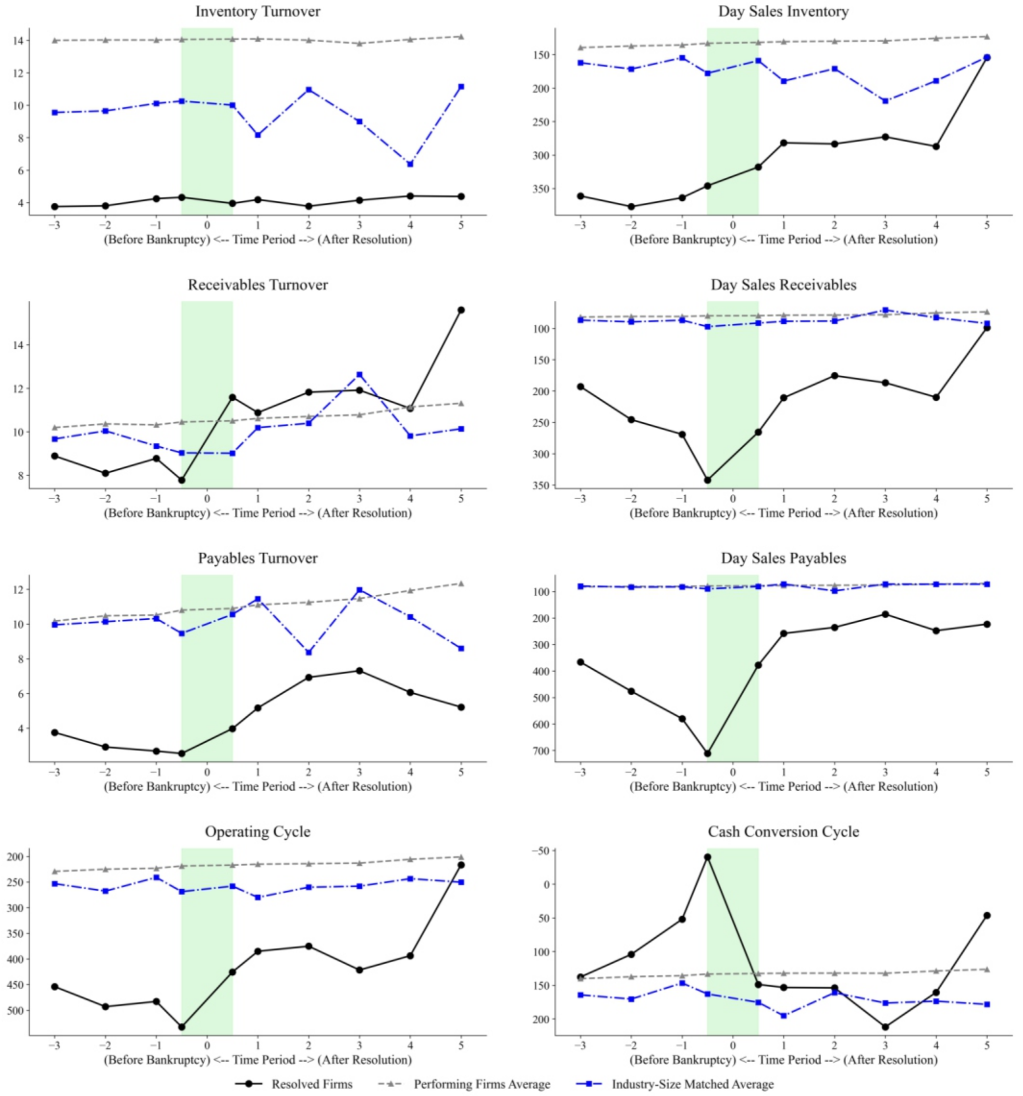
- Post-resolution data highlights a steady recovery in Activity Ratios, including Inventory Turnover, Day Sales Inventory, and the Operating Cycle. As illustrated in Figure 2.11, resolved firms are not only improving internally but are effectively narrowing the performance gap with performing firms and industry benchmarks.



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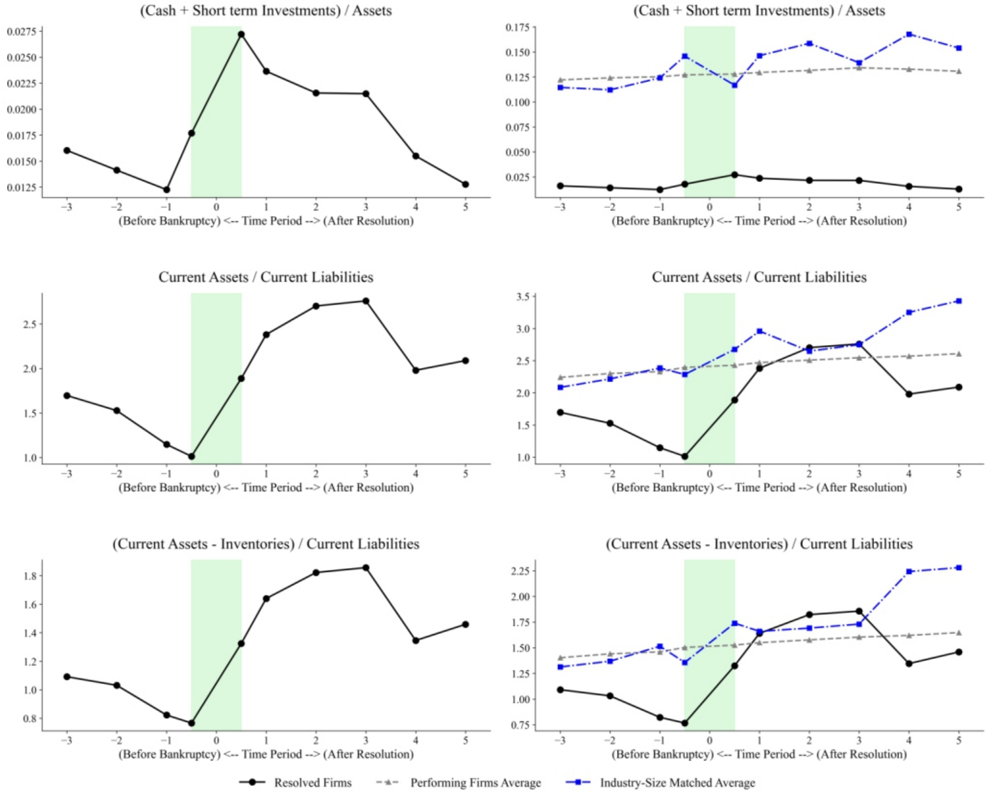
Note that the axis of some plots has been inverted for better representation.

- Liquidity has improved in the post-resolution period by about 106%. 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 2.09 in the fifth year post-resolution.



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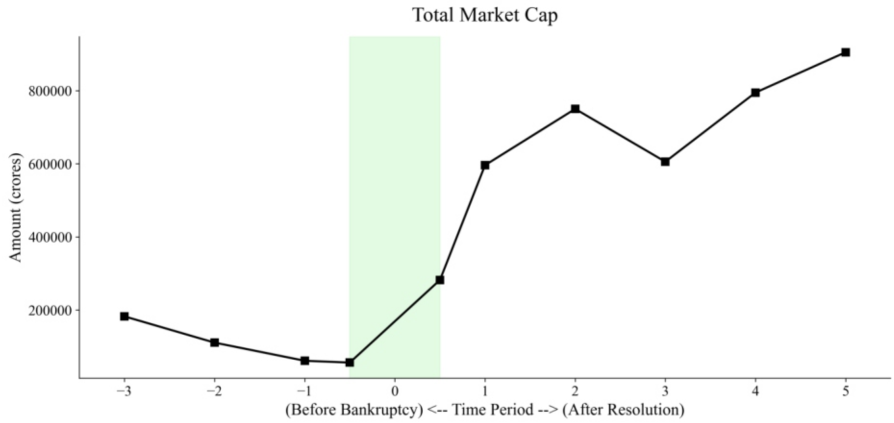
- The trends in the market capitalization of listed resolved firms indicate a significant revival in the average market valuations in the post-resolution period, which is expected given the growth opportunities that will accrue to these firms post the resolution with the creditors. A similar trend is seen for the aggregate market valuation of all the resolved firms which has increased from around INR 2.8 lakh crore to INR 9 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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- The recovery rate analysis indicates an overall improvement in recovery rates when compared to previous benchmarks, with the average at around 37.5%. Financial creditors realized an average recovery of about 43%, while operational creditors realized about 25%.

The report is divided into two parts. Part 1 provides the background and the methodology. 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.

Part 2 of the report consists of findings from the detailed empirical analysis. The profitability margins of the resolved firms saw a sharp uptick post the conclusion of the statutory process under IBC. This analysis holds true when compared 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. We observe an increasing trend in average assets, increasing from 228.33 crores in the resolution year to 254.60 crores in the fifth year post-resolution, representing a 11.5% gain. For resolved firms, average capex saw an increase of approximately 105% in the five 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 has shifted notably. The current analysis demonstrates that improvements in both liquidity and leverage ratios are now statistically significant in the post-resolution period. Regression results confirm that resolved firms experience a significant positive adjustment in their liquidity (CA/CL Ratio) and key leverage metrics, including Debt-to-Equity and Total Debt-to-Total Assets, relative to the pre-bankruptcy window. Furthermore, visual trends indicate that the interest coverage ratio and other leverage indicators are not merely stabilizing but are actively converging with the averages seen in performing and industry-matched firms, signaling a robust recovery in financial health.

The uptake of labour by firms in the post-resolution period shows signs of recovery. We find a statistically significant increase in Employee Expenses to Total Assets, although the impact on Employee Expenses to Total Sales remains insignificant. Regarding operational functioning, the trend analysis points to a broad-based enhancement in efficiency. Overall, we observe a statistically significant improvement in all the activity ratios in the post-resolution period except for the cash conversion cycle.

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 Health and Social Work industry and the lowest for Mining and Quarrying. It is a similar case for the operational creditors as well, with the highest recovery rate observed in the 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.

Overall, several indicators suggest that the resolved firms have recovered to levels comparable with those of other financially healthy firms during the same period. This indicates an increase in the value added by resolved firms to the Indian economy. Importantly, relative to the earlier study conducted in 2023, the findings demonstrate not only sustained improvements across performance metrics but also higher recovery rates for both financial and operational creditors.

Chapter 1

Background of the study, objectives, and approach

1.1 Background of the study

The Insolvency and Bankruptcy code (IBC) enacted in 2016 is now in its 10th year of existence. The IBC was heralded as one of the major reforms initiative with the aim to improve efficiency of insolvency and bankruptcy process. A decade of law in practise is a good time to look back and see what has been the impact of IBC. Impact, of course, can be measured in multiple ways and must be a continuous exercise, both from process and outcomes perspectives. This study looks at outcomes - *whether the resolutions undertaken after the enactment of IBC have resulted in better outcomes for the firms coming out of the process as a going concern.* IIMA with the support of IBBI has undertaken a similar study in 2023.[1,2] The current 2026 study covers a larger number of firms and years, and is part of a sustained effort to understand the impact of IBC in terms of firm outcomes in the post resolution phase.

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

[1] Full report can be accessed here: `https://ibbi.gov.in/uploads/resources/59f737b213b4700cc16428aefd62869a.pdf`.

[2] Summary: `https://ibbi.gov.in/uploads/whatsnew/37833a4cfcba02255949f3920133c3bd.pdf`.

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 1194 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 2024. 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 844. Detailed criteria and the data waterfall is shown in Table 1.1.[3] 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 is 7,993. 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

[3] The number of unique firms in the event time window t-3, t-2, t-1, Bankruptcy, Resolution year, t+1, t+2, t+3, t+4, and t+5 is 661, 593, 422, 277, 291, 240, 197, 130, 71 and 32 respectively.

Table 1.1: Data waterfall and exclusion criteria

Criteria	No. of unique firms
IBBI data	1194
Merging with MCA data	1160
Restricting event window to three years before bankruptcy and 5 years after resolution	1017
Removing financial intermediation firms	994
Removing firms with Sales and COGS as less than zero	844

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.

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
Asset turnover	844	2914	0.502	0.521	0.000	0.113	0.317	0.696	1.931
PAT/Assets	844	2914	-0.074	0.111	-0.348	-0.113	-0.043	0.003	0.039
Net Margin	844	2914	-0.733	1.412	-4.996	-0.624	-0.139	0.010	0.088
PBITDA/Assets	844	2914	0.008	0.069	-0.132	-0.023	0.009	0.048	0.140
Operating Margin	844	2914	-0.084	0.454	-1.347	-0.117	0.030	0.107	0.570
Gross Margin	844	2914	0.475	0.392	-0.253	0.200	0.370	0.917	1.000
Liquidity (Cash + short term investments)/Assets	844	2914	0.018	0.023	0.000	0.003	0.009	0.020	0.090
Current Assets/Current Liabilities	844	2913	1.719	2.153	0.019	0.446	0.929	1.987	9.349
(TCA-Inv)/CL	844	2913	1.172	1.522	0.007	0.276	0.666	1.332	6.571
Leverage (Debt/Equity)	844	2912	0.203	5.770	-9.352	-2.339	0.185	2.492	19.074
Leverage (Debt/Assets)	844	2914	0.604	0.454	0.016	0.296	0.516	0.790	1.754
Leverage (Interest coverage ratio)	844	2663	-38.683	128.194	-560.113	-2.926	-0.291	1.054	12.718
Leverage (Debt/PBITDA)	844	2914	-7.991	78.708	-542.885	-12.540	1.455	13.309	130.085
Labour (Employee expenses/Sales)	844	2914	0.137	0.173	0.000	0.029	0.059	0.173	0.629
Labour (Employee expenses/Assets)	844	2914	0.035	0.039	0.000	0.007	0.018	0.049	0.135
CAPEX	844	2914	0.022	0.048	0.000	0.000	0.000	0.020	0.186
Cashflow from ops./Assets	844	2914	0.011	0.049	-0.080	-0.008	0.000	0.023	0.124
ROCE	844	2914	-0.023	0.079	-0.193	-0.060	-0.008	0.024	0.110
Inventory Turnover	844	2425	3.986	4.937	0.000	0.667	2.556	4.691	18.582
Day Sales Inventory (DSI)	844	2098	339.683	593.948	16.432	65.704	140.058	268.773	2604.746
Receivables Turnover	844	2643	9.472	15.055	0.000	1.570	3.774	8.794	59.792
Day Sales Receivables (DSR)	844	2643	235.338	339.050	5.176	41.506	96.717	232.489	1220.261
Payables Turnover	844	2735	3.885	6.464	0.000	0.176	1.718	3.593	27.315
Day Sales Payables (DSP)	844	2201	420.070	657.151	8.282	80.237	137.476	388.667	2534.518
Operating Cycle (DSI+DSR)	844	1997	453.698	528.860	57.817	151.159	236.775	479.970	2001.724
Cash Conversion Cycle	844	1960	109.460	337.123	-483.692	-20.243	86.429	183.829	1006.735

Table 1.4: Descriptive summary of performing firms

	Firms	Observations	Mean	Std	Min	25%	50%	75%	Max
Sales/Assets	7993	53296	1.014	0.747	0.063	0.451	0.878	1.368	2.878
PAT/Assets	7993	53296	0.043	0.061	-0.074	0.006	0.035	0.080	0.175
PAT/Sales	7993	53296	0.043	0.118	-0.272	0.007	0.038	0.095	0.290
EBITDA/Assets	7993	53296	0.118	0.078	-0.007	0.061	0.110	0.166	0.288
EBITDA/Sales	7993	53296	0.180	0.176	-0.025	0.066	0.129	0.227	0.699
Gross Margin	7993	53296	0.273	0.179	0.003	0.137	0.244	0.389	0.653
Liquidity (Cash+short term investments)/Assets	7993	16153	0.123	0.123	0.006	0.029	0.076	0.180	0.437
Liquidity (CA/CL)	7993	53057	2.335	1.920	0.663	1.176	1.600	2.613	8.264
Liquidity (CA-Inv)/CL	7993	44995	1.467	1.263	0.287	0.670	1.036	1.709	5.306
Leverage (Debt/Equity)	7993	49583	1.037	1.242	0.011	0.178	0.589	1.336	4.787
Leverage (Debt/Assets)	7993	49583	0.271	0.192	0.007	0.101	0.252	0.410	0.655
Leverage (Interest coverage ratio)	7993	48962	22.402	45.881	-1.704	1.618	4.094	14.718	184.828
Leverage (Debt/PBITDA)	7993	49560	3.126	3.593	-0.621	0.552	2.006	4.261	13.707
Labour (Employee expenses/Sales)	7993	52937	0.159	0.176	0.009	0.043	0.091	0.191	0.643
Labour (Employee expenses/Assets)	7993	52937	0.122	0.147	0.004	0.028	0.069	0.142	0.584
CAPEX	7993	41424	0.428	1.013	0.000	0.003	0.024	0.201	4.105
Cashflow from Ops./Assets	7993	47505	0.050	0.063	0.001	0.008	0.024	0.065	0.234
ROCE	7993	46901	0.100	0.082	-0.032	0.044	0.088	0.145	0.290
Inventory Turnover	7993	45012	13.924	23.815	0.364	2.776	5.156	11.066	99.840
Day Sales Inventory (DSI)	7993	45005	134.809	201.935	3.206	32.390	70.151	129.816	870.204
Receivables Turnover	7993	52151	10.382	12.122	1.375	3.565	5.704	10.809	49.748
Day Sales Receivables (DSR)	7993	52151	80.188	65.556	7.335	33.766	63.992	102.386	265.425
Payables Turnover	7993	52014	10.580	12.094	1.197	3.593	6.004	11.470	49.974
Day Sales Payables (DSP)	7993	51992	79.403	69.373	6.857	31.403	60.335	100.793	284.371
Operating Cycle (DSI+DSR)	7993	44538	221.904	248.997	34.310	88.870	144.266	228.147	1098.763
Cash Conversion Cycle	7993	44168	136.214	206.663	-46.974	28.732	76.462	147.412	867.347

Chapter 2

Results, findings and discussion

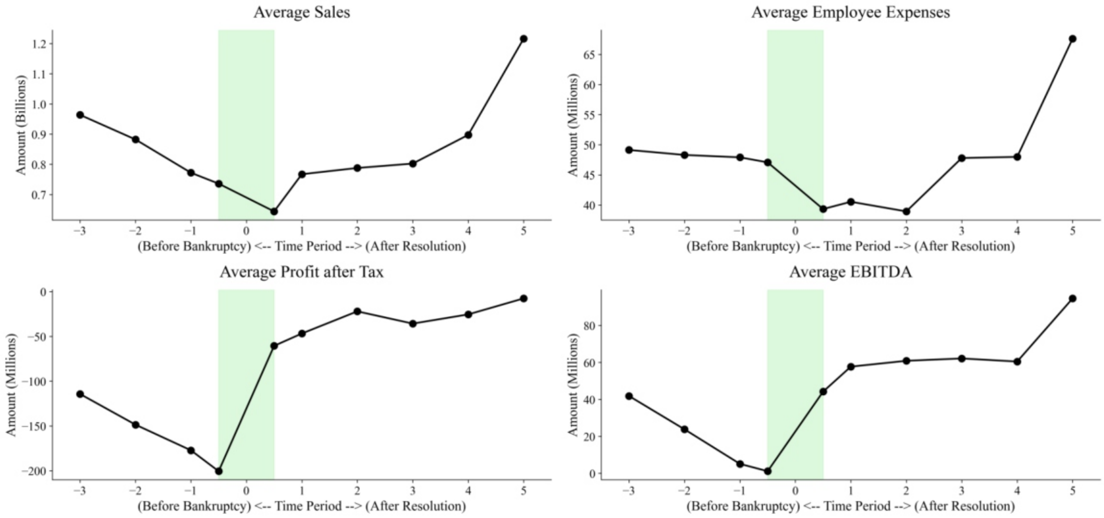
2.1 Empirical analysis and results

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 significant increase in aggregate values in the post-resolution period. In terms of average sales, we see an increase of 89% in the five years since the resolution. We see a similar trend in the profitability of the firms as well. Further, results indicate an increase of 71.91% for the average employee expenses in the five 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 cash, debt, and capital expenditure. Average CAPEX has increased by about 106% in the post-resolution period (over a five-year period). The increase in total debt 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 in 2019 will be equated 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.

Figure 2.2: Performance metrics: Balance sheet and Cash flow

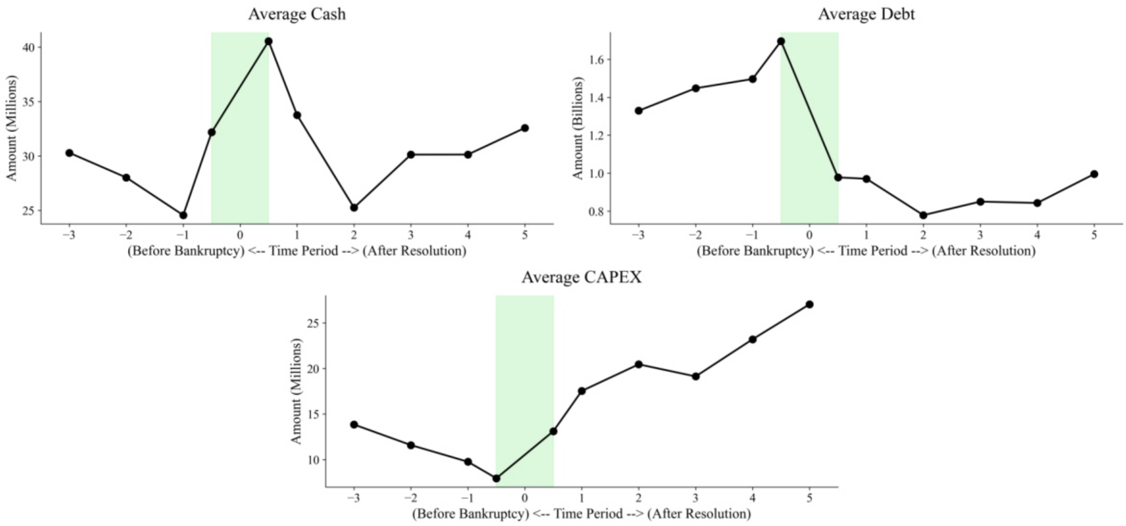


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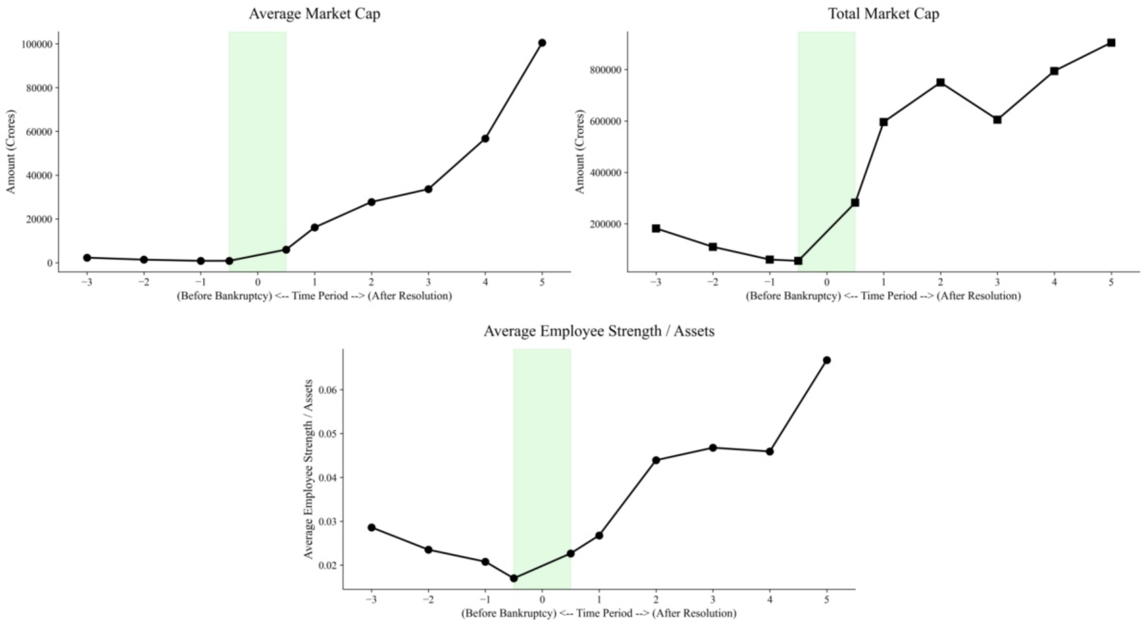
Figure 2.3: Employee strength by assets and market capitalization of resolved listed firms



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 in 2019 will be equated 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. Market Cap and Employee strength data is sourced from Prowess for listed firms only (n = 83).

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, analysis is conducted with a subsample of firms among the resolved firms. We obtain the total number of employees for the listed resolved firms (a total of 83 firms) from the CMIE Prowess database. We compute the ratio of employee strength to total assets (employees per lakh of assets) for each listed firm. The trend of this ratio over the event window is shown in Figure 2.3. It follows a declining trend in the pre-bankruptcy period, reaching its minimum at the year of bankruptcy. Post-resolution, the ratio rises steadily from approximately 0.022 at the year of resolution to around 0.066 at t = 5, representing an increase of 200% over the five years post-resolution.

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 are indicative of the market 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 -26% in the year of Bankruptcy to around 8% by the fifth 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 margin continue to remain negative, the resolved firms have operationally broken even in the post-resolution period (operating margin of 8% as of T+5), which is a major improvement from the pre-resolution period.

Figure 2.4: Profitability ratios

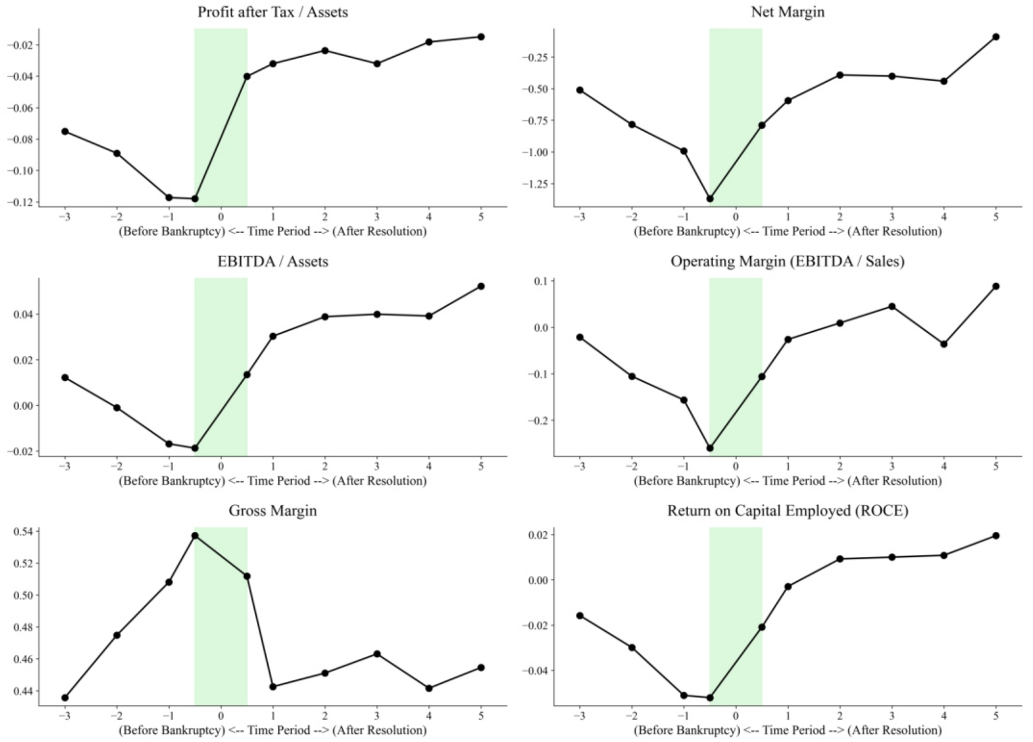


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Figure 2.5: Profitability ratios with industry and size comparison

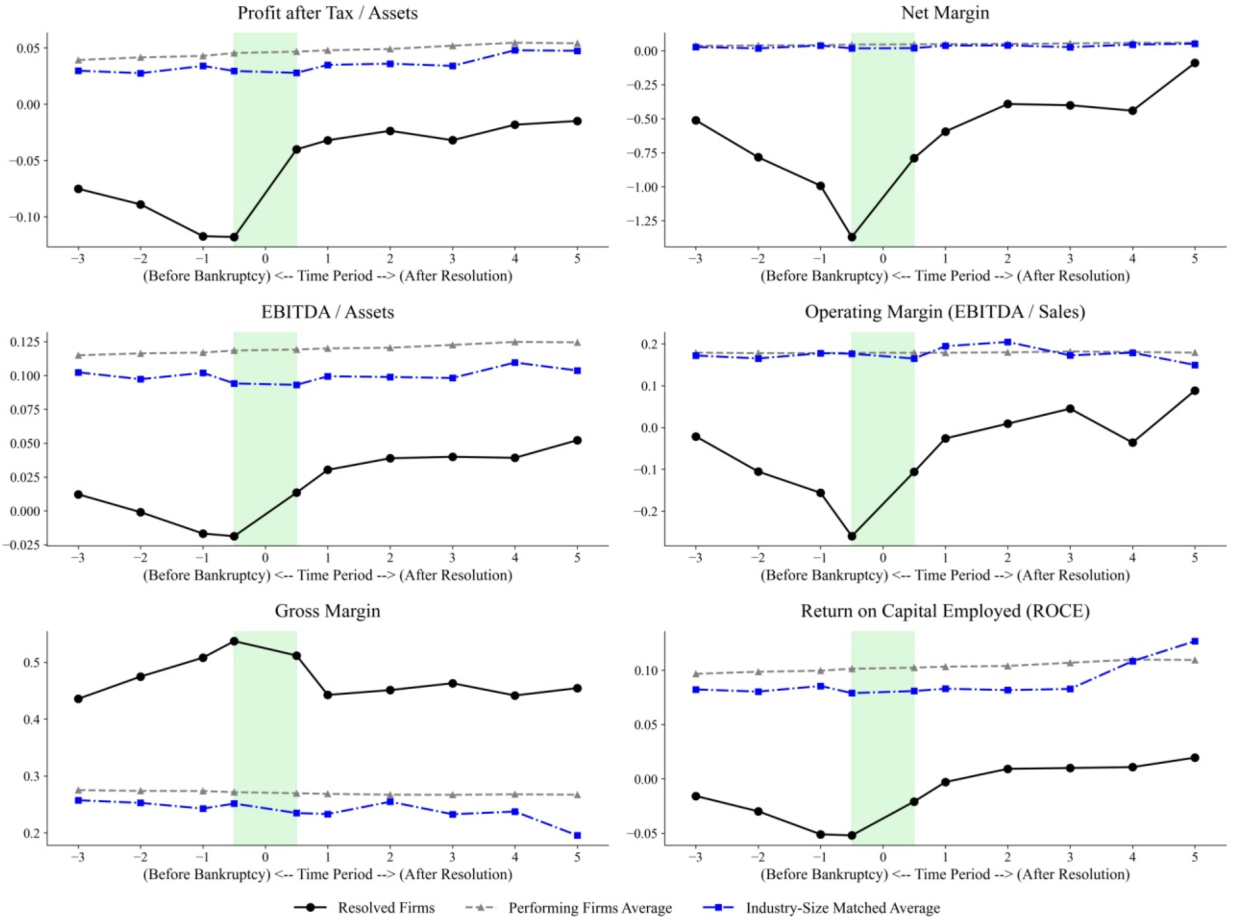

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Figure 2.6 shows the univariate trends of the capital investments made by the firms over the period. The results show an increase in capital investments of the resolved firms indicating an increase in asset growth and overall economic growth in the 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.

Figure 2.6: CAPEX ratio

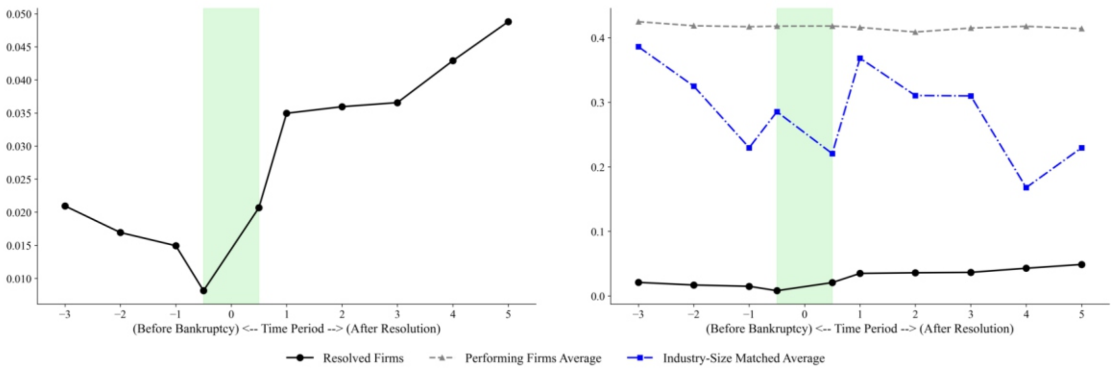

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Figure 2.7 shows the univariate trends of various Liquidity ratios such as Current Ratio and Quick Ratio (Current assets-inventory/Current liability). The results indicate a significant increase in the liquidity of the firms in the post-resolution period. For instance, the current assets to current liability has improved from 1.01 in the year of bankruptcy to 2.09 in the fifth 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 presents the univariate trends of various leverage ratios, specifically the Interest Coverage Ratio. The results demonstrate a clear improvement in the performance of resolved firms, with metrics rebounding to levels similar to the pre-bankruptcy period. As several firms in this sample have no interest expense due to either an absence of debt or missing information, this ratio is reported for a reduced sample. Despite this, the upward trajectory in leverage ratios signals a recovery in firm cash flows and overall financial health.

Figure 2.7: Liquidity ratios

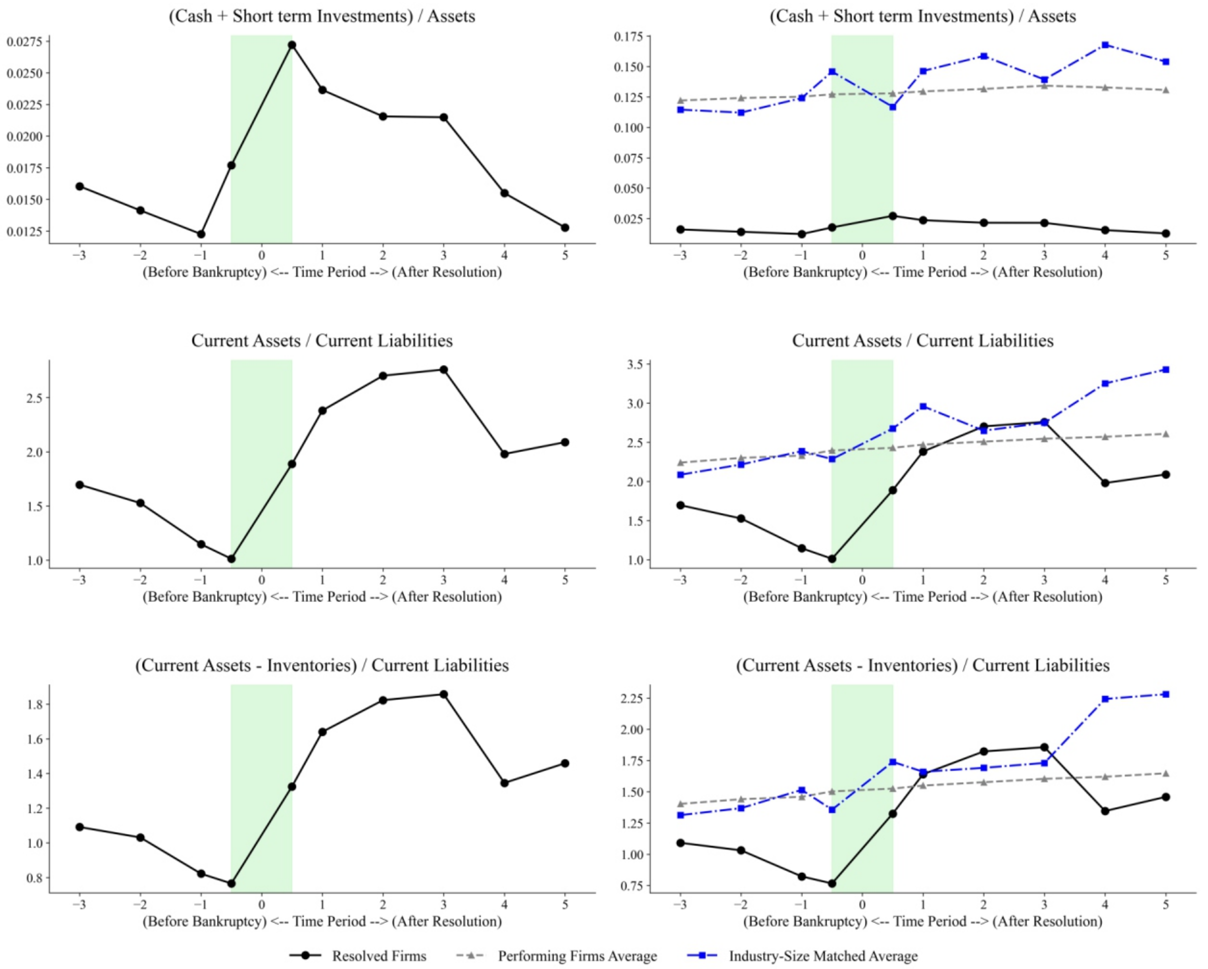

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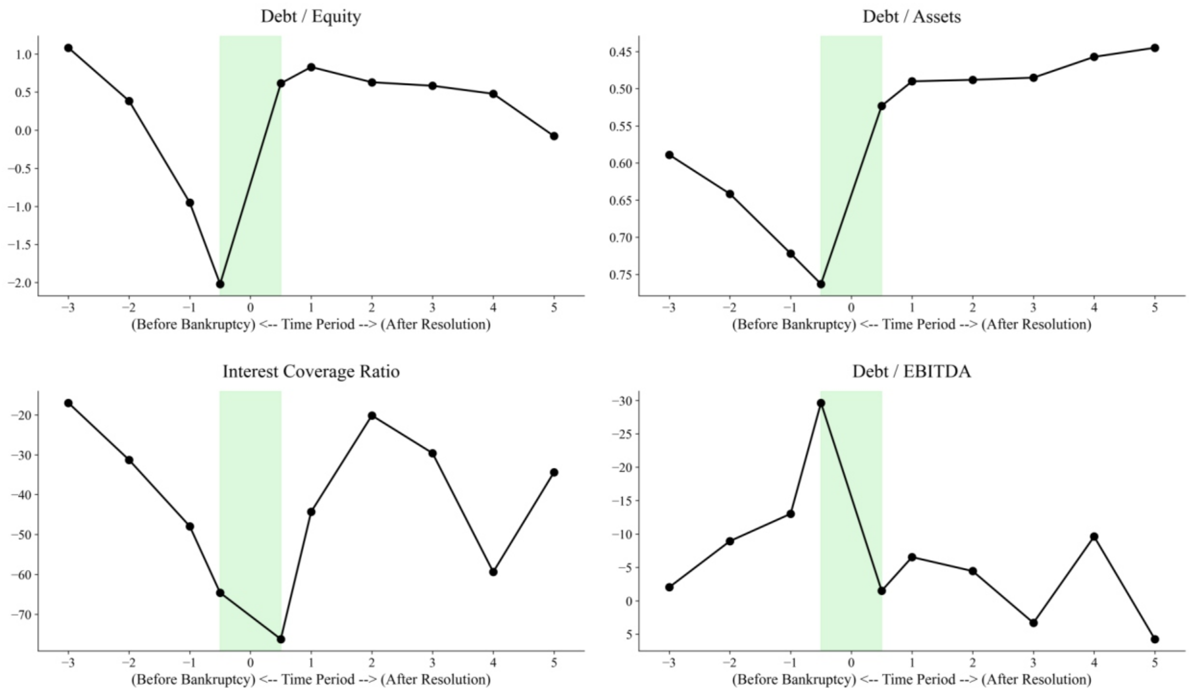
Figure 2.8: Leverage ratios



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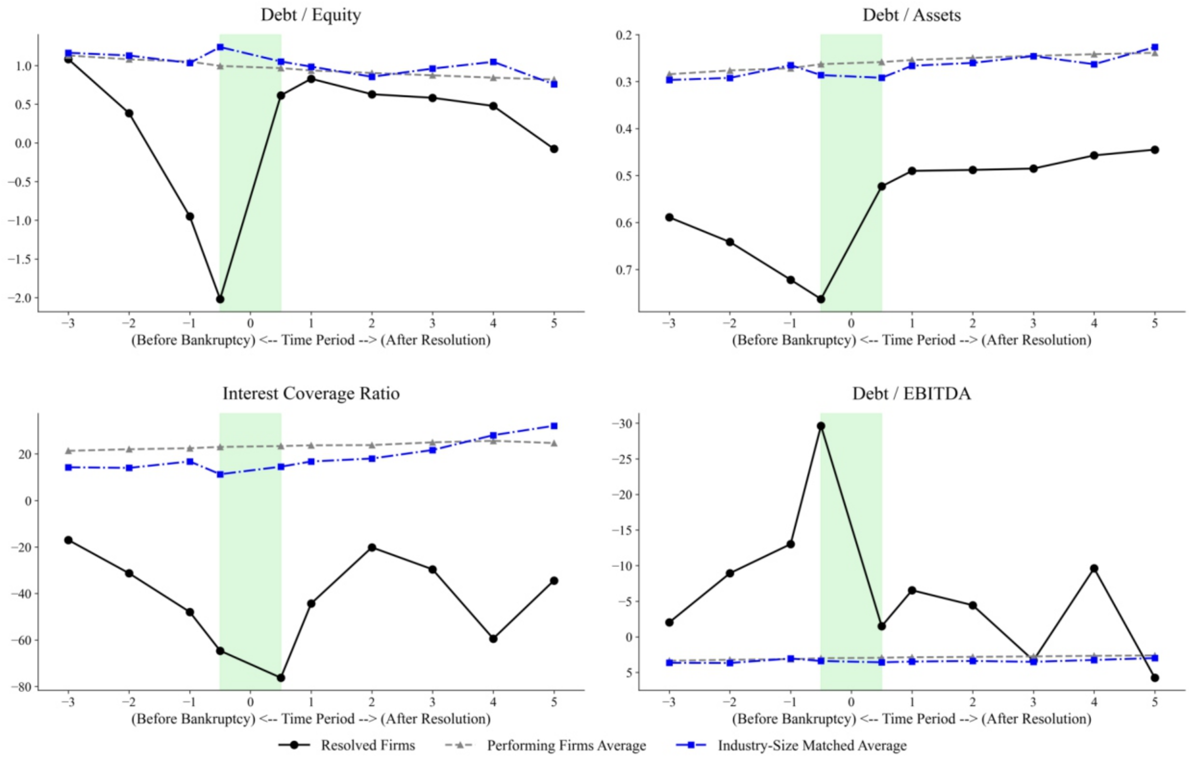
Note that the axis of some plots has been inverted for better representation.

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 Debt to Equity or the Debt to EBITDA ratio.

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 2.9: Leverage ratios with industry and size comparison



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

Figure 2.10: Activity ratios

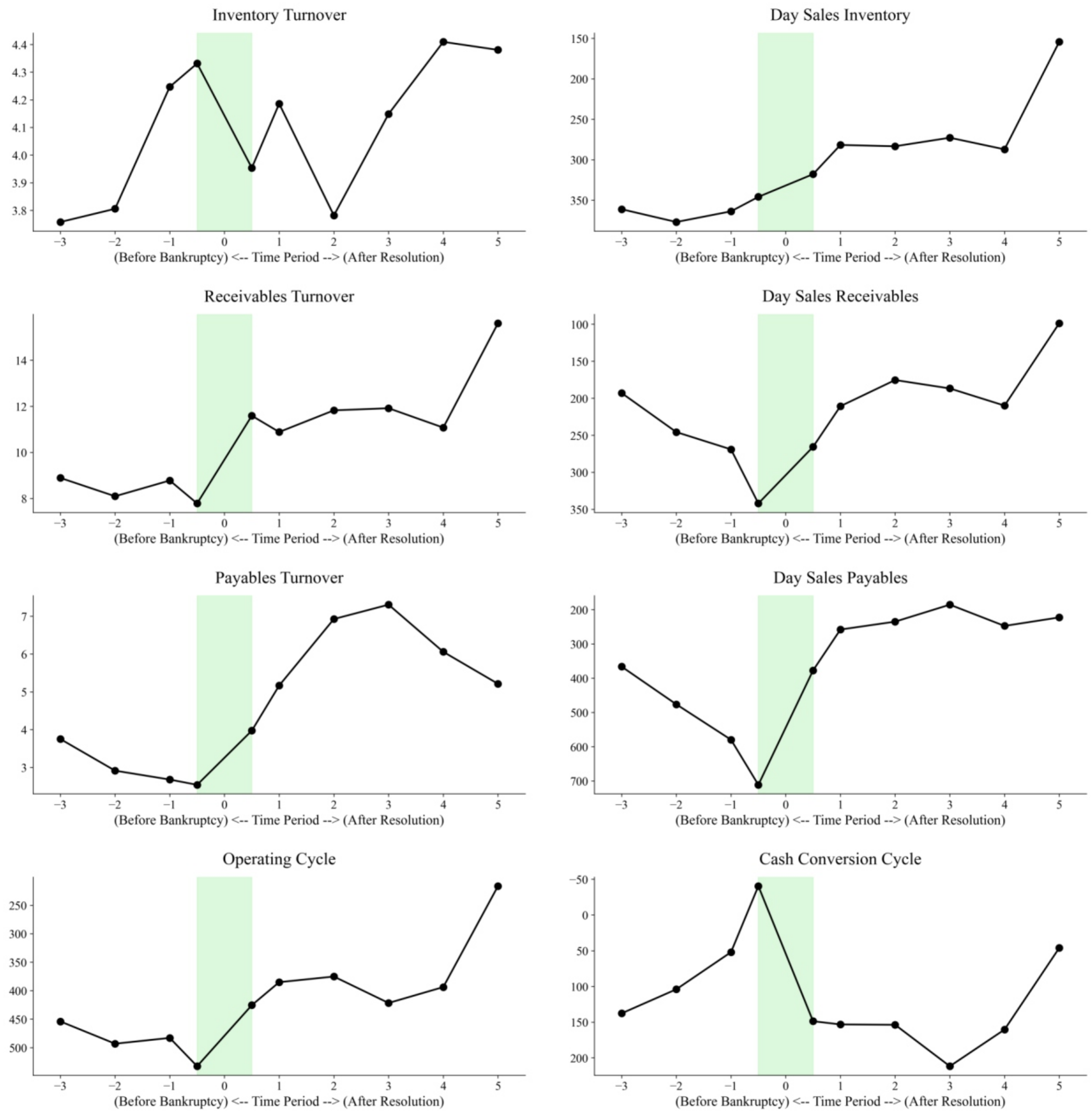

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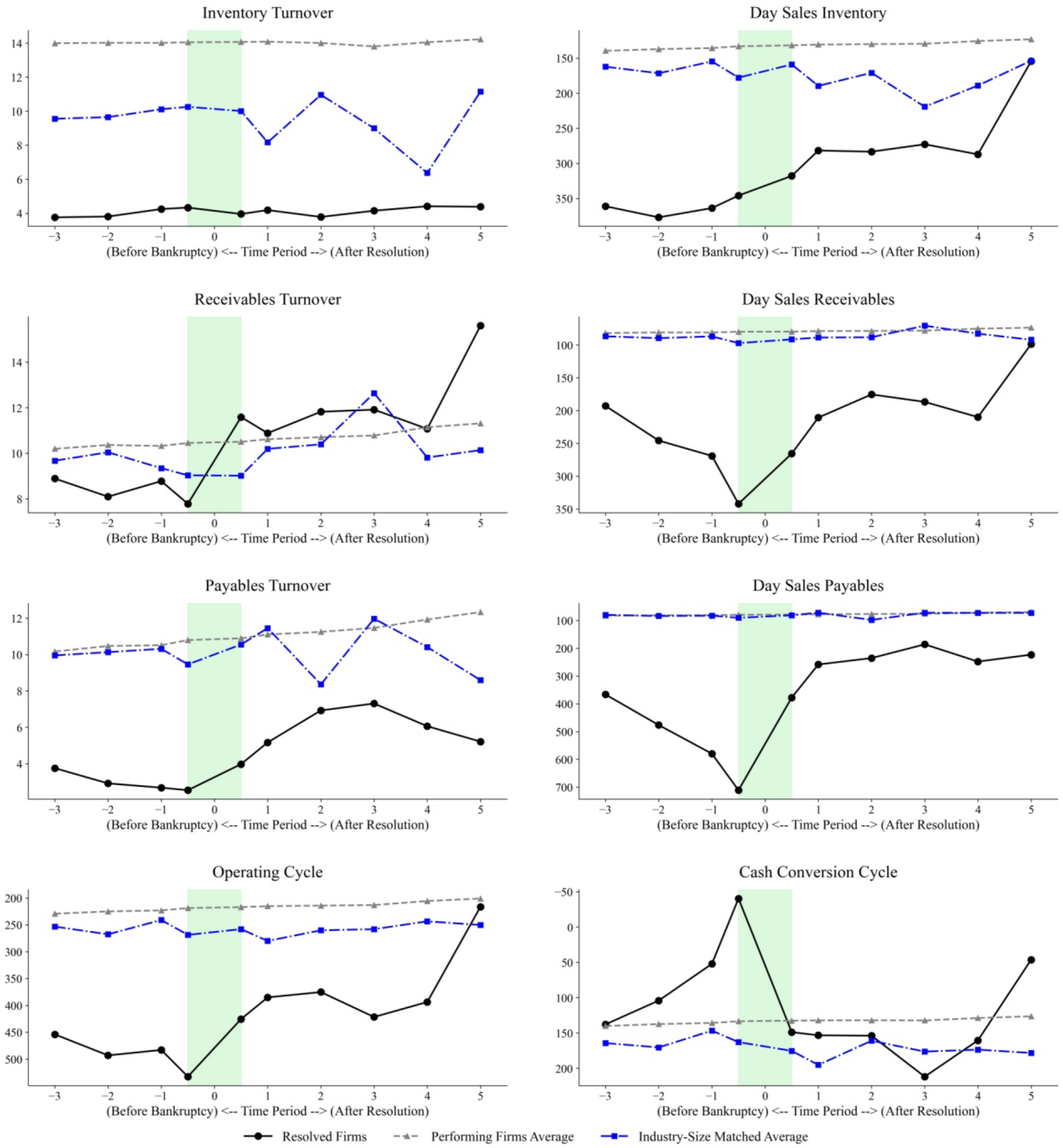
Figure 2.11: Activity ratios with industry and size comparison

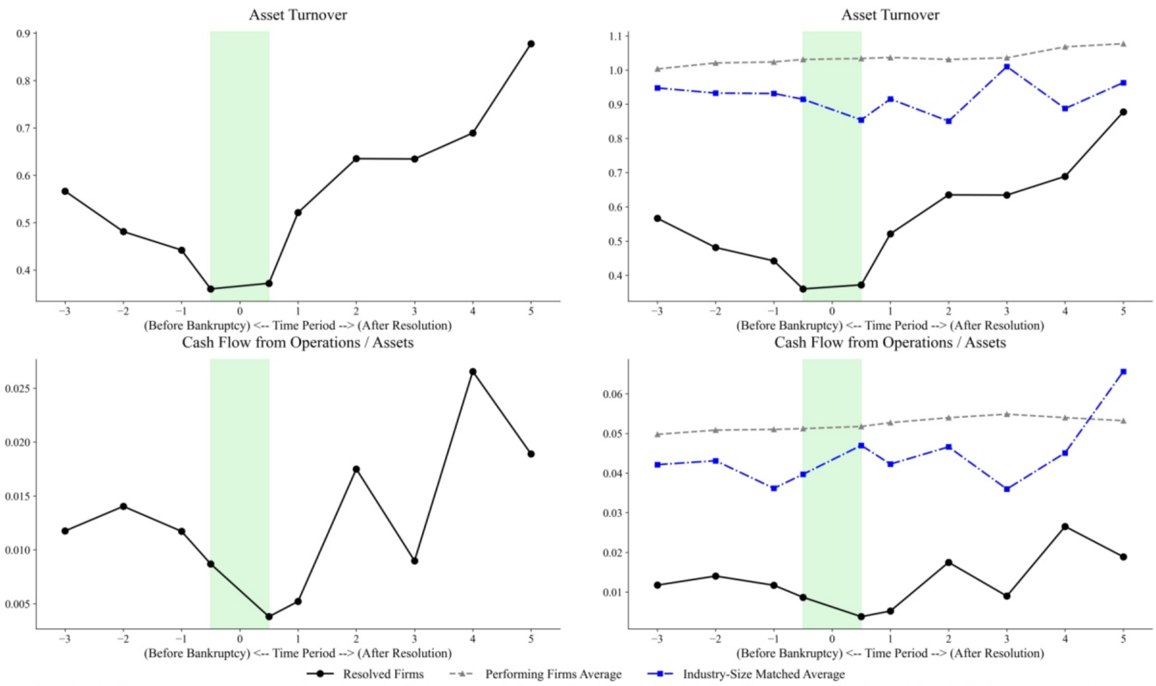


Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one in 2019 will be equated in the same event year. Also, t = -0.5 refers 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 2.12 shows the univariate trends of Turnover Ratios, covering Asset 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 0.37 in the year of resolution to 0.87 in T+5, an increase of about 131% in the five years post-resolution.

While higher Asset turnover indicates the firms are generating more revenue, the trends further reveal that profitability has risen; this growth is supported by realized cash flows and increased accruals, confirming that the financial health of these firms has significantly improved. Similarly, the 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



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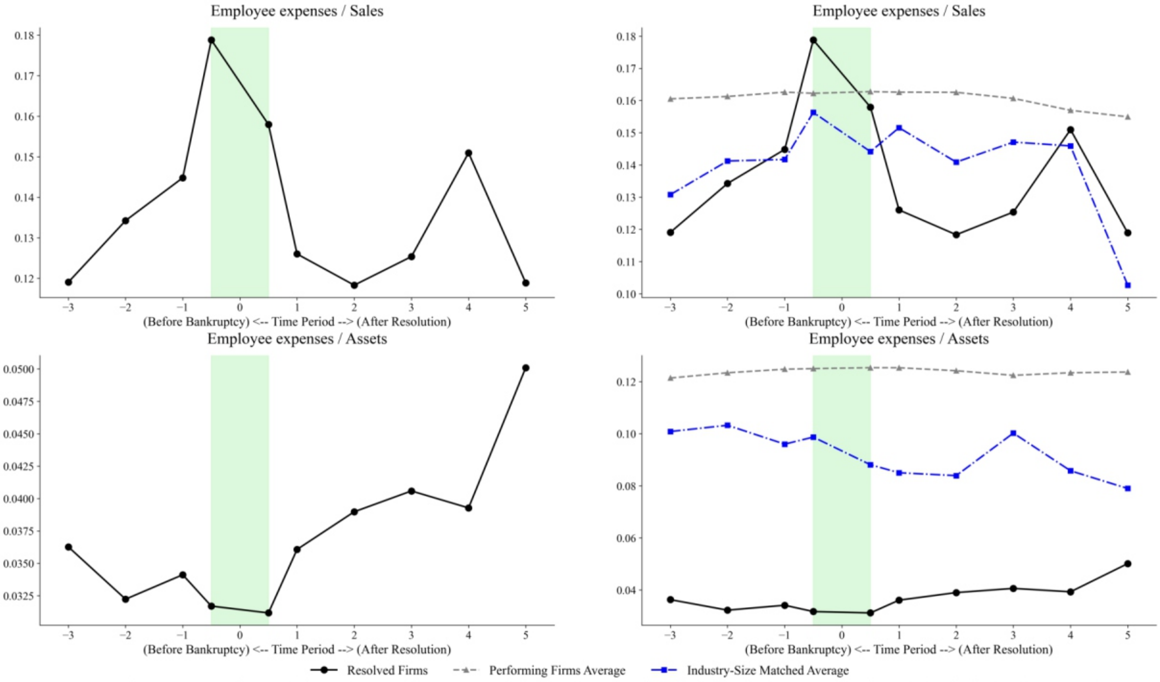
For instance, firms may take less than two years to resolve or more than two years to resolve.

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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For instance, firms may take less than two years to resolve or more than two years to resolve.

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 (-0.12). However, in the post-resolution period, the wedge between the resolved firms and the performing firms decreased by around 5 percentage points. Similarly, we find that all the profitability ratios except Gross Margin 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, with the exception of Interest Coverage ratio, we find statistically significant variation in the post-resolution period for the resolved firms. Looking at the Current Assets to Current Liabilities ratio, there is a positive and significant effect (0.74), suggesting an improvement in liquidity post resolution.

Table 2.1: Profitability - Regression Results

	PAT/Assets	Net Margin	EBITDA/Assets	Gross Margin	ROCE
Resolved_firms	-0.127***	-0.861***	-0.115***	0.206***	-0.126***
	(0.003)	(0.043)	(0.002)	(0.013)	(0.003)
Resolved_firms × Post_resolution_period	0.050***	0.347***	0.030***	-0.029	0.029***
	(0.005)	(0.068)	(0.004)	(0.020)	(0.004)
Observations	56132	56132	56132	56132	49741
R-squared Adj.	0.185	0.214	0.135	0.189	0.148
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

Note:$\hat{*}p<0.1$; $\hat{*}*p<0.05$; $\hat{*}**p<0.01$. *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 period 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	-0.613***	-1.188***	0.355***	-57.434***	-13.769***
	(0.066)	(0.160)	(0.016)	(3.838)	(2.022)
Resolved_firms × Post_resolution_period	0.741***	0.798***	-0.128***	2.184	6.288*
	(0.151)	(0.291)	(0.026)	(7.728)	(3.646)
Observations	55893	52417	52419	51549	52396
R-squared Adj.	0.067	0.041	0.158	0.083	0.022
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

Note:$\hat{*}p<0.1$; $\hat{*}*p<0.05$; $\hat{*}**p<0.01$. *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 period 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))	CAPEX (Cash flow from Ops/Assets)
Resolved_firms	0.024***	-0.056***	-0.237***	-0.029***
	(0.006)	(0.002)	(0.014)	(0.001)
Resolved_firms × Post_resolution_period	-0.013	0.006**	0.034***	-0.002
	(0.009)	(0.003)	(0.013)	(0.003)
Observations	55784	55784	44271	50343
R-squared Adj.	0.369	0.284	0.110	0.091
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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	224.847***	161.233***	398.409***	258.023***	-41.107***
	(21.219)	(11.147)	(23.570)	(19.333)	(13.629)
Resolved_firms × Post_resolution_period	-67.072**	-52.134***	-233.478***	-76.401***	72.307***
	(28.093)	(19.909)	(31.090)	(29.148)	(20.029)
Observations	47082	54724	54116	46514	46107
R-squared Adj.	0.197	0.139	0.199	0.199	0.166
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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 find a statistically significant change in the employee expenses of the resolved firms (see column (2)). Additionally, we observe an increase in capital expenditure for resolved firms during the post-resolution period (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 52 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.

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 liquidity metrics in the regression analysis. However, we do not see much statistically significant improvement in the employment 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	-0.114***	-0.913***	-0.096***	0.259***	-0.109***
	(0.004)	(0.053)	(0.003)	(0.017)	(0.004)
Resolved_firms × Post_resolution_period	0.048***	0.391***	0.029***	-0.044*	0.031***
	(0.006)	(0.079)	(0.005)	(0.023)	(0.005)
Observations	5477	5477	5477	5477	5051
R-squared Adj.	0.314	0.156	0.325	0.156	0.338
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

Note:$\hat{*}p<0.1$; $\hat{*}*p<0.05$; $\hat{*}**p<0.01$. *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 period 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	-0.886***	-1.061***	0.352***	-56.088***	-13.777***
	(0.111)	(0.211)	(0.020)	(4.534)	(2.757)
Resolved_firms × Post_resolution_period	0.796***	0.765**	-0.152***	14.951*	7.378*
	(0.177)	(0.332)	(0.029)	(8.671)	(4.437)
Observations	5462	5228	5230	4921	5228
R-squared Adj.	0.072	0.026	0.212	0.094	0.010
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

Note:$\hat{*}p<0.1$; $\hat{*}*p<0.05$; $\hat{*}**p<0.01$. *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 period 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	0.005	-0.056***	-0.352***	-0.036***
	(0.009)	(0.004)	(0.041)	(0.002)
Resolved_firms × Post_resolution_period	-0.015	0.007**	0.017	0.001
	(0.011)	(0.004)	(0.028)	(0.003)
Observations	5447	5447	4530	5115
R-squared Adj.	0.142	0.263	0.140	0.112
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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	235.606***	161.217***	434.351***	230.549***	-78.237***
	(30.474)	(14.747)	(31.078)	(26.920)	(20.623)
Resolved_firms × Post_resolution_period	-76.659**	-67.157***	-259.025***	-91.190***	68.269***
	(32.796)	(22.985)	(32.985)	(33.558)	(23.326)
Observations	4374	5156	4814	4244	4191
R-squared Adj.	0.126	0.112	0.171	0.144	0.088
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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.

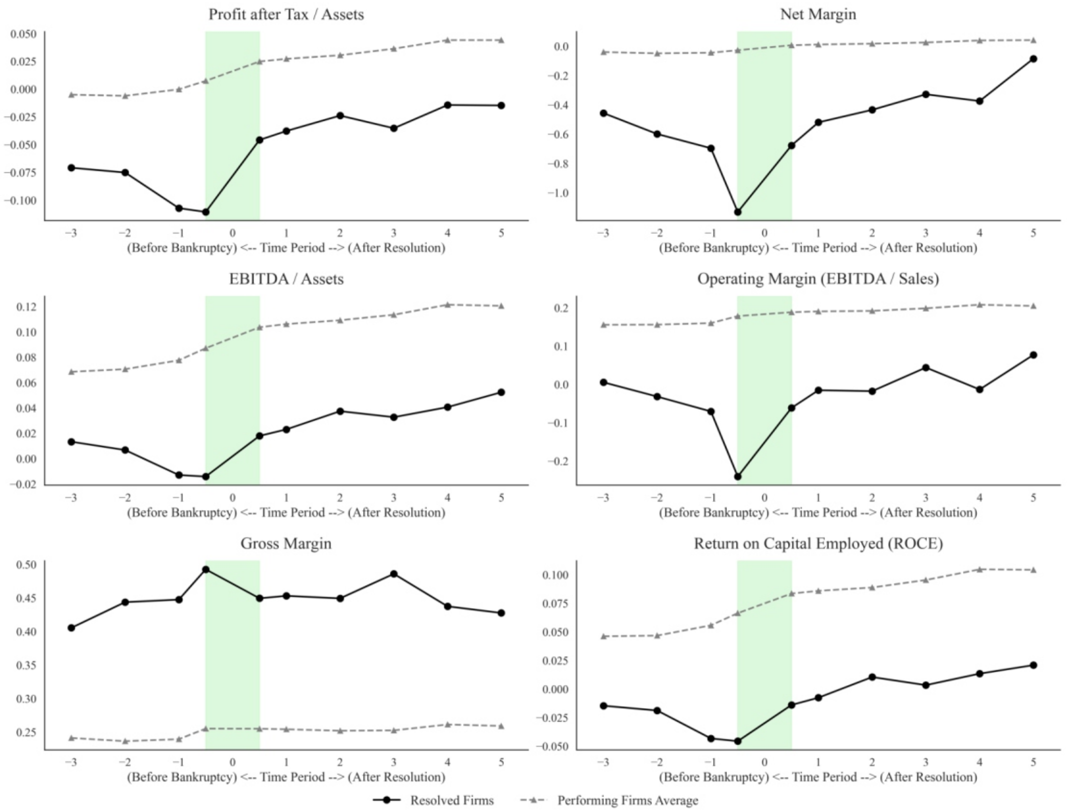
In this analysis, we match the treated firms (resolved firms) with control firms using a propensity score matching (PSM) algorithm. The PSM matching relies on a nearest neighbour matching method without replacing the matched firms. The matching process was done using the logit model that has an outcome 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.

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	0.01	0.055
Debt/Assets	0.604	0.535
Cashflow from Operations/ Assets	0.010	0.025
Working Capital/Assets	0.147	0.000
Log(Assets)	20.999	21.680

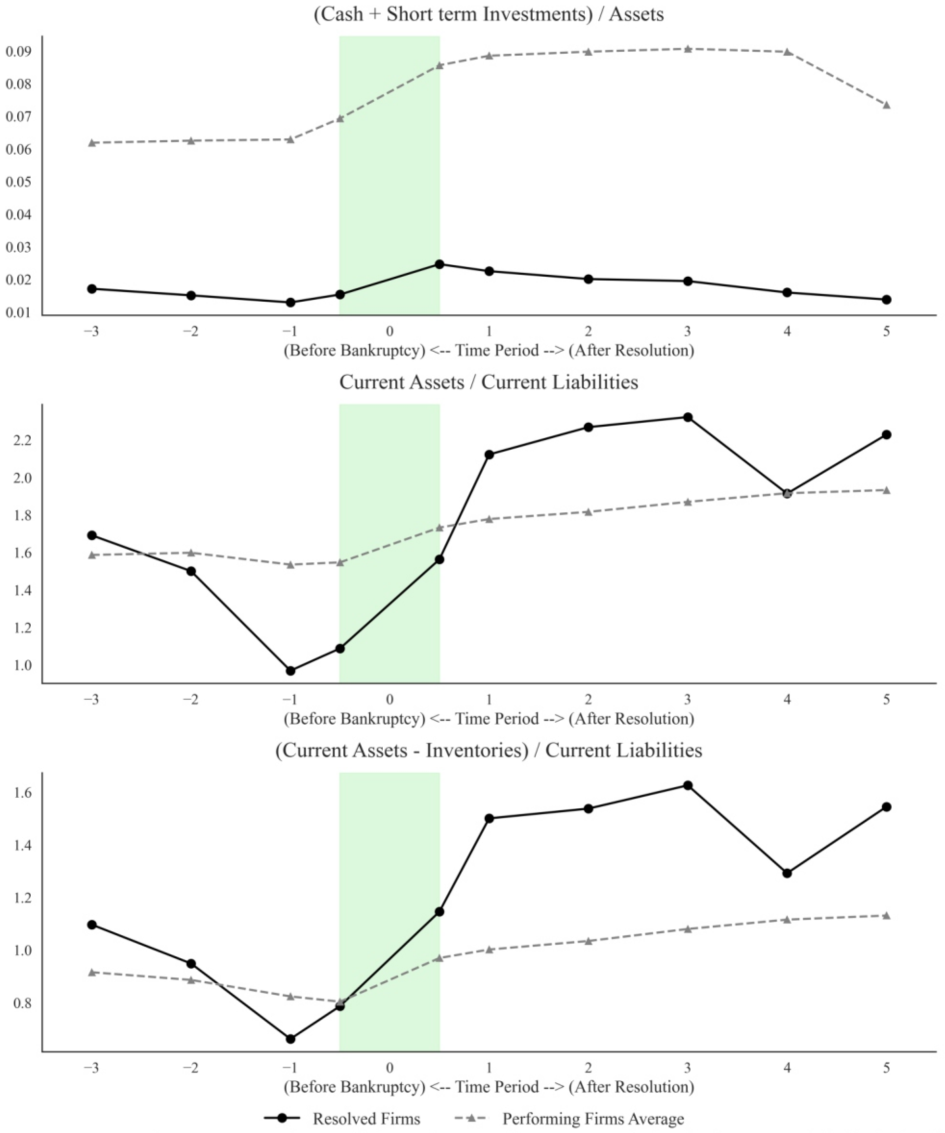
Based on the matched sample, we carry out the event window analysis, as shown in the earlier sections. The results are shown in Figure 2.14 to Figure 2.19. We find

Figure 2.14: Profitability - PSM analysis



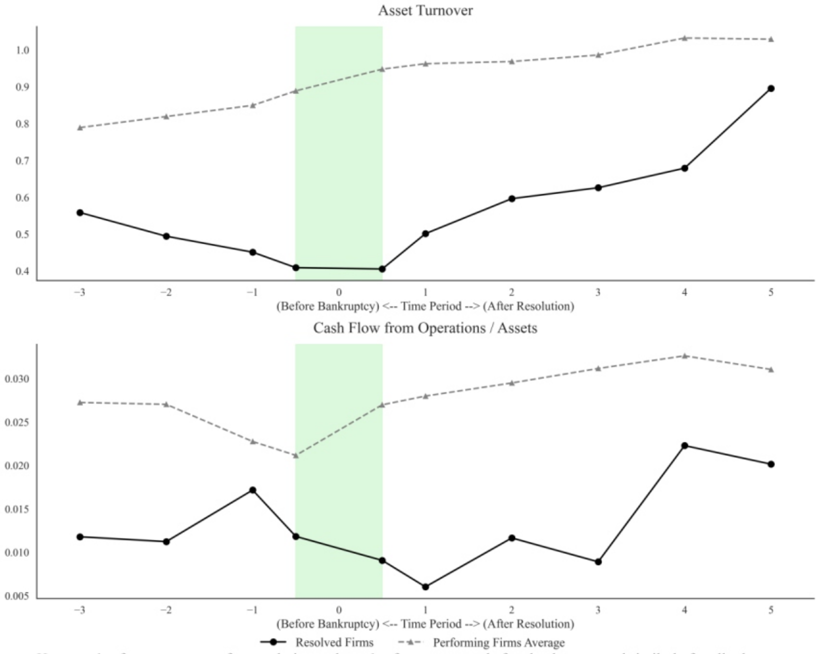
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one in 2019 will be equated in the same event year. Also, t = -0.5 refers 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.

Figure 2.15: Liquidity - PSM analysis



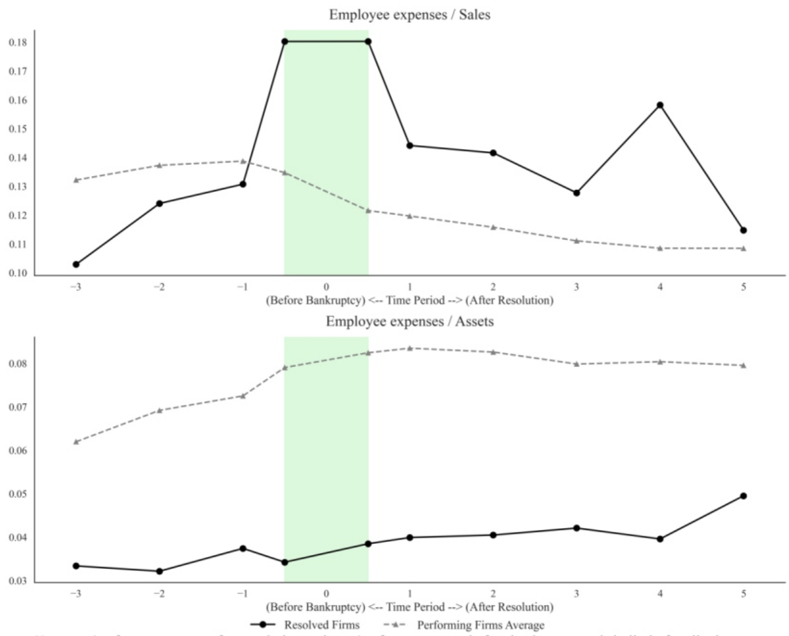
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one in 2019 will be equated in the same event year. Also, t = -0.5 refers 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.

Figure 2.16: Turnover - PSM analysis



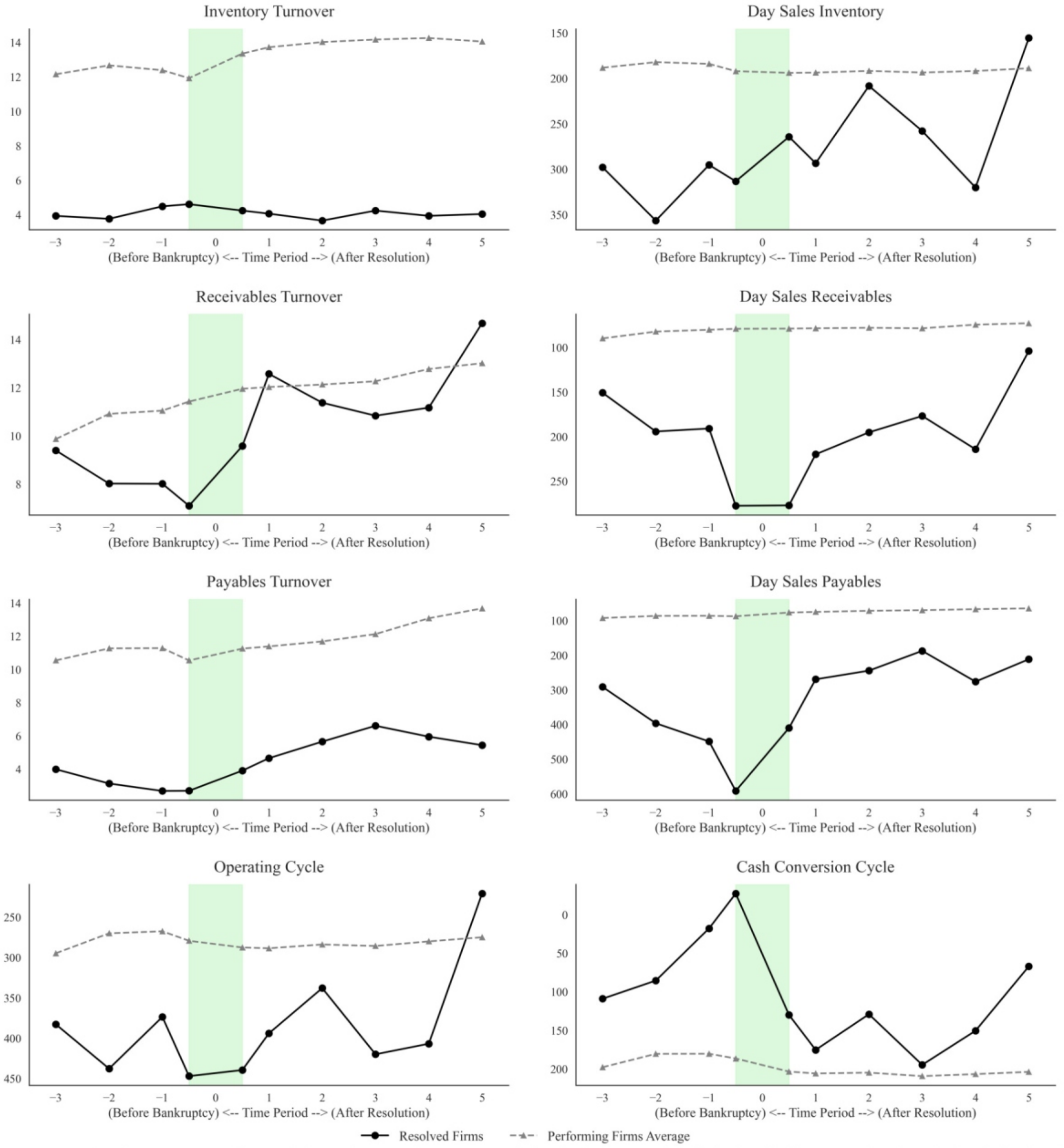
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one in 2019 will be equated in the same event year. Also, t = -0.5 refers 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.

Figure 2.17: Labour expenses - PSM analysis



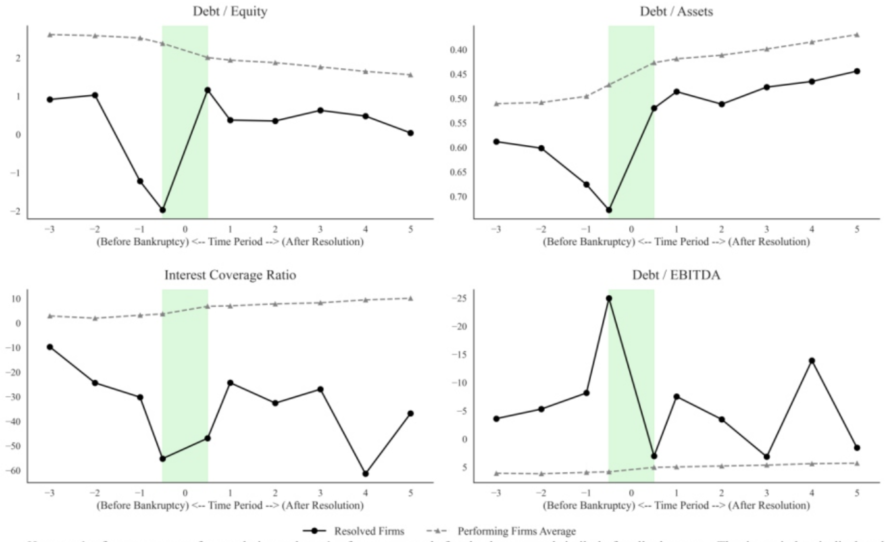
Here, t = 1 refers to one year after resolution and t = -1 refer to one year before bankruptcy and similarly for all other years. The time window is displayed on event time rather than calendar time. So, a firm resolved in 2018 and one in 2019 will be equated in the same event year. Also, t = -0.5 refers 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.

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 in 2019 will be equated 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 in 2019 will be equated 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.

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 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 two out of five profitability indicators in the post-resolution period and have reduced the divergence between these two cohorts (see Table 2.10). When we compare the performance of the liquidity ratios in Table 2.11, we find that the resolved firms have improved their current ratio in the post-resolution period (see column (1)). However, we do not see much statistically significant difference in other metrics in the post-resolution period. 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	-0.080***	-0.626***	-0.078***	0.232***	-0.083***
	(0.006)	(0.069)	(0.006)	(0.026)	(0.006)
Resolved_firms × Post_resolution_period	0.020**	0.261***	0.003	0.008	0.003
	(0.008)	(0.098)	(0.007)	(0.029)	(0.008)
Observations	2420	2420	2420	2420	2336
R-squared Adj.	0.249	0.119	0.304	0.204	0.305
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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	-0.031	-2.285***	0.122***	-33.009***	-11.196***
	(0.152)	(0.319)	(0.028)	(5.343)	(3.050)
Resolved_firms × Post_resolution_period	0.560***	0.670	-0.064*	0.324	3.073
	(0.212)	(0.472)	(0.036)	(10.933)	(5.042)
Observations	2420	2414	2416	2302	2416
R-squared Adj.	0.059	0.074	0.067	0.044	0.007
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

*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 period 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	0.029**	-0.032***	-0.436***	-0.010***
	(0.013)	(0.007)	(0.099)	(0.003)
Resolved_firms × Post_resolution_period	0.007	0.001	0.119*	-0.005
	(0.015)	(0.006)	(0.071)	(0.005)
Observations	2411	2411	2168	2347
R-squared Adj.	0.189	0.261	0.239	0.048
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year

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 period 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	151.159***	129.475***	336.430***	159.223***	-105.706***
	(36.553)	(18.452)	(35.367)	(34.947)	(28.351)
Resolved_firms × Post_resolution_period	-14.620	-38.900	-152.255***	-23.911	71.544**
	(36.752)	(27.464)	(38.855)	(37.961)	(29.751)
Observations	2048	2303	2187	1978	1964
R-squared Adj.	0.146	0.100	0.157	0.146	0.186
Fixed effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Year

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 period 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.

Towards this, we 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.

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. We find that the average recovery rate is about 37.5%, of which the financial creditors have an average recovery of about 43% and the operational creditors at 25%. Furthermore, after accounting for the time value, the adjusted recovery rates are about 38% and 23%, respectively, for financial and operational creditors. Overall, these results mark an improvement over the recovery rates observed in the 2023 report.

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	43.001	38.795	32.903	29.148	37.019
Operational Creditors	25.435	23.292	21.368	19.564	14.200
Combined	37.480	33.790	31.857	28.091	35.155

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 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 Mining and Quarrying. 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.

Figure 2.20: Recovery rate by industry - overall

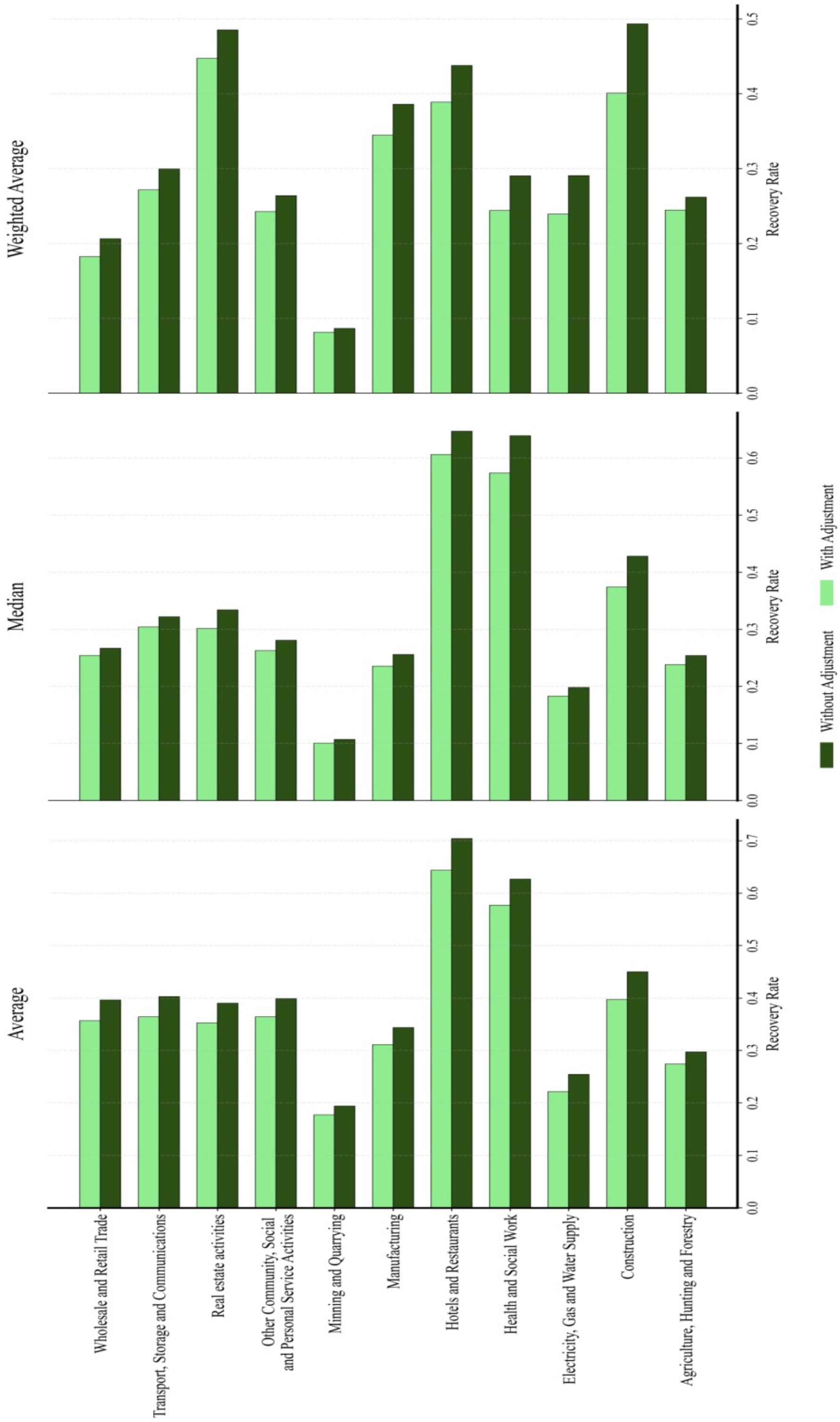
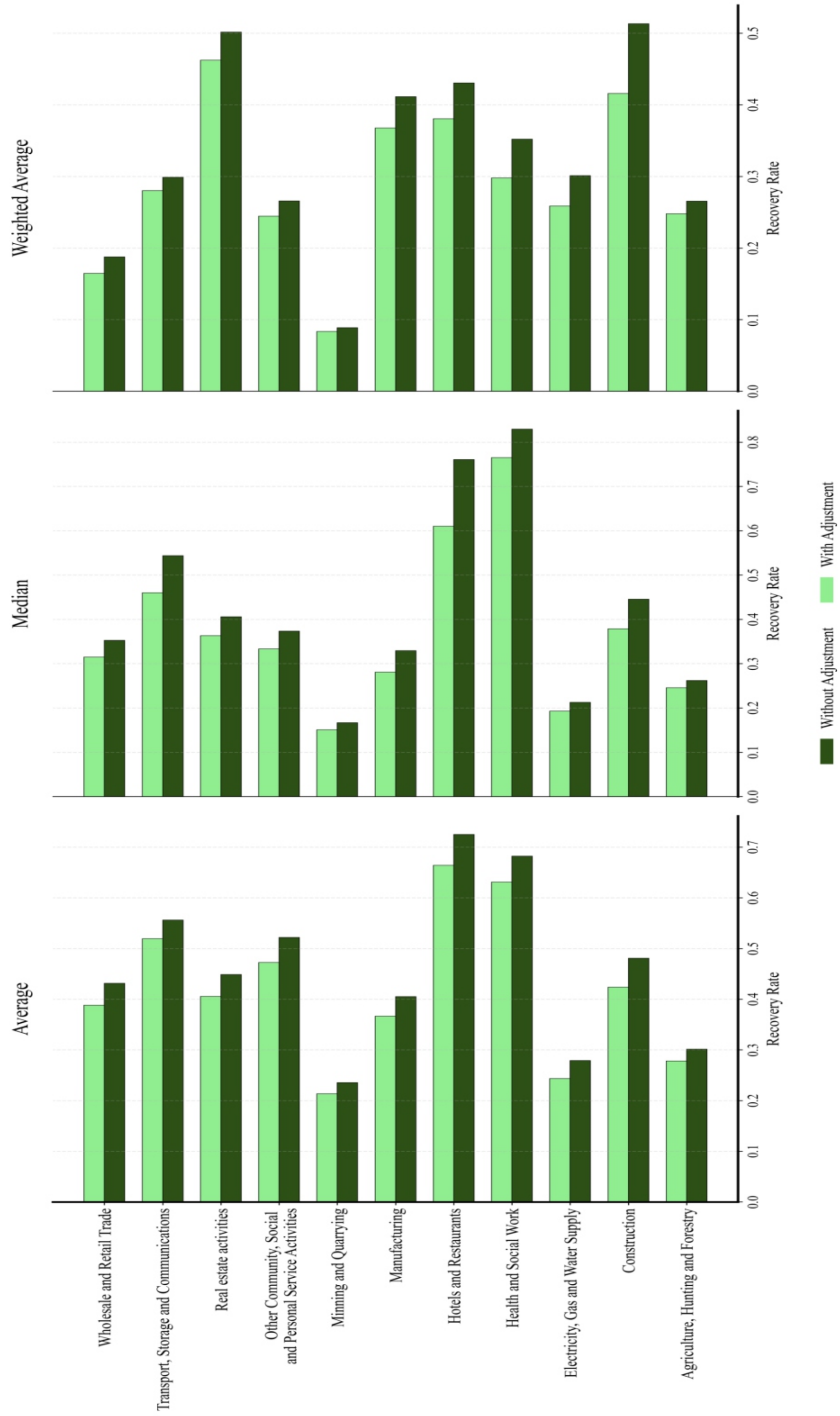


Figure 2.21: Recovery rate by industry (financial creditors)



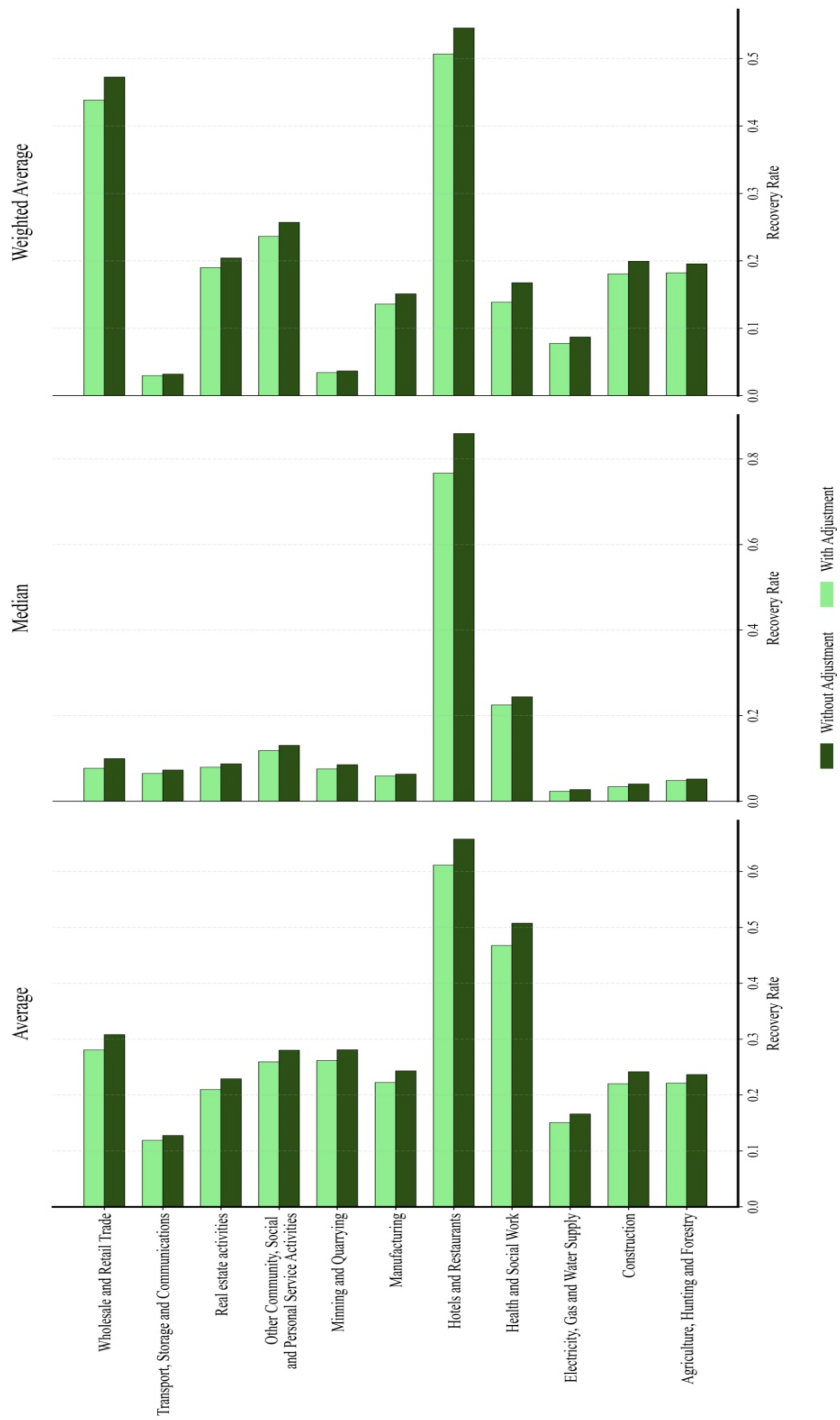


Figure 2.22: Recovery rate by industry (operational creditors)

2.1.7 Resolution expense analysis

An analysis of the expenses incurred during the resolution process is shown in Figure 2.23. The results suggest that while the recovery rates of firms in the Wholesale and Retail Trade industry are low (approximately 21% compared to the overall weighted average of 31.8%), the expense ratio is the highest, with the average expenses reaching approximately 47% of the realizable amount. 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

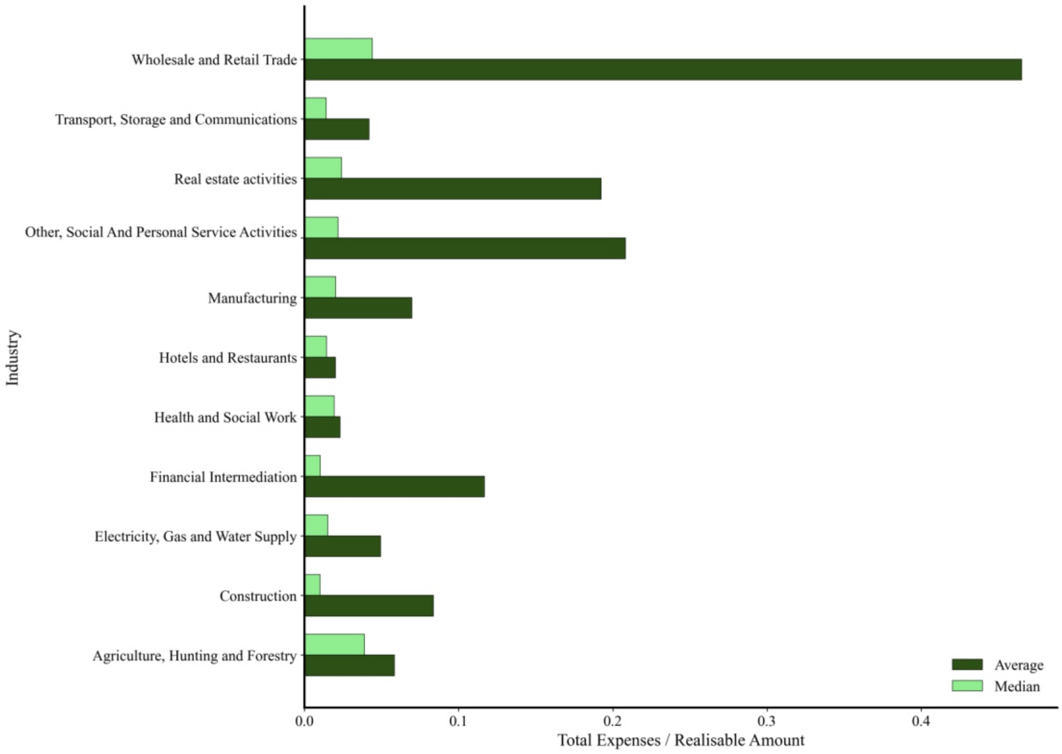
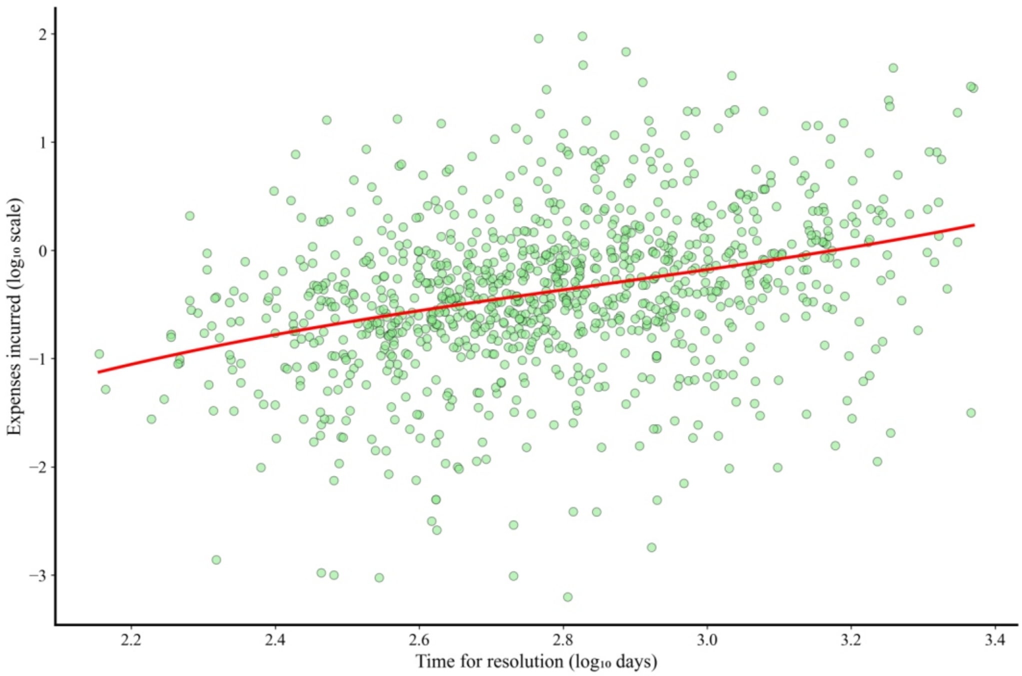


Figure 2.24: Resolution costs vs. time to resolve



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. We have conducted an empirical analysis to estimate the impact of the changes to the resolution process in the post-IBC period. The empirical analysis is based on the financial performance data of the resolved firms and comparable performing firms.

The key findings of our study are as follows. In the five years following resolution, average sales have witnessed a significant growth of approximately 89%, accompanied by a return to operational profitability with margins stabilizing around 8% by the fifth year. Furthermore, the firms have increased their capital expenditure by roughly 106%, indicating a strong buildup of tangible assets and management confidence in future growth. Additionally, the liquidity crunch that characterized the pre-insolvency period has been resolved, with the current assets to current liability ratio more than doubling from 1.01 in the year of bankruptcy to 2.09 in the post-resolution phase.

The market has also reacted positively to the improved performance, evidenced by a significant rerating of listed resolved firms. The aggregate market capitalization of these entities has increased three-fold, rising from INR 2.8 lakh crore to nearly INR 9 lakh crore, reflecting improved investor confidence. We also find that there is a 71.91% increase in average employee expenses, signaling higher employment intensity and a recovery in jobs within these listed firms.

Crucially, the study finds that resolved firms are not just improving in isolation but are converging with the performance metrics of healthy, industry-matched peers. Across profitability, leverage, and activity ratios, the performance gap between resolved firms and performing firms has significantly narrowed. Additionally, the analysis of recovery rates shows considerable and sustained improvements.

In summary, the detailed empirical analysis suggests that the resolved firms have demonstrated significant improvements across all critical financial metrics — profitability, liquidity, leverage, and operational efficiency. The improvements in the metrics from the distress period to levels comparable with healthy peers in the post-resolution period indicate that these firms are now actively contributing to value addition and the overall economic activity.