APPLICABILITY OF FULMER AND SPRINGATE MODELS FOR PREDICTING FINANCIAL DISTRESS OF FIRMS IN THE FINANCE SECTOR – AN EMPIRICAL ANALYSIS

Dr. R. Arasu
Professor & Head
Dept. of Management Studies
Velammal Engineering College
Chennai, India

Dr. C. D. Balaji
Professor, Dept. of Management Studies
Panimalar Engineering College
Chennai, India

Dr. S. Praveen Kumar
Associate Professor, Dept. of Management Studies
Panimalar Engineering College
Chennai, India

N. Thamizhselvi
Assistant Professor
JNN Institute of Engineering
Chennai, India

ABSTRACT

Though use of financial distress models to predict financial failure has been a subject matter of interest, the global financial crisis accentuated the need for such studies. The objective of this study is to assess the solvency of specific home and infrastructure finance companies in the Indian NBFC sector and comment on whether Fulmer and Springate models are useful for predicting solvency of financial firms. The researcher concludes that the two models can be applied to predict solvency of financial firms though they have been developed keeping manufacturing firms in mind.

Keywords: NBFC, Financial Health, Financial Distress, Fulmer & Springate Model

Introduction

The global financial crisis has led to failure of many banking and financial enterprises across the world. Though use of financial distress models to predict financial failure has been a subject of interest, the crisis has accentuated the need for such studies. Though significant failures have not been reported in the Indian financial system, the slowing down of growth and rising incidence of NPA’s in the financial sector may lead to problems in the future. Hence, this study involves a critical investigation using Fulmer H-Score (US - 1984) and Springate Z-score (Canadian - 1978) models in predicting solvency of Non-Banking Financial Institutions in India.

The objective of the study is to use the Fulmer and Springate models in determining practical predictive ability of failure in selected non-banking financial institutions and to comment on the models’ applicability for financial institutions.

1.1 Problem identified and need for the study

The Indian GDP growth rate has slowed down from the 9 percent plus growth achieved in the period before the onset of the global financial crisis. The fall in IIP, capital goods spending, demand deceleration are pointers to this trend. The rise in corporate debt restructuring cases and the rise in NPA’s indicate that the financial sector in India is facing a severe test. This scenario might lead to financial distress among banks and non banking finance entities. Since the regulatory framework of NBFC’s has been made more stringent in the aftermath of the crisis, many of them have been facing problems in raising funds as well as in their deployment. Therefore it becomes imperative to test the financial health of NBFC’s so that they can take steps to prevent distress and it would also serve as a guide to investors in their decision making.

1.1.1 Objective of the Study

The objective of this research study is to assess the solvency of specific home finance and infrastructure finance companies in non-banking financial sector in India and to comment on whether these two models are useful for predicting solvency of financial firms.
1.1.2 Review of Literature

Zavgren (1985) stated that Beaver (1966) pioneered empirical research in business failure prediction using a univariate model which achieved a moderate level of predictive accuracy. McKee & Lensberg (2002) stated that solvency prediction has been a major research topic in accounting and finance ever since Altman’s study in 1968 and it has been studied extensively by many researchers such as Altman (1983), Edmister (1972), Jones (1987), Dugan & Zavgren (1988). Pacey & Pham (1990) referring to Altman (1983) stated that the survey of business failure models, which covers ten countries, identified that corporate failure can be predicted with a high degree of accuracy ranging from 70% to 95%.

According to Timmons & Spinelli (2004) the benefit of being able to predict crisis is that owners, employees, and significant outsiders, could see trouble brewing in time to take corrective actions. Sung et al. (1999) opined that as corporate insolvency brings with economic losses to all stakeholders and the nation, accurate prediction of solvency is an important issue in finance.

According to Bruno & Leidecker (2001) no two experts agree on a definition of failure. According to Doukas (1986) Springate modified Altman’s MDA formula for Canadian use. Subsequently testing showed that this formula was accurate 88% of the time. The model was developed in 1978 by Gordon L.V. Springate, following procedures developed by Altman in the US, using a step-wise multiple discriminate analysis to select four out of 19 financial ratios that best distinguished between sound business and those that actually failed. Springate.

Botheras (1979) tested the Springate Model on 50 companies with an average asset size of $2.5 million and found an 88.0% accuracy rate. Sands (1980) tested the Springate Model on 24 companies with an average asset size of $63.4 million and found an accuracy rate of 83%. Boritz et al. discussed that there may be some problems working with Canadian data as the Altman model was developed using US data. The Fulmer’s model considers more indicators than other methods and, hence, more reliable. According to Bruno & Leidecker (1988) research indicates that business failure results from definable causes and an understanding of causes can help prevent failure.

1.2 Research Methodology

This study involves analysis of data and interpretation without any subjective action and hence Descriptive Research was applied. The models used in this study require financial data from published annual reports for computation of scores and hence secondary data was used.

1.2.1 Springate Model
The Springate model takes the following form:

\[ Z = 1.03X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4 \]

Failed \( Z < 0.862 \)  \( (1) \)

\( X_1 = \) Working Capital / Total Assets
\( X_2 = \) Net Income before Interest and Taxes (EBIT) / Total Assets
\( X_3 = \) Net Income before Taxes (EBIT) / Current liabilities
\( X_4 = \) Sales / Total Assets

1.2.2 Fulmer Model
The Fulmer model takes the following form:

\[ H = 5.528v_1 + 0.212v_2 + 0.073v_3 + 1.270v_4 - 0.120v_5 + 2.335v_6 + 0.575v_7 + 1.083v_8 + 0.894v_9 - 6.075 \]

Failed \( H < 0 \)  \( (2) \)

\( v_1 = \) Retained Earnings / Total Assets
\( v_2 = \) Sales / Total Assets
\( v_3 = \) Net Income before Taxes (EBIT) / Equity
\( v_4 = \) Cash Flow / Total Debt
\( v_5 = \) Debt / Total Assets
\( v_6 = \) Current liabilities / Total Assets
\( v_7 = \) Log Tangible Total Assets
\( v_8 = \) Working Capital / Total Debt
\( v_9 = \) Log EBIT / Interest

2. Data Analysis and Interpretation

2.1 Home Finance Companies

<table>
<thead>
<tr>
<th>TABLE 1 Z Scores for Home Finance Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Z Score</strong></td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>CFHL</td>
</tr>
<tr>
<td>DHFL</td>
</tr>
<tr>
<td>GRUH</td>
</tr>
<tr>
<td>IDBIHFL</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2 H Scores – Home Finance Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H Score</strong></td>
</tr>
<tr>
<td>------------</td>
</tr>
</tbody>
</table>
The Z Score for GRUH in 2007-08 was below the minimum score of 0.862. The H score also was low compared to other years because of the high current liabilities. H Score for IDBI HFL in 2007-08 and 2010-11 were less than the minimum score of 0 indicating poor performance. This is because working capital and cash flow dipped for those two years. As Cash Flow was not an independent variable required in Springate, the Z Scores did not report this problem.

From Table 3, it is evident that SBIHF has not been performing well, and its Z and H Scores are way below the minimum score value of 0.862 and 0. The reasons are:

a) Working capital for all the years were on the negative side
b) Constant interest charges
c) Profit before taxes and retained earnings were negative.

### 2.2 Infrastructure Finance Companies

<table>
<thead>
<tr>
<th>Z Score</th>
<th>2007-08</th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
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</thead>
<tbody>
<tr>
<td>IDFC</td>
<td>1.621</td>
<td>1.637</td>
<td>1.354</td>
<td>1.179</td>
<td>1.241</td>
</tr>
<tr>
<td>LTFL</td>
<td>0.570</td>
<td>0.591</td>
<td>0.516</td>
<td>0.630</td>
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</tr>
<tr>
<td>PFCL</td>
<td>2.129</td>
<td>1.738</td>
<td>1.151</td>
<td>1.313</td>
<td>1.051</td>
</tr>
<tr>
<td>REC</td>
<td>1.629</td>
<td>1.245</td>
<td>1.259</td>
<td>0.880</td>
<td>0.839</td>
</tr>
</tbody>
</table>
The Z Score of LTFL for all years except 2011-12 was below the minimum score of 0.862, the major reason being that Working Capital of LTFL has been negative all the years except 2011-12. Z Score of REC for the year 2011-12 was below the minimum score of 0.862. Working Capital of REC for the year 2012 was negative resulting in a low Z Score. H Score of all the companies for all years met the minimum requirement of 0 implying that no company in this segment is near insolvency.

### 2.3 Correlation – Z score and H score

Table 6 represents the correlation between Z and H Scores. The table indicates that Z and H scores are highly positively correlated. This indicates that using these models for predicting solvency would help conclude results much better.

### 1.3 Simple Regression – Springate Model Variables

Table 7 Simple Regression – Springate Model Variables
A simple regression with residuals calculation was carried out with all the independent variables of Springate model and table 3.3 shows that all independent variables contribute 34% for the Z Score at significance of less than 0.05.

Figure 1 – Histogram of Residuals – Springate Variables

Figure 2 – Normal Probability Plot – Springate Variables

1.4 Simple Regression – Fulmer Model Variables

<table>
<thead>
<tr>
<th>Model</th>
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<tr>
<td></td>
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### ANOVA

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<th>Sig. F</th>
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<td>Res</td>
<td>Reg</td>
<td>Res</td>
<td>F</td>
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<tr>
<td>11</td>
<td>112</td>
<td>7973.7</td>
<td>17784.2</td>
<td>724.89</td>
<td>158.7</td>
<td>4.5</td>
</tr>
</tbody>
</table>

#### Figure 3
Histogram of Residuals – Fulmer Variables

#### Figure 4
Normal Probability Plot – Fulmer Variables

A simple regression with residuals calculation with all the independent variables of Fulmer model in Table 6 shows that all independent variables contribute 31% for the H Score at significance less than 0.05. Figures 3 and 4 show the histogram of residuals and normal probability plot.

1. **Summary of Findings**
   A. **Findings from Home Finance Segment**
      - Financial soundness of SBI Home Finance is weak and both Springate and Fulmer Model scores indicate that. If the situation continues, it may get into a state of financial distress.
      - GRUH and IDBIHFL though had problems in few years, were able to recover and improve on the scoring
      - DHFL and IDBIHFL were able to consistently improve on the scoring over the five year period.
B. Findings from Infrastructure Finance Segment

- Z Scores of L & T Finance Limited over a period of 4 years has not been good because of negative working capital.
- The companies under this segment have been doing well and their scores are well within the limits of the models.
- SREI has been the true leader in this segment with high average scores.
- Other Findings
  - Both Springate and Fulmer models are able to demonstrate the actual status of solvency of the companies as seen in this study.
  - These two models would definitely help the investors and shareholders to find out strength of the companies and their solvency status.

4. Direction for Further Research

Other solvency prediction models such as ‘Artificial Neural Network’, ‘Taffler and Tisshaw’s’, ‘R-Model’ and ‘Voronov–Maximov model’ can be tried out for NBFCs in India and research can be extended to Asset Finance and Leasing Companies.

5. Conclusion

Based on the outcome of the study conducted, the researchers conclude that Fulmer and Springate model scores can be applied to predict solvency using recent period financial information. Fulmer and Springate models are very much useful for predicting solvency of financial firms though these models have been developed keeping manufacturing firms in mind. The practical applicability of these two models is still justifiable in the current Indian economic environment, as the calculations are based on the financial data available (financial data reporting standards have not changed much) and results of the study validate the same.

6. International and Managerial Implications

The Fulmer and Springate Model have been used predominantly to predict financial distress among manufacturing companies in the advanced economies. The models have not been widely used in India. This research paper has demonstrated that the two models can be used to predict financial distress in the Indian context and also their use need not be restricted to the manufacturing sector but can also be extended to the financial sector. In the current Indian scenario, though the banking sector in India has not suffered from the implications of the global economic and financial crisis to the extent that the banking system in the US and European economies have suffered, the fact remains that it has not been completed insulated.

The rise in NPA’s and piling up of cases for debt restructuring are evidences. The NBFC sector which had been reeling under the burden of the regulatory requirements imposed by the RBI is also feeling the heat of the slowdown in growth in terms of rise in non-performing loans. While the larger NBFC’s might be able to weather the downturn, the medium and smaller NBFC’s might face a question mark over their future. Therefore application of the financial distress models can help policy makers, investors and the NBFC’s themselves to gauge their capacity to survive their downturn. This would aid investors to make informed investment decisions and also provide key inputs to the government to introduce necessary policy interventions.

Internationally, the two models which were hitherto applied to manufacturing firms can be applied to financial sector also to assess the financial health of firms to enable the investors’ investment decisions, government’s policy and support measures and firms’ prudential operations.

References