



## An Approach to Predict Insolvency based on Financial Potential of Indian Textile Industry

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### Abstract

It is effective to establish an effective early warning system for prediction of financial distress for better corporate governance because the deterioration in profitability of listed companies not only threatens the interests of the firm and internal staff but also makes the investors face significant financial loss. The paper presents a study of bankruptcy prediction and application of KMV Merton Distance-to-Default Model and Logit Analysis approaches to predict the financial distress of top ten textile companies in India as per the market capitalization. The data collection is done through the published annual reports of selected companies from 2009 to 2018 to calculate the default distance, correlation and regression. The findings can be useful for managers, investors and creditors. Managers can get early warnings signals of performance deterioration in order to take corrective actions and reduce the financial distress risk. Investors can understand the main factors leading to financial distress which allows them to avoid investing in risky firms. Creditors can correctly evaluate the firm's financial situation and avoid capital loss and costs related to counterpart risk by being vigilant to signs of impending financial distress. This study also will attempt to find that the independent variables such as current ratio, net working capital to current assets ratio, current assets to total assets ratio, total debt to total assets ratio, sales to total assets ratio and EBIT to total assets ratio can be used to predict financial distress companies in the textile sector in India

**Key Words:** Indian Textile Industry, Financial Potential, Bankruptcy, KMV Merton Distance-to-Default Model, Logit Analysis

### Introduction

The Indian textile industry is one of the largest industries in India. It is second largest in terms of providing employment opportunities to more than 35 million people in the country. The industry is one of India's oldest industries and has a formidable presence in the national economy in as much as it contributes to about 14 percent of manufacturing value-addition and accounts for around one-third of India's gross export earnings. The industry is providing one of the most basic needs of people and it holds importance in maintaining sustained growth for improving the quality of life of people. The industry has a unique position as a self-reliant industry from the production of raw materials to the delivery of finished products. It involves substantial value-addition at each stage of processing. Such important sector in the economy can make the economy poor if there is no proper functioning. The fear of insolvency is on every sector. And the study is an attempt in finding the probability of insolvency for ten companies in textile industry. The term insolvency, failure and bankruptcy are usually used interchangeably. But all these terms have somewhat different meaning. Insolvency means inability to pay. It's a situation in which a

company or other legal bodies or individuals are not able to pay, settle the due payment obligations in terms of their maturity. From economic point of view the failure of the company represents a situation where the rate of return on invested capital is continuously decreasing. When there is failure of the company then from legal point of view it's termed as bankruptcy. Whenever a company is facing such issues of insolvency, failure or bankruptcy then from management's point it shows the deterioration in the effectiveness of the company. It can further jeopardize the long-term survival of the company in the market. Hence the insolvency prediction holds an important and significant position in the financial area of study. Insolvency forecasting can be used by investors, managers, shareholders, government, auditors, employees, suppliers and other entities to do a company risk analysis. It makes it possible to predict the financial condition in a way that can help avoid or reduce financial losses. The bankruptcy prediction models can be developed to provide an early signal of a significant bankruptcy risk and to indicate companies facing potential bankruptcy. The losses that financial distress give rise to would directly impact the cost of the company. There are various models and approaches that are framed by the researchers but the scientific literature does not present insolvency prediction models unanimously accepted by the researchers. The models used for the purpose of knowing in advance if a company incurs the risk of entering into insolvency proceedings by the researcher are KMV Merton Distance-to-Default Model and Logit Analysis. Both the methods have their strengths and weaknesses and choosing among them for an empirical application is not a simple task. The studies done on insolvency prediction models have mostly been supported by the use of historical data. KMV Merton Distance-to-Default Model was developed in 2001. The name of the model arrived from the initials of its developers Kealhofer, McQuown and Vasicek. The following parameters are considered for assessing the default probability of a firm:

1. The value of assets, i.e. the market's value of the firm's assets
2. The asset risk, i.e. uncertainty about the asset's value. It indicates the firm's business and industry risk
3. The leverage which denotes the extent of firm's contractual liabilities. The value of liabilities is computed relatively to the market value of assets

The default risk of the firm increases when the value of the assets drops and approaches the value of the liabilities. The firm defaults when the value of the assets becomes smaller than the value of the liabilities. Default Point is computed in the given model which is the assets' value at which the firm defaults. On the other hand the Logit model in bankruptcy prediction area provides probability in terms of percentage of bankruptcy of a firm which might be considered as a measure of effectiveness of management of a firm or bank. Logit Analysis involves the determination of conditional probabilities of variables in a sample using the logit model. A set of variables are considered for predicting a discrete outcome in logistic regression analysis. There is a combination of independent variables used under logit regression to estimate the probability that a particular event will occur or not. Calculated probability is thus equal to either 1 or 0. The dependent or response variable is dichotomous such as presence/absence or success/failure. In our case its solvent/insolvent.

## Literature Review

Karalevičienė and Bužinskienė (2012) studied on “The Suitability Evaluation of Modern Bankruptcy Models for Enterprises Bankruptcy Diagnosis” and investigated modern models of bankruptcy prediction. After the investigation of ten companies, the research infer that the analysed models, with the exception of Romania Bankruptcy and Shumway models, are suitable for the prediction of a company’s bankruptcy.

Korol (2013) studied on “Early warning models against bankruptcy risk for Central European and Latin American enterprises” and provided drawbacks for the model used by Alaka. Some restrictive assumptions that were considered are: (1) The variables (i.e. financial ratios) should have normal distributions, must be independent and must have high discriminative ability to separate the healthy companies from the distressed ones; (2) The values for all the indicators for all the firms must be available and be complete (i.e. there should be no missing values for any variables); (3) The classification of firms must be clearly defined.

Valaskova (2014) in the paper titled “Quantification of the Company Default by Merton Model” mentions that the Credit Metrics model sees the risk of volatility in the portfolio while the Merton model respectively KMV model doesn’t. The credit risk in the assets value volatility is seen by these two models. The default possibility or the possibility of change in rating category causes the volatility of the portfolio.

Kliestik et al. (2015) in the paper “Calculation of distance to default” worked on the distance to default for evaluating the probability of default of a company. The default is usually associated with bankruptcy The KMV model is used for the same. The model defines that the failure of the analysed company occurs at a time when the market value of the business assets derived from the market price of the equity falls below the payable debt.

Liao and Mehdian (2016) in the paper titled “Measuring Financial Distress and Predicting Corporate Bankruptcy: An Index Approach” suggested a simple approach in order to employ a set of financial ratios as inputs to estimate an aggregate bankruptcy index (ABI). The value of this index is between 0 and 1 and it basically ranks the firms on the basis of their relative financial distress. Their findings was that ABI can be used to predict the bankruptcy of firms more accurately than Z-score. According to them ABI has relatively robust predictive power so it can be applied together with other models to predict corporate bankruptcy.

Özari (2017) in the paper “A Merton Model Approach to Assessing the Default Risk: An Application on Selected Companies from BIST100” showed that how the Merton Model approach can be used to estimate the default probabilities of selected BIST100 companies. There are four inputs used total debt of company, stock returns volatility, time and risk-free interest rates. The distance to default and expected default frequencies of the companies were calculated and their correlation with total debt was examined. There was positive strong relationship between debt and equity and between debt and expected default frequencies; negative relationship between debt and distance to default for the total time period of five years.

Alaka et al. (2018) in the paper on “Systematic review of bankruptcy prediction models: Towards a framework for tool selection” proposed an integrated framework for bankruptcy prediction models on the basis of 13 criteria which

includes accuracy, ability to use, small sample size and transparency of result. Here in bankruptcy prediction the emphasis is more on the strengths and weaknesses rather than the popularity of tool. The classification of forecasting models is done into two categories. First one consists of statistical models which is used to estimate the parameters of the model and the probability of default whereas the second category consists of soft computing techniques which is used to forecast the risk of default. These methods are designed to take into account that some parameters may be affected by changing environmental conditions; therefore, these models are dynamic and are often labelled as learning systems.

From the above cited literature review studies it is observed that more papers are published by the foreign authors and there were none article or paper which showed the application of KMV Merton Distance-to-Default Model & Logit Analysis in context of the prediction of financial distress for textile industry in India. The relatable research on financial distress and prediction of bankruptcy are widely available but only limited ones had the application of KMV Merton Distance-to-Default Model & Logit Analysis. Thus, this study covers a major aspect of application of KMV Merton Distance-to-Default Model & Logit Analysis to review the prediction of bankruptcy of the major textile companies in India.

### **Research Objectives**

There is significant impact of KMV Merton Distance-to-Default Model statistic on Profitability of selected textile enterprise.

### **Research Methodology**

The sampling process has been used for the study. The samples of the population (top 10 textile companies of India.). The non-probability convenience sampling method has been used in the research. The sample size is of 10 textile companies. The samples include the top ten textile companies of India based on market capitalization. For the research work the secondary data have been used. The secondary data have been collected for the period 2014-2018 from the money control website. In case of KMV Model the Distance to Default value if the independent variable is between 0 and 1, then it means that which means that there are less chances for company to face bankruptcy in near future. If the values would have been less than 0 then the chances for bankruptcy would have been high.

### **Research Analysis**

The analytical aspect of the research paper describes the impact KMV Merton Distance-to-Default Model statistic of the on Profit after tax of selected textile companies in India. Hence the regression technique is used to identify the impact. If the value of Regression ( $R^2$ ) statistic is more than 0.7, then it is suggestive measure of significant impact.

**Results and Interpretation**

**Table 1: Regression Summary Statistics**

Sr no.	Company	Dependent Variable	Independent Variable	KMV D to D Statistic	Regression Statistic(R <sup>2</sup> )	Inference
1	Page Industries	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.894	0.799	Significant Impact
2	SRF Limited	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.271	0.163	Insignificant Impact
3	Arvind Limited	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.165	0.011	Insignificant Impact
4	Vardhman Textiles Ltd	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.331	0.109	Insignificant Impact
5	Welspun India Ltd	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.368	0.136	Insignificant Impact
6	Raymond	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.537	0.289	Insignificant Impact
7	KPR Mill	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.694	0.484	Insignificant Impact
8	Forbes Gokak Ltd	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.709	0.503	Insignificant Impact
9	Rupa & Company Ltd.	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.617	0.381	Insignificant Impact
10	Trident Ltd	Profit after tax	KMV Merton Distance-to-Default Model statistic	0.451	0.203	Insignificant Impact

Source: Spss Output

### Interpretation Company-wise

1. **Page Industries:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.799. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 79.9%, thus, leaving out 20.10% (100% - 79.90%) unexplained. This means that null hypothesis is rejected. Thus there is significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Page Industries
2. **SRF Limited:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.163. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 16.30%, thus, leaving out 83.70% (100% - 16.30%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of SRF Limited
3. **Arvind Limited:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.011. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 1.10%, thus, leaving out 98.90% (100% - 1.10%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Arvind Limited
4. **Vardhman Textiles Ltd:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.109. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 10.90%, thus, leaving out 89.10% (100% - 10.90%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Vardhman Textiles Ltd
5. **Welspun India Ltd:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.136. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 13.60%, thus, leaving out 86.40% (100% - 13.60%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Welspun India Ltd

6. **Raymond:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.289. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 28.90%, thus, leaving out 71.10% (100% - 28.90%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Raymond.
7. **KPR Mill:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.484. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 48.40%, thus, leaving out 51.60% (100% - 48.40%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of KPR Mill
8. **Forbes Gokak Limited:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.503. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 50.30%, thus, leaving out 49.70% (100% - 50.30%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Forbes Gokak Limited
9. **Rupa & Company Ltd:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.381. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 38.10%, thus, leaving out 61.90% (100% - 38.10%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Rupa & Company Ltd
10. **Trident Ltd:** R2 statistic helps in explaining changes in the dependent variable (profit after tax). Based on the results the (R square) value is 0.203. This means that the independent variable (KMV Merton Distance-to-Default Model statistic) predicts the changes in dependent variable (profit after tax) by 20.30%, thus, leaving out 79.70% (100% - 20.30%) unexplained. This means that null hypothesis is accepted. Thus there is no significant impact of KMV Merton Distance-to-Default Model statistic on Profit after tax in case of Trident Ltd

## Conclusion

Thus it can be concluded that an assessment should be conducted on all listed companies to check on their general health. It would ensure that the listing obligations are continuing to be filled and also the shareholders will be assured about the performance of their investments. The listed firms should establish financial distress prediction reporting in order to analyze the financial distress status of the firms and advice appropriately where financial distress is likely to occur. This would further help them in taking appropriate measures to prevent liquidated state in future. As a part of survival measures the firms should use such models for applying turnaround strategies before the occurrence of financial distress. Such kind of study or survey on the listed companies could analyze their key performance ratios and determine that actions are taken based on the results of such analysis or not. Also the results of such study form the basis of recommendations to incorporate in the management reports as “An analysis of key ratios targeted at predicting the occurrence of financial distress of the firms”.

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