# Assessing the Performance of Default Risk Models using Firm-specific and Systematic Factors


A Doctoral Dissertation Submitted in Partial Fulfillment of the Requirements for the Fellow Programme in Management

Indian Institute of Management Indore

By
Khushbu Agrawal

November 2013

Thesis Advisory Committee:

Prof. Yogesh Maheshwari
(*Chair*)

Prof. Ganesh Kumar N.
*(Member)*

Prof. Pradip Banerjee
*(Member)*

# Abstract

The event of default signals a state of financial distress which needs to be identified accurately and timely. Although financial distress prediction has considerably evolved over a period of time, the existing default risk models primarily focus on firm-specific information to predict distress. There have been only limited attempts to include systematic factors (macroeconomic and industry) in the models. Moreover, the lack of an integrated approach to modelling the risk of default is the primary motivation for the present study. Given the internal risk factors and turbulences in the external environment, recent years have been characterized by increased instances of default. Thus, it further provides impetus for exploring alternative ways to model the risk of default.

The present study is an attempt to develop a comprehensive and integrated model for default prediction that incorporates firm-specific factors i.e. factors internal to the operations of a firm as well as systematic factors represented by the sensitivity of a firm to industry and macroeconomic variables. Specifically, it seeks to address three relevant research questions pertaining to the prediction of default. Firstly, it is assessed which among the three firm-specific models i.e. accounting based model, option based model and the hybrid model has the highest prediction accuracy. Secondly, it is assessed whether the addition of industry beta to the hybrid model improves the prediction accuracy. Thirdly, it is assessed whether the addition of macroeconomic variables further improves the prediction accuracy. The study employs two alternative prediction techniques, logistic regression and multiple discriminant analysis. It is found that among the models based on firm-specific information, the hybrid model, which is a combination of information from the financial statements and option theory based measure (distance-to-default) performs the best in terms of classification accuracy, both in-sample and out-of-sample. The addition of industry beta as well as macroeconomic betas sequentially improve the classification accuracy of the model, both in-sample and out-of-sample. Overall, the results suggest that firm-specific and systematic factors are complementary to each other in prediction of default.

The findings of the study have important implications for lending and investment decisions. The model serves as a predictive tool to lenders, particularly banks and financial institutions, and investors for managing their exposures efficiently through a broader understanding of the relevant risk factors that are likely to affect the debt servicing capacity of a firm. Furthermore, the complementary role of firm-specific information and systematic factors in predicting default emphasize the fact that information from the external environment also needs to be considered in making investment and lending decisions. Each firm is uniquely affected by the changes in the external environment. Hence, lenders and investors need to constantly monitor the sensitivity of a firm to these changes and understand its implications for default risk. Accurate assessment of default risk is also useful in determining the appropriate risk premium. The findings of the study also have important implications for managers and other stakeholders. The potential direct as well as indirect costs of financial distress can be avoided by timely and accurate assessment of default risk.


**Keywords:** Default risk, financial distress, option theory, firm-specific factors

# Table of Contents

## List of Tables

## List of Figures