ABSTRACT

It is difficult to over-emphasize the importance of credit risk. Its use is manifest in the explosive growth of sophisticated credit instruments such as Credit Default Swaps (CDS). Its abuse can wreak havoc as we saw in the sub-prime crisis and its aftermath. One of the most important indicators of credit risk is the credit ratings, which are provided by the major rating agencies. The rating assigned to any debt instrument reflects the assessment by the Credit Rating Agency of the creditworthiness of the issuer. Recent years have seen growing importance of both ratings and the Credit Rating Agencies (CRAs) as the latter serve the entire gamut of regulators, issuers and investors. Some academic work has been done in the Indian context, to investigate, examine and suggest improvements in the process and methodology employed by CRAs. Academicians and practitioners have also proposed several credit risk models to predict default on debt obligations by borrowers. These credit risk models can be broadly classified as structural (market-based) models and statistical (reduced-form) models.

This research study has two broad objectives: (1) to analyze the methodologies and practices adopted by the Credit Rating Agencies (CRAs) in India for assigning ratings to corporate debt instruments; & (2) this study attempts to combine financial variables and the market-based default drivers in a hybrid form to predict corporate default for public limited companies in India. The proposed model is a blend of structural (market-based) and statistical (reduced-form) models. The present research work has been carried out on the manufacturing industries by classifying companies into seven sectors, based on the Prowess CMIE classification.

The KMV model is a widely applied structural model. In this research study, existing work on KMV has been extended to develop a suitable algorithm for determining probability of default (PD) of selected Indian public limited companies. The predictive ability of this algorithm has then been enhanced by combining information from financial statements of these companies. This has been done by running multiple regression (SPSS, version 20.0) between probability of default (PD) as the dependent variable, and a set of accounting ratios as the explanatory variable. Through this process, accounting ratios which are significant for each sector have been identified. Then, in a set of sector-wise logistic regressions, effort has been made to establish linkage between the implicit default probability and financial ratios of these firms. The predicted
probability of default thus generated has been compared with the actual default rates assigned by CRAs across the rating spectrum. A moderate correlation is observed between the two. This implies that the model is an efficient predictor of default risk. Such a model can be put to profitable use by various financial institutions.

For the reduced-form statistical models two different types of logistic regression are estimated: (1) model based on net worth; & (2) model based on ratings. In the first model, net worth of a firm is taken as a measure of default risk and the logit model is applied to determine the predicted probability of default. Companies with net worth/total assets<0.10 have been classified as ‘defaults’ (coded ‘1’) and the other companies have been classified as ‘non-defaulting’ (coded ‘0’). The predicted probability of default is determined by running binary logistic regressions between net worth as the dependent variable and the set of accounting ratios (also used for the KMV model) as the predictors (SPSS version 20.0).

Similarly, in the ratings model, a set of logistic regressions are also applied on ratings by classifying them into investment grade (coded ‘0’) and speculative grade (coded ‘1’). The predicted probability of default is determined by running binary logistic regressions between ratings as the dependent variable and the same set of accounting ratios as the predictors (SPSS version 20.0). The findings and results largely support the hypothesis that adding the accounting ratios as predictors significantly increases the predictive ability of the logit models.

Both the structural KMV model and the reduced-form logit model were tested for accuracy and validation by segregating the companies into estimated sample and hold out sample. The receiver operating characteristics curve (ROC) on the hold out sample for all the sectors showed a high predictive ability, thus validating the models.

The research findings indicate that credit ratings, by themselves, are not adequate to measure credit risk. The correlation of what the model predicts as default probability and the default rates assigned by the rating agencies to these firms is compared. It is evident from the findings that the correlation is moderate implying that the proposed model is an efficient predictor. The reason for the correlation not to be very high is that both the models are conceptually different, and ratings in themselves include qualitative and macro variables when assigned which are not reflected in our market-based model.
It can also be seen that some of the ratios are common across the models for each sector. Although the two models are based on some common variables, each one includes some indicators that do not look relevant for the other one. These differences might be due to some 'structural' limits in our analysis and some qualitative variables that can be significant in determining the risk of default (and also in shaping the raters' assessments) which cannot be easily incorporated into a quantitative model. Notwithstanding such limitations, the correlation of default probabilities between the two models is significant. Comparing the KMV model to the reduced-form model gives a new perspective about the robustness of the models assumptions.