Chapter 1

Introduction

1.1 Background

As part of its operations every business entity undertakes a variety of activities. By necessity, the outcome of at least some of these activities may be unpredictable. This introduces an element of risk for every organization. While specific business risks may vary across organizations, broadly the risk profile of an organization would comprise the following risks:

(i) Capital risk: The size of the owner’s stake in an organization determines the strength of its operations. The composition of its capital-Tier I (paid-up capital and reserves) and Tier II (bonds, hybrid instruments etc) depends on its resource mobilization capacity. In contemporary financial management, capital has three components, namely: accounting capital, regulatory capital and economic capital. Accordingly to the Basel Committee, capital base is one of the three pillars of risk assessment.

(ii) Market risk: According to the Basel II, market risk is the risk of loss in on-balance sheet and off-balance sheet positions, arising from movements in market prices. The components of this risk are: composition of investment portfolio, interest rate volatility, equity/commodity risk and exchange volatility.

(iii) Credit risk: Credit risk is the risk of loss due to the probability that an obligor is either unable or unwilling to meet its credit obligations.

(iv) Operational risk: This risk covers the entire gamut of activities in an organization. It is the risk of loss resulting from inadequate or poor internal systems of a company. The main components of this type of risk include human resources risk, technology risk, legal risk, reputation risk and risk of operating environment.

Among the different risks stated above, credit risk is perhaps one of the oldest financial risk. Yet, till recently, there was a dearth of instruments to manage and hedge this type of
risk. Earlier, the focus had been primarily on market risk and bulk of the academic research was based on this risk. However, there has been an upsurge in research on credit risk with the increasing emphasis being given to its modeling and evaluation. There are several forces behind this trend.

(i) Credit markets have grown steadily and the credit derivatives market (CDS) has grown exponentially.

(ii) Market risk, including both interest rate risk and currency risk, is not only better understood but also methodologies for measuring and managing it have developed considerably.

(iii) Credit risk has increasingly lent itself to quantitative methods for its evaluation and management, in turn drawing the attention of market participants in general, and risk management groups in particular.

(iv) The growth of more sophisticated products such as credit default swaps has sharpened the need for quantitative models to measure credit risk.

1.2 Credit risk

The plain vanilla definition of credit risk is the “probability of loss from a credit transaction”. Accordingly to the Basel Committee, credit risk is most simply defined as “the potential that a borrower or counterparty will fail to meet its obligations in accordance with agreed terms”. Though it is one of the oldest financial risks, it is only recently that the management and mitigation of this risk has become important.

Credit risk modeling relies mainly on three parameters; the probability of default (PD), the recovery rates (RR) and the correlation structure among borrowers (when computed on portfolios of debt instruments).

Various studies have attempted to formulate theories and develop models which help to explain and measure this risk. Credit risk (default risk) is defined by Lopez and Saidenberg (2000) as “the degree of value fluctuations in debt instruments and derivatives due to changes in the underlying credit quality of borrowers and
counterparties”. It can be stated as the distribution of financial losses due to unexpected changes in the credit quality of an issuer of debt instrument in a financial agreement. Credit risk can be viewed either from the cause or the effect of possible future default. From the view point of the cause, the default event is triggered by a firm’s capital structure when the value of the firm falls below the sum of its financial obligations. From the view point of the effect upon default, the corporate bond price is likely to be lower than the government bond price.

1.3 Significance of credit risk

Credit risk modeling has grown significantly over the past few years; driven both by a market impetus of explosive growth in products such as credit derivatives, and a regulatory impetus of increasing reliance on sophisticated quantitative methods for assessing capital requirements. Credit risk is one of the most rapidly developing areas in finance and an active area of recent financial research. It is attracting strong interest from all market participants, financial institutions (commercial banks, investment banks, and hedge funds), regulators (US Federal Reserve, Bank of International Settlements) and investors. Credit risk has wide applications in portfolio management and risk management techniques, credit derivatives, and in the regulatory context, the adoption of Basel Capital Accord (BIS2006). It attracts people from a diverse group of disciplines, from traditional finance (asset pricing) and mathematical statistics to econometrics.

Following the Revised International Capital Framework by the Basel Committee on Banking Supervision (known as Basel II), qualified banks would be using the Internal Rating-Based (IRB) approach for economic capital calculation. One of the important IRB components is measuring the credit risk by the Probability of Default (PD), which is to be estimated by banks applying their internal credit risk models. Quality of internal credit risk models is therefore of vital importance for the calculation of economic capital.

At the centre of credit risk is the default risk: the failure to honor a financial commitment. Thus, before deciding on whether to invest in a debt security, the investor must ascertain
what is the likelihood that the issuing entity will be able to meet its obligations and that there is a proper compensation for carrying the default risk. This is where the rating agencies begin to play a role in determining the probability of default, or the degree of safety in investing in the issuer company.

Rapid globalization has seen in its wake both the increasing complexity of the financial markets as well as the growing convergence of the capital markets. This has increased the importance of ratings and the Credit Rating Agencies (CRAs) over the years as they serve the regulators, issuers and investors. In the emerging markets like India, Credit Rating Agencies (CRAs) have been the predominant source for assessing the credit quality of borrowers. Since upgrades and downgrades of ratings can impact the price of traded debt and equity, market participants are interested in developing good forecasting models. Historically, many measures have been used as proxies for default risk, including credit ratings, model-implied default probabilities, and bond yields or spreads (Hull 2008).

1.4 Credit ratings

Credit rating is one of the most important indicators of measuring default risk of corporate debt instruments. It is a tool that enables the investor to differentiate between debt instruments on the basis of their underlying credit quality. A credit rating is specific to a debt instrument and is intended as a grade, and an analysis of the credit risk associated with the particular instrument. Rating is based upon the relative capability and willingness of the issuer of the instrument to service the debt obligations (both principal and interest) as per the terms of the contract. The rating of a debt instrument broadly examines three factors.

(i) The probability of default
(ii) The terms and character of the security
(iii) The degree of protection that can be granted to investors if the security issuer faces liquidation.
Rating agencies play a very important role in providing independent and objective assessment of the creditworthiness of companies and countries. Globally, the most recognized CRAs are: Standard and Poor, Moody’s, and Fitch. Ratings lie on a spectrum ranging from the highest credit quality on one end to default on the other end. Within this spectrum, there are different degrees of each rating, depending on the agency, sometimes denoted by a positive or negative sign or a number (Appendix-I). All in all, credit ratings are a measure of the likelihood of a firm’s default. For the emerging market economies, credit ratings are the key to showing the creditworthiness to foreign investors. Since the role of credit ratings is to facilitate investments, the companies strive to improve their ratings continuously. Ratings play a prominent role in the credit industry. Their key purpose is to provide a simple qualitative classification of the solidity, solvency and prospects of a debt issuer.

Some of the functions of credit rating agencies are:

(i) Credit rating provides the investor with risk-return analysis in deciding among the instruments of investment, thereby giving the investor wider choice of instruments and independence of investment decisions.

(ii) It safeguards to a large extent against bankruptcy.

(iii) Rating also serves as a vital tool from the issuer angle. It provides low cost and extensive information, more so to lesser known companies to access the money and capital markets.

(iv) Credit rating also provides intermediaries with a tool to improve efficiency in the funds raising process.

(v) It raises the possibility of lowering the cost of borrowing, and serves as a marketing tool in the financial system.

(vi) Rating provides greater credence to financial and other institutions.

(vii) Rating helps in reduction of the cost of public issues.
(viii) Rating Agencies assist the regulators in promoting transparency in the financial markets.

1.4.1 Evolution of credit rating industry (Global scenario)

The business of credit rating by independent rating agencies began in the United States early in the twentieth century, about 100 years after the emergence of the bond market. In the early decades of US financial history, transactions were between people who knew each other. As the scale and geographical scope of transactions expanded in a large economy in which resources were mobile, the need for information on suppliers and customers increased. Old informal channels continued but by 1830s, the expanding scale and scope of American business gave rise to a new institution, the special and standardized credit rating agency.

The use of credit rating arose in the US out of the desire of the growing class of investors to have more information about new securities, especially railroad bonds, which were being issued and traded. John Bradstreet founded a firm in 1849 for rating the creditworthiness of these bonds and by 1857 was publishing the world’s first commercial rating book. The Dun and Bradstreet companies merged in 1933 to form Dun & Bradstreet. In 1962, Dun and Bradstreet acquired Moody’s Investor Service, the bond rating agency.

Thus the first rating agency started operations in 1909, when John Moody became the first person to issue ratings for railroad company bonds. The Poor’s Co began issuing bonds in 1926 and the Standard Co in 1922. Subsequently, Standard and Poor’s merged in 1941. Fitch entered the rating business in 1924. Around 1950s and 1960s, many regulators began to rely on the information provided by these CRAs to fulfill their regulatory requirements. S&P, Moody’s and Fitch, are the leading agencies globally for providing sovereign ratings as also bond ratings. Securities Exchange Commission (SEC) introduced the process of granting the NRSRO status (Nationally Recognized Statistical Rating Agencies) to rating agencies. This status created virtual barriers and restricted entry of new and small firms into the industry.
The most important criterion used by the SEC to designate a firm as a NRSRO is that the agency must have national recognition from the investors as a credible source of information. The other criteria include:

(i) Organizational structure of the rating organization
(ii) Financial resources of the agency
(iii) Size and quality of staff
(iv) Rating organization’s independence from the company it rates
(v) Rating organization’s rating procedure to determine if ratings can be consistent, credible and accurate.
(vi) Internal procedures of organization to prevent the misuse of non-public information.

Credit Rating Agencies rose rapidly from the 1970s through the 1990s as the demand for funds in the US came not just from railroad sector but also the public utility and the manufacturing sector.

1.4.2 Sovereign ratings

Sovereign ratings aim at indicating the capacity and willingness of the governments to repay debt obligations in full and on time. They have twin objectives- the first one is to assess the creditworthiness of the government and the second one is to assess the creditworthiness of the debt advanced to private creditors in the form of bills, bonds, etc. The parameters for sovereign risk assessment include assessing the political risk of the country, the income and economic structure, the economic growth prospects, fiscal flexibility, the government debt burden, off-budget and contingent liabilities, monetary stability, external liquidity and the debt burdens for the private and public sector.

1.4.3 Application of credit ratings

Credit rating agencies have been playing a significant role in the investing and financing decisions. Given the intrinsic nature of credit ratings of simplicity and comparability, there is a wide application of these ratings. Some of the common applications of credit ratings are:
(i) Credit rating provides the investor with risk-return analysis in deciding among the instruments of investments, thereby giving the investor wider choice of instruments and independence of investment decisions. Ratings safeguard to a large extent against bankruptcy.

(ii) Credit rating also provides intermediaries with a tool to improve efficiency in the funds raising process. It raises the possibility of lowering the cost of borrowing, and serves as a marketing tool in the financial system.

(iii) Rating provides greater credence to financial and other institutions.

(iv) Developments in credit ratings commonly reveal an improvement or deterioration in the creditworthiness of a firm. Credit risk, or the risk of counterparty default, is thus an important factor in the valuation and risk management of financial assets.

(v) Improvement in credit management and credit quality of issuers helps in estimating the historical default rates for different categories of issuers/companies. Thus, ratings provide a cushion or protection to existing and potential investors, and also pave the way for fund managers in effective credit portfolio management.

(vi) In addition, lenders often offer borrowers more favorable terms if they are willing to commit to rating-based covenants that trigger debt re-pricing, refinancing, or collateralization.

(vii) Some financial regulators vary capital requirements with the riskiness of an institution's assets, as measured in part by the credit ratings assigned to its investments.

### 1.4.4 Limitations of credit ratings

Though ratings have a wide application in the financial decision-making, there are certain limitations to the ratings assigned. These limitations are:

(i) Rating is not a performance evaluation of the rated company.

(ii) It is not a recommendation to invest or not to invest in the instrument being rated.

(iii) It is not an audit of the rated company, statutory or non-statutory.

(iv) It is not an indication of compliance with statutory or other requirements.
(v) Rating reports are confidential- the client only gets a final rating and a rating rationale but no further details of the analysis.

(vi) Ratings are forward looking assessment, not a forecast of future performance

(vii) The issuers have the option of going in for dual rating if the rating given by a rating agency is not satisfactory. This may further confuse the investors.

### 1.4.5 Possible pitfalls in the functioning of rating agencies in India

The importance of reliable credit risk assessment in financial markets has increased over the years. Credit rating agencies are the foremost providers of third party credit risk assessment. Therefore, the efficacy of their performance can have a profound impact on credit markets. For many years, default and transition statistics have been widely accepted as the most objective measure of the performance of credit rating agencies. The role of credit markets in modern economic systems has grown steadily, particularly over the past two decades. Today, credit markets are a crucial component of any modern economy, as the availability and cost of credit plays a key role in the trade of goods and services. Correspondingly, the importance of reliable credit risk assessment in financial markets has increased over the years. This has caused the role and performance of credit rating agencies, as the foremost providers of credit risk assessment, to come under closer scrutiny than ever before.

Given the relevance of credit ratings in measuring credit risk or the risk of default, it is imperative that the rating process and methodology accurately measure the creditworthiness of the issuer company, and the ratings be proactive. The intrinsic nature of credit ratings is simplicity, comparability and accessibility. However, there are some issues in credit ratings that detract from their information content.

(i) Ratings are relative measures of risk. As a result, the assignment of ratings in the same category to entities and obligations may not fully reflect small differences in the degrees of risk. Credit ratings are opinions on relative credit quality and not a predictive measure of specific default probability.
(ii) Changes made in the exact timings of the rating often come as a surprise to the market, as is evidenced by the significant accompanying price reactions.

(iii) Credit ratings are an accurate and unbiased estimate of default probabilities over the long run. However, they do not always map to default probabilities within a short time period.

(iv) Ratings are opinions on the ranking of credit risk. However, ratings do not factor in other investment or market risks. The changes in the market risk (unless there are extraordinary circumstances to trace) are not incorporated. To that extent, if the stock volatility is likely to impact the credit risk, it is not reflected by the rating agencies.

(v) Despite the fact that they continue to monitor the credit conditions of the underlying firms, it is observed that the rating agencies are reactive rather than proactive in their actions. They act only when the market or the firm cannot reverse the change within a reasonable time period. Hence, they can be considered as a proactive indicator of the firm’s default probability if it has not yet defaulted. A better understanding this nuance could help investors better anticipate rating changes, and also help them to interpret the information in rating changes. It could also help researchers better model the rating process. Thus, continued research is needed to develop better models that capture and predict sudden rating changes.

(vi) The losses arising from the string of corporate collapses, including Enron, WorldCom and the recent global meltdown have led many to question the reliability of the ratings; the competence of the processes and the institutions; & the governance issues around ratings. The nationally recognized credit rating agencies (e.g., Moody’s, Standard and Poor’s, and Fitch) have faced widespread criticism for their credit ratings’ lack of timeliness in predicting some high-profile bankruptcies. These rating agencies maintained investment-grade ratings for Enron, Californian utilities, and other bankrupt companies, days before each declared bankruptcy.

(vii) With the movement of financial markets towards a more quantitative methodology and the constantly growing number of credit instruments, an increasing need is felt for quantitative models to help analyze and mitigate this risk. Empirical evidence shows the
growing dependence between the obligors and the movement in credit quality. For example, certain economic and political factors may impact all the firms, or certain sector-specific factors may impact all the companies within that sector. A credit event in one firm may be contagious for other firms, and may lead to changes in their credit quality as well. To quote an example, the default of Delphi led to downgrade of Ford and General Motors. With the rapid growth in credit risk markets in the recent years, there has been increasing research wherein different models and approaches have been proposed.

1.5 Problem statement

Credit rating agencies have been the predominant source for assessing the credit quality of borrowers until now. The number of rating categories and their symbols offer fairly limited information about risk. Firms' credit qualities have traditionally been linked to their credit ratings, which are ordinal measures assigned by rating agencies to reflect the debt-issuing firms' ability to serve their debts. They are thus not directly usable measures of default probability. In other words, a rating of AAA obtained by a firm and a rating of AA obtained by another, would indicate that the latter is 'more risky' than the former, however, it doesn’t say “how much”? Thus, there is a need for a quantitative model that can measure the probability of default for different firms which may fall in the spectrum of AAA companies or BBB companies as assigned by the rating agencies but the exact measure of default rate cannot be measured. While similar approaches are used by different rating agencies when assigning credit ratings, and although some agencies are more forthcoming than others in describing the procedures they follow in assigning or reviewing a rating, they all use proprietary methods to do so. Rating reports are confidential, once a rating is accepted; the rating rationale is available in the public domain for easy access.

The traditional ratings have some drawbacks: one, they are backward looking, two, they are not sensitive to new and frequently available information and three, they are subject to ‘creative accounting’ practices by the auditors. Ratings are based primarily on accounting information pertaining to companies. Traditional credit ratings and internal
scores by banks rely on data that provide information only on the firm’s past and are therefore backward-looking.

As was observed in the case of Enron, the company continued to enjoy ‘investment grade’ till sometime after the scam. It is also observed that there is a ‘conflict of interest’ in the functions of the rating agencies. All the rating agencies have a division or subsidiary which provides consultancy services to the clients for whom the rating may have also been provided by the same rating agency. During the global meltdown, the credit rating agencies were assigning ratings to the products whose structuring was also done by them. Financial statements lack flexibility because they are updated only at discrete time intervals, which are usually annually or quarterly. Rating agencies follow the concept of ‘through the cycle’ methodology which is that only changes in the permanent component of credit quality would warrant a revision in the ratings, short-term changes which are likely to be reversed do not lead to rating revisions. Moreover, the accounting information is unable to explain assets volatility, which is an important factor of credit risk.

There are several ways in which the risk of default can be gauged. One way is to rely on rating agencies, that rate individual firms’ capability to service and repay their debt. Since upgrades and downgrades in ratings can impact the price of traded debt and equity, market participants are interested in developing good forecasting models. The transition probabilities captured in the transition matrix computed by the rating agencies quantify the likelihood that a company will change from one rating grade to another within a year. The one-year average stressed probability of default (PD) of various rating notches are reported in the last column. It is observed that as the credit quality worsens (i.e. decline in the rating grades), the probability of default increases. The higher risk in the bottom grades (mainly non-investment grades) calls for developing a corporate default prediction model that would better capture the firm’s characteristics and could give an early warning signal of corporate distress.
Traditionally the credit risk literature has taken two approaches to measure default on debt. One is the structural approach which is based on market variables, and the second is the statistical approach or the reduced form approach which factors in information from the financial statements. The credit risk model proposed in the research study attempts to quantify the credit risk using both accounting information as also the market variables and provide a measure of credit quality along with complementing the existing role of external credit rating agencies.

**Figure 1.1 Elements of the credit risk model used in the study**

Figure 1.1 shows that the rating model factors in financial information, qualitative information (management quality etc). But ratings are symbols and thus the exact measure of default rate cannot be measured. Moreover, the default rates for all companies within one symbol would be same. As against this, a credit risk default forecast model, would factor in both market data combined with accounting information and the default risk is measured by the probability of default (PD) which is a quantifiable measure.
While highlighting the relevance of credit risk and the characteristics of credit ratings; among the important facts that emerge is a need for an integrated risk model that can combine continuous valuations from the market to determine the probability of default alongside the accounting information and capture the key determinants which impact default risk.

This unified model is able to blend the merits of both the accounting and market-based models. The fundamental assumption of market-based models is that market values contain all information relevant to the providers of capital for computing the probability of default. It is believed that the stock prices reflect all the information pertaining to the financials of the company. Market-based models have good predictive power in being flexible, providing continuous probability of default and being forward looking.

One model is market-based (structural) which is not self-reported and the second model (reduced-form) is self reported where the ratios are already reported by the firm. The structural form KMV model provides continuous probability estimates; these are the ‘Y’ variables to observe how close the Balance Sheet information is explained by the market variables. Since the Probability of Default (PD) calculated from KMV model is continuous, the combined valuations from the market along with accounting information enables us to observe the consistency between market variables and other financial statement information. Eventually ratings are based on financial statements.

An important issue that is explored in this work is whether ratings are an accurate reflection of the cardinal measure of probability of default. Put differently, are different ratings categories associated with an unconditional estimate of a fixed range of probability of default? Empirical studies on the performance of structural models generally focus on the relationship between default risk and corporate bonds yields. Few empirical studies have been conducted on the relationship between the actual default frequency and the theoretical default probability calculated from these models. The research study attempts to develop a unified credit risk model for predicting default
which quantifies the probability of default and thus serves as an additional tool for measuring default, in addition to the role of the credit rating agencies.

1.6 Research objectives

Broadly, the research study has the following two fold objectives:

1. To analyze the methodology and practices adopted by the Credit Rating Agencies (CRAs) in India regarding Corporate Debt Ratings.

2. The research 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) model to determine the predicted probability of default on debt instruments and provide a measure of assessing the credit quality of issuers.

Within these two broad objectives the framework of research involves examining the rating process and methodologies of credit rating agencies in India and highlight the gaps therein which emphasizes the need for research in this field. This entails developing a unified credit risk model that blends the merits of both market variables and also the financial statements. In the literature, there are two approaches to model credit risk. The market based models (Merton, KMV) is a structural model, while those based on Logistic regressions or the Altman scores are reduced form models. The research is based on application of the structural KMV model and the statistical reduced-form model into one integrated framework, to identify the significant ratios common to both the models, and to offer a simple model that can measure default risk and complement the functions of the credit rating agencies in India. The structural model is a forward looking model, and being mathematical the probability of default can be directly computed. The second part of the research study is based on testing the traditional statistical (reduced) model by applying Logit model to determine the predicted probability of default.

The PD is calculated from the KMV model, with underlying assumptions that the market is at least weakly efficient. Therefore all available historical information is already
incorporated in the market price and hence the PD. Therefore it is worthwhile to see which accounting ratios predict these PDs best. These ratios once identified will provide an easy to use default prediction model.

In the structural form model, the objective is to combine the merits of market-based variables along with the information present in the financial statements, namely the Balance Sheet and the Income Statement to examine if the default measures calculated from the structural models can actually predict a firm's credit risk, which is assumed to be reflected by the firm's credit rating, and if the default risk measures so calculated adequately reflect all the information in the individual factors concerning the firm's credit quality. Thus, the researcher uses the continuous observations of default probability obtained from KMV and also the balance sheet ratios (as the reduced form) to obtain a simple default probability model that Financial Institutions can use.

In the second type of reduced-form model, the net worth of a company is identified as a measure of default and the companies are segregated as “defaults” and non-defaults” based on the Net worth/Total Assets (NW/TA) being <.10 as the former and non defaulting when the NW/TA>.10. It is against this background that the study attempts to test the predictive power of the Logit model with 1) net worth and 2) ratings as the key explanatory variable defining default risk. The purpose of this statistical model is to build a robust framework that enables banks and financial institutions in an emerging market economy like India to classify a firm in the default or non-default category based on the information of its financial variables and to serve as a useful tool for quick evaluation of the risk profile of a corporate.

More specifically, the present study has been undertaken to answer a simple question:

“What are the key financial ratios that explain default probabilities across seven sectors”?

While trying to answer this question, emphasis has been given to (a) marry structural and reduced form model; & (b) parsimony of the model, so that it is easily usable by all.

In particular, the details of the study are as follows:
(i) To examine the validity of the structural Kealhofer, McQuown, and Vasicek (herein after KMV) model by testing to what extent it can be applied to determine the default risk of Public Limited Companies in India.

(ii) The KMV model is applied to determine the probability of default by developing an algorithm in Excel (using Solver Applications) based on market data of companies.

(iii) To identify the key ratios which impact default risk by taking default probability obtained from (ii) as the dependent variables, and taking a set of accounting variables obtained from the financial statements of companies as predictors (independent variables) and applying multiple regression.

(iv) To test to what extent the predictive ability of the model to forecast default risk is close to the measure of risk as reflected in the credit ratings. Then in a set of logistic regressions, efforts have been made to establish linkage between the implicit default probability and financial ratios of these firms and assess their predictive power. This is done by set of logistic regressions to link the expected default probability (EDF) with the financial ratios.

(v) Identifying net worth/ total assets as the dependent (explanatory) variable and the same set of accounting ratios used for the structural model as independent variables.

(vi) To determine the predicted probability of default by coding as NW/TA<.10 as ‘1’ for defaults and ‘0’ for non defaults.

(vii) Determining the predicted probability of default by running binary logistic regression on part (v) above, to identify the predictive ability of the model and the key ratios impacting the sectors.

(viii) To compare the significant ratios for both the models and identify the common ratios. These would be the significant ratios for each sector.

(ix) Ratings are coded as ‘0’ if in investment grade and as ‘1’ if in speculative grade. Taking the ratings coded as the dependent variable, and the set of accounting ratios as the independent variables, binary logistic regression is run to ascertain the predicted probability of default and the significant ratios.
(x) To also establish the correlation between the predicted probability of default as per both the models and compare with the logistic regressions run on the ratings.

(xi) To identify the accounting ratios which impact the default risk. The researcher has taken 24 ratios in all which factor in the liquidity, profitability, solvency and productivity of the companies along with the Altman ratios.

1.7 Layout of the study

In order to present this research work in a lucid manner, it has been divided into six chapters, which are further subdivided into various sections.

Chapter 1 gives the introduction to the study. It gives an overview of credit risk, and the role of credit ratings agencies in measuring credit risk. A need for research and the outline of objectives have also been stated in this chapter.

Chapter 2 reviews the available literature on the subject so as to know the methodologies used and the important findings of these studies. For better understanding of prior research done in this area, the literature review has been sub divided into two sections. The first section reviews the prior research on credit ratings and the second section reviews the credit risk models developed for measuring different types of credit risks.

Chapter 3 describes the research design and methodology followed by the researcher to achieve the stated research objectives. The theoretical framework of KMV as a concept has been elucidated. This chapter also looks into the methodology underlying KMV for the computation of probability of default by the market-based structural model. The concept underlying the statistical Logit model is also underlined in this chapter. The rationale for identifying set of accounting ratios as explanatory variables to the default risk has been explained along with the methodology applied to determine the predicted probability of default.

Chapter 4 gives a detailed insight in to the Credit Rating Agencies in India, their rating process and methodology and the methodology followed by them to measure defaults. By
a detailed study on the rating agencies in India, the limitations and gaps in their role in measuring default risk are highlighted.

Chapter 5 discusses the result and analysis part of the study. The predictive ability of both the models is analyzed and the strength of relationship between the structural model and the reduced-form statistical model is assessed using the correlation. To test the predictive ability of the model, the models have been tested on a random sample of hold-out companies.

Chapter 6 recapitulates the important findings of the study. It also discusses the important suggestions and recommendations emerging from the research study. Further, the limitations of the study along with possible areas of future research on the subject are also stated in this chapter.

1.8 References


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