# Determination of Expected loss and credit risk using Basel II's Internal Rating

# **Based** Approach (IRB)

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**Abstract:** This study analysis the credit assessment procedures followed by a bank (in south India) to determine the potential borrowers. A complete Study of Risk Assessment Model which is currently being used by thatBank (in south India). Moreover the study identifies the potential borrowers in of Loan limit above one crore and makes an assessment on their creditworthiness by using the financial performance, industry performance and management performance. Further the study evaluates the expected loss which may occur when the borrower defaults using Basel II's Internal Rating Based Approach (IRB).

**Keywords:** Risk Assessment Model, Basel II, Internal Rating Based Approach, credit risk, Expected loss(EL), Exposure Amount at Default (EAD), Loss Given Default (LGD).

**Introduction:**There have been several instances in recent years of large companies defaulting on bank loans of vast amounts like the Kingfisher airlines case. This gives us a view that doing business with micro, small and medium companies is less risky than funding big companies. Recently one of the banks in South India has identified 19 big accounts to be sold to asset reconstruction companies. Each account would have an outstanding of Rs.5 crore and above. Approximately the total outstanding to that bank on these accounts will be around Rs.300 crore. Thus analyzing and assessing the credit risk of Large Corporate borrowers is highly essential due to their high default rate.

But there are some drawbacks in the credit risk assessment of large corporate borrowers. Audited Financial statements and internal rating is intended to provide greater transparency but in some cases it is not so. At the same time credit decisions have gone wrong when they are strictly based on financial statements. This is because the financial statements are subjective and they don't consider the other risk factors such as Market Risk, Industry Risk, and Management Risk. The financial statements represent the historical performance of the company but the sanctioned loan will rely on the future performance of the company. The borrower probability to default a credit cannot be measured only by analyzing the past performance. Thus there is a need for developing a risk assessment model where quantitative and qualitative measurements are used to measure the borrower's probability of default.

**Methodology and data**

**Type of Research**

The research is a Descriptive and Analytical type of research. Where both qualitative and quantitative data are collected and quantified. Suitable scores are assigned to determine the probability of default and expected loss.

**Objectives of the Study**

The study aimed at learning the expected loss using Internal Rating Based Approach (IRB) for analyzing credit Risk Assessment and to understand existing credit risk assessment method adopted by one of the Bank in south India.Further this study assesses the expected loss and risk's associated in sponsoring large loans by that Bank and to provide requirement based suggestion for the Bank to overcome defaulting Issues.

**Data and Sources of Data**

The data used in this study are secondary data. The Company (borrower) Profit and Loss statement and Balance Sheet was the Source for the Quantitative analysis.

Management risk was measured through Qualitative statements. The Bank credit officer who has analyzed the borrowers past performance has rated the management performance. A set of questions pertaining to the management performance was rated in a scale ranging from highest score of 5 to the lowest score of 1. The question which evaluates the management performance were such as past payment record, working capital management, managerial competence, experience in Industry etc. The data for industry risk is taken from Index of Industrial Production for the month of January 2014.Totally ten borrowers whose loan amount above one crore was used for this study. The details such as total loan amount sanctioned, value of the collateral were also used for this study. To maintain confidentiality the name of the Corporates' are camouflaged for the study purpose.

**Time Period Covered**

Period of this study was 53 days. The study was done in one of the Bank in south India situated in Chennai.
During the period of 2013-2014 the Bank has given loan to 10 large corporate borrowers of limit above Rs 1 Crore and 87 SME's, MSME borrowers.

**Statistical tool Used**

Determination of expected loss requires the evaluation of the amount exposed when the borrower defaults, the probability or the likelihood that the loan gets defaulted and the amount that can be recovered using collateral. First we need to determine the various credit risks which can affect the repayment of loan by the borrower. Credit risk can be classified into financial risk, Industry risk and the Management risk.The amount of credit exposure that will be lost when a borrower suddenly defaults a loan can be measured using expected loss(EL). It is the amount that is expected to be lost when the borrower defaults.

$$EL = PD * EAD * LGD$$

LGD measures the amount of credit loss relative to the amount that can be recovered. The amount that is recovered has to be estimated in percentage.

Thus LCG = (1 – recovery rate) in percentage.

Margin % is the amount that the borrower has to contribute. The percentage differs from one loan to the other. Thus the amount that the bank will gets exposed when the borrower defaults will be calculated as (1 – margin %).

Credit risk can be classified into financial risk, Industry risk and the Management risk. The traditional method of evaluating the creditworthiness of potential borrower was by checking the balance sheet and profit & loss statement of the borrower.Since the past performance can only tell how the borrower has performed in its past it cannot be fully trusted to predict the future performance of the borrower.The future performance will be determined by various other factors like the Industry performance, management performance,

The Credit Scoring model was used to identify the default risk of the borrowers. The basic concept behind this model is to calculate the default risk from key financial risk factors by using the data(scores) that intended to separate good credit risk from the bad ones. Borrowers are sorted into different risk classes based upon the likelihood of future default. A Key is prepared in order to measure the performance of financial risk, management risk, and industry risk.

The default probability of an Individual borrower can be estimated using logistic regression model. The reason for using logistic regression is because the input value can be positive as will as negative but the output will always take the value between 0 and 1.A borrower who is likely to default will have negative values while a borrower who doesn't default will have positive value.

For using logistic regression odds ratio is calculated to know the likelihood of default.It shows an association between and exposure and outcome. If p is the probability of default then (1- p) is the likelihood of not to default.The probability of default (P) is taken as 0 and the probability of not to default (Q) is taken as 1. To create a relationship between this two variables i.e 0 probability to default and 1 not to default requires a probability model.

First binomial distribution was tried to link the two variables but it was not possible since it required and error distribution. Therefore logitfunction (log of odds) was used to link the two variables which proved to be convenient and simple. Using odds ratio the likelihood of borrower becoming default can be calculated.

$$\text{Logit(P)} = \log \frac{P}{1-P} = \beta_0 + \beta_1 x$$

In logistic regression, the dependent variable is a logit, (means log base e(log) of odds) which is the natural log of the odds, that is, When a logistic regression is calculated, the regression coefficient (b1) is the estimated increase in the log odds of the outcome per unit increase in the value of the exposure. In other words, the exponential function of the regression coefficient ($e^{b1}$) is the odds ratio associated with a one-unit increase in the exposure.

$$F(x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}$$

From the ten large corporate borrowers which were used in the study the probability of default was ascertained using logistic regression. To find the expected loss of individual borrowers next step is to determine the Exposure Amount at Default (EAD). The exposure amount at default is estimated internally based upon the outstanding amount that will be lost when default occurs. The value is dependent on the amount the borrower has already repaid when default occurs. The Suitable suggestions were given which was based on the findings. For calculation purpose the EAD or outstanding liability amount is measured in percentage. For example consider an X borrower who availed for OCC type loan of Rs 98 lakhs then the margin is 25% whereas the total exposure is 75% then the exposed amount is 73.5 lakhs.

Once the probability of default and EAD are calculated the next step is to ascertain Loss Given Default (LGD) which is 1- recovery rate in percentage. Thus the expected loss for the ten large corporate borrowers was calculated and suitable suggestion was given to the Bank.

**Findings**

> The credit risk assessment ultimately measures the expected loss of individual borrower. Based on the calculated expected loss the bank (lender) can determine the loan limit of the potential borrowers. From the study among the ten large corporate borrowers the highest expected loss is Rs69.65 lakhs and the lowest is Rs 7.81 lakhs the difference is around Rs 65 lakhs.

> The Probability of default ranges from 39.37% - 42.81% this shows that the Bank has given loans to the borrowers whose probability of default is not below 43 percent level.

> The Financial risk score has a variation of lowest of 1 to highest 5 level whereas the management risk score for all the borrowers is at above average score. This shows Bank has sanctioned loans to the Potential borrowers with good management performance.

**Suggestions**

> The accuracy of the expected loss entirely depends upon the accurate information provided by the borrowers. Since the measurement of past performance of the company purely depends upon the financial statements.

> The Internal rating should not be borrower biased, if the rating is done in favor of the borrower then its defeats the purpose of credit risk assessment.

> There are various instruments to transfer the credit risk of an individual borrower know as credit derivatives or provisioning techniques. Like credit default swaps(CDS) where the buyer of the CDS makes a series of payments (the CDS "fee" or "spread") to the seller and, in exchange, receives a payoff if the loan defaults.

**Conclusion**

The objective was to calculate the expected loss using the Internal Rating Based Approach (IRB). The data collected for this study is purely secondary in nature. Ten large corporate borrowers have been chosen for this study. This is because in recent times large

corporate borrowers are the ones who have highest default rate compared to Small Medium Enterprises (SME's) and Micro, Small and Medium Enterprises (MSME). The expected loss of the borrowers was calculated by probability of default, exposure amount at default and loss given default. The probability of default is calculated using the logistic regression. The key finding is that this particular Bank has a pattern of sanctioning loans to the borrowers who has good management records. This bank has given loans to the borrowers whose probability of default is not below 43 percent level. The key suggestion is that the credit risk can be transferred or reduced when credit derivatives and provisioning techniques like the credit swaps are used. Moreover the accuracy of the expected loss entirely depends upon the accurate information provided by the borrowers.

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