Credit Risk Analysis

Credit risk analysis extends beyond credit analysis and is the process that achieves a lender's goals by weighing the costs and benefits of taking on credit risk.

By balancing the costs and benefits of granting credit, lenders measure, analyze and manage risks their business is willing to accept.

The creditworthiness of the borrower, derived from the credit analysis process, is not the only risk lenders face. When granting credit, lenders also consider potential losses from non-performance, such as missed payments and potential bad debt. With such risks come costs, so lenders weigh them against anticipated benefits such as risk-adjusted return on capital (RAROC).

Purpose Of Credit Risk Analysis

Credit risk analysis aims to take on an acceptable level of risk to advance the lenders' goals. Goals can include profitability, business growth, and qualitative factors. Management crafts policies that drive their business to achieve its goals.

Although credit analysis can rate risks and estimate the probability of default, default risk is only one entity-specific risk factor. Lenders consider costs and benefits holistically when determining if the anticipated outcomes are acceptable to their business and financial exposure.

To estimate the cost of risk, lenders employ a multitude of information from the borrower, the lender, and external parties such as credit agencies. Some measures, such as credit scores and credit risk analysis models, are tools that allow lenders to estimate their expected loss (EL) via the probability of default (PD), loss-given default (LGD), and exposure at default (EAD).

The direct benefit of taking on credit risk is interest, a combination of default risk premium, liquidity premium, and other factors; however, benefits extend beyond interest revenue. For example, lenders may take on additional credit risk to grow a credit portfolio (their asset base), gain market share and expand relationships, or ensure their portfolio achieves an acceptable risk-adjusted return on capital.

Individual outcomes of credit risk analysis include granting credit with specific credit conditions or even approving exceptional credit to borrowers who may not qualify within standard policies. Management's goal is to mitigate the portfolio credit risks sufficiently to optimize the firm's accepted risks in aggregate.

For example, credit risk analysis can determine that lending in the absence of financial risk (e.g., cash-secured lending) is still not acceptable, perhaps due to headline risk specific to the borrower's owner or the industry that the company operates in.

Conversely, credit risk analysis may support lending to a newer business model (i.e., without proven cash flow) as a business strategy to expand relationships and increase exposure to a growing segment.

Note - The below Git HUB Link contains the code that I developed with three core component **expected loss (EL)**- percentage of total loan which bank cannot recover if a customer defaults, **the probability of default (PD) –** Predictive Modelling for customer with a high probability of defaulting in the future, **loss-given default (LGD) –** percentage of total loss a bank incurs when a customer defaults, and exposure at default (EAD) models and have shown how to compute the credit risk scores.

What is Probability at Default(PD modelling)

Default probability is the likelihood over a specified period, usually one year, that a borrower will not be able to make scheduled repayments. It can be applied to a variety of different risk management or credit analysis scenarios. Also called the probability of default (PD), it depends, not only on the borrower's characteristics but also on the economic environment.

Creditors typically want a higher interest rate to compensate for bearing higher default risk. Financial metrics—such as cash flows relative to debt, revenues or operating margin trends, and the use of leverage—are common considerations when evaluating the risk. A company's ability to execute a business plan and a borrower's willingness to pay are sometimes factored into the analysis as well.

For businesses, a probability of default is implied by their credit rating. PDs may also be estimated using historical data and statistical techniques.

Note – I have used Logistic Regression Modelling to design PD.

What is Exposure at Default (EAD)?

Exposure at default is the predicted amount of loss a lender may incur if a debtor defaults on their loan. It is the realized value of what the bank may lose if one of its borrowers is unable to satisfy their debt obligation.

There are two methods to determine exposure at default. Regulators use the first approach, which is called foundation internal ratings-based (F-IRB). This approach to determining exposure at risk includes forward valuations and commitment detail, though it omits the value of any guarantees, collateral, or security.

How to calculate EAD?

There are two main approaches to calculating exposure at default: the foundation approach and the advanced approach.

The foundation approach is guided by regulators and is calculated by considering the asset, forward valuation, and commitments details. The foundation approach does not consider the value of any guarantees, collateral, or security.

The advanced approach lets banks determine how EAD is calculated based on each individual exposure. These types of calculations may vary across loan types of borrower characteristics, as the lender is able to assess value as it sees fit.

Note – I have used Linear and Logistic Regression Modelling to design EAD.

What is Loss Given Default (LGD)?

Loss given default (LGD) is the estimated amount of money a bank or other financial institution loses when a borrower defaults on a loan. LGD is depicted as a percentage of total exposure at the time of default or a single dollar value of potential loss. A financial institution's total LGD is calculated after a review of all outstanding loans using cumulative losses and exposure.

Banks and other financial institutions determine credit losses by analyzing actual loan defaults. Quantifying losses can be complex and require an analysis of several variables. How credit losses are accounted for on a company's financial statements include determining both an allowance for credit losses and an allowance for doubtful accounts.

Consider if Bank A lends $2 million to Company XYZ, and the company defaults. Bank A's loss is not necessarily $2 million. Other factors must be considered such as the amount of collateral, whether installment payments have been made, and whether the bank makes use of the court system for reparations from Company XYZ. With these and other factors considered, Bank A may, in reality, have sustained a far smaller loss than the initial $2 million loan.

How to calculate LGD?

There are a number of different ways to calculate LGD.

A common variation considers the exposure at risk and recovery rate. Exposure at default is an estimated value that predicts the amount of loss a bank may experience when a debtor defaults on a loan. The recovery rate is a risk-adjusted measure to right-size the default based on the likelihood of the outcome.

LGD (in dollars) = Exposure at Risk (EAD) * (1 - Recovery Rate)

Another basic variation compares the potential net collectible proceeds to the outstanding debt. This formula provides a general ratio of what portion of debt is expected to be lost:

LGD (as percentage) = 1 - (Potential Sale Proceeds / Outstanding Debt)

Of these two methods, it is more common to see the first formula be used as it is more conservative approach to reflect the maximum potential loss. It can often be difficult to assess what the potential sale proceeds are especially considering multiple collateral assets, disposition costs, timing of payments, and liquidity of each asset.

What Is the Difference Between EAD and LGD?

EAD is exposure at default and represents the value of a loan that a bank is at risk of losing at the time a borrower defaults on their loan. Loss given default is the value of a loan that a bank is at the risk of losing, after taking into consideration any recovery, represented as a percentage of total exposure at the time of loss.

A bank may calculate its expected loss by multiplying the variable, EAD, with the PD and the LGD:

EAD x PD x LGD = Expected Loss

Note - The below Git HUB Link contains the code that I developed for three core components **PD, EAD and LGD** to assess risk with a loan and also have shown how to compute the credit risk scores.

Git Hub - https://github.com/AninditaDeb/Credit-Risk-Analysis