Expected Credit Loss Framework Under IND AS109

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Agenda

- Credit Loss: Basel Perspective
- Credit Loss: IAS 39 Vs IND AS 109
- Building Blocks of ECL
- Demystifying PDs: A Numerical Example
- Methodologies for Estimating PD
- Transition Matrix Approach
- Vasicek Model
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- Sample Disclosures
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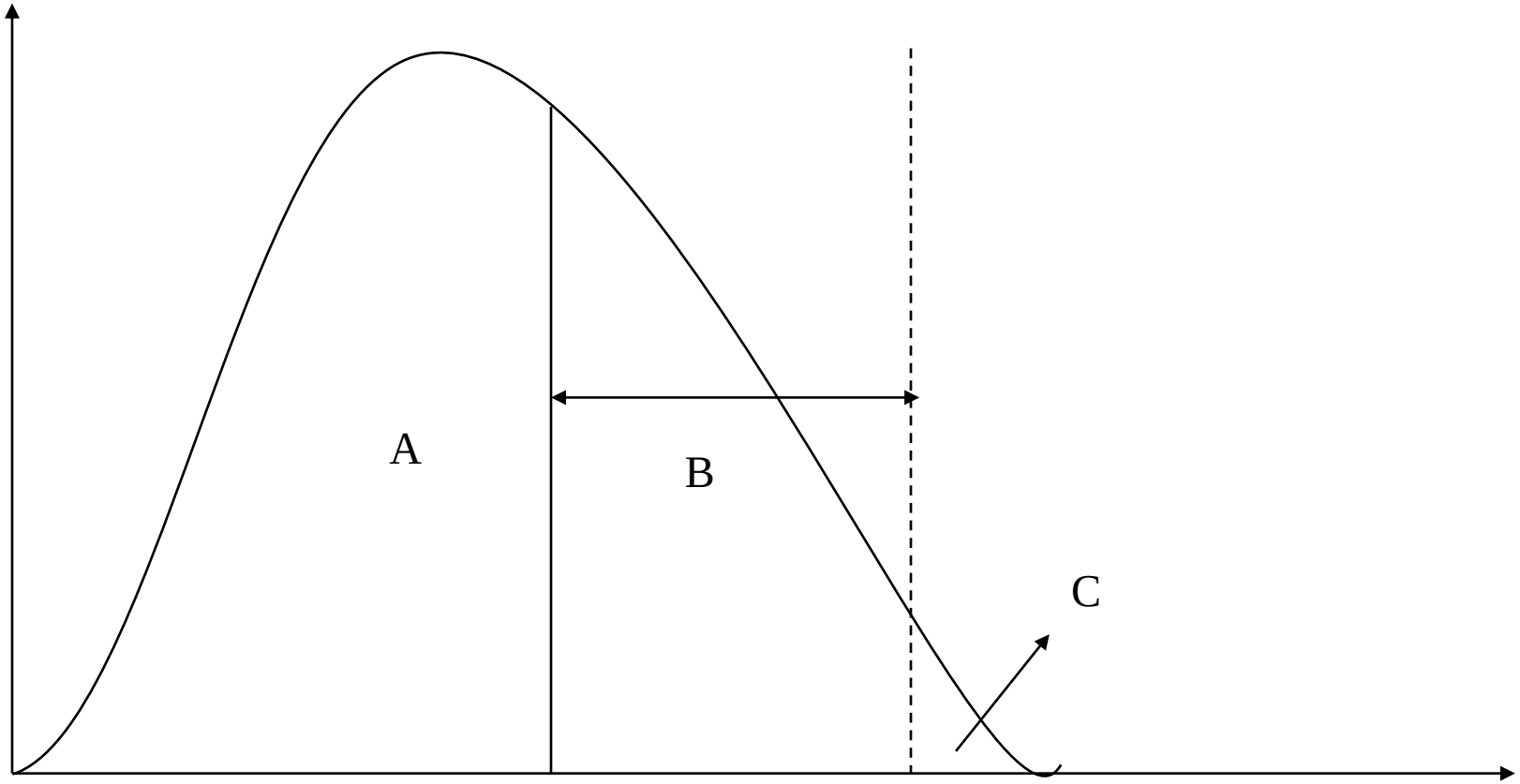
Credit Loss: Basel Perspective

Typical Credit Loss Distribution for a Loan Portfolio



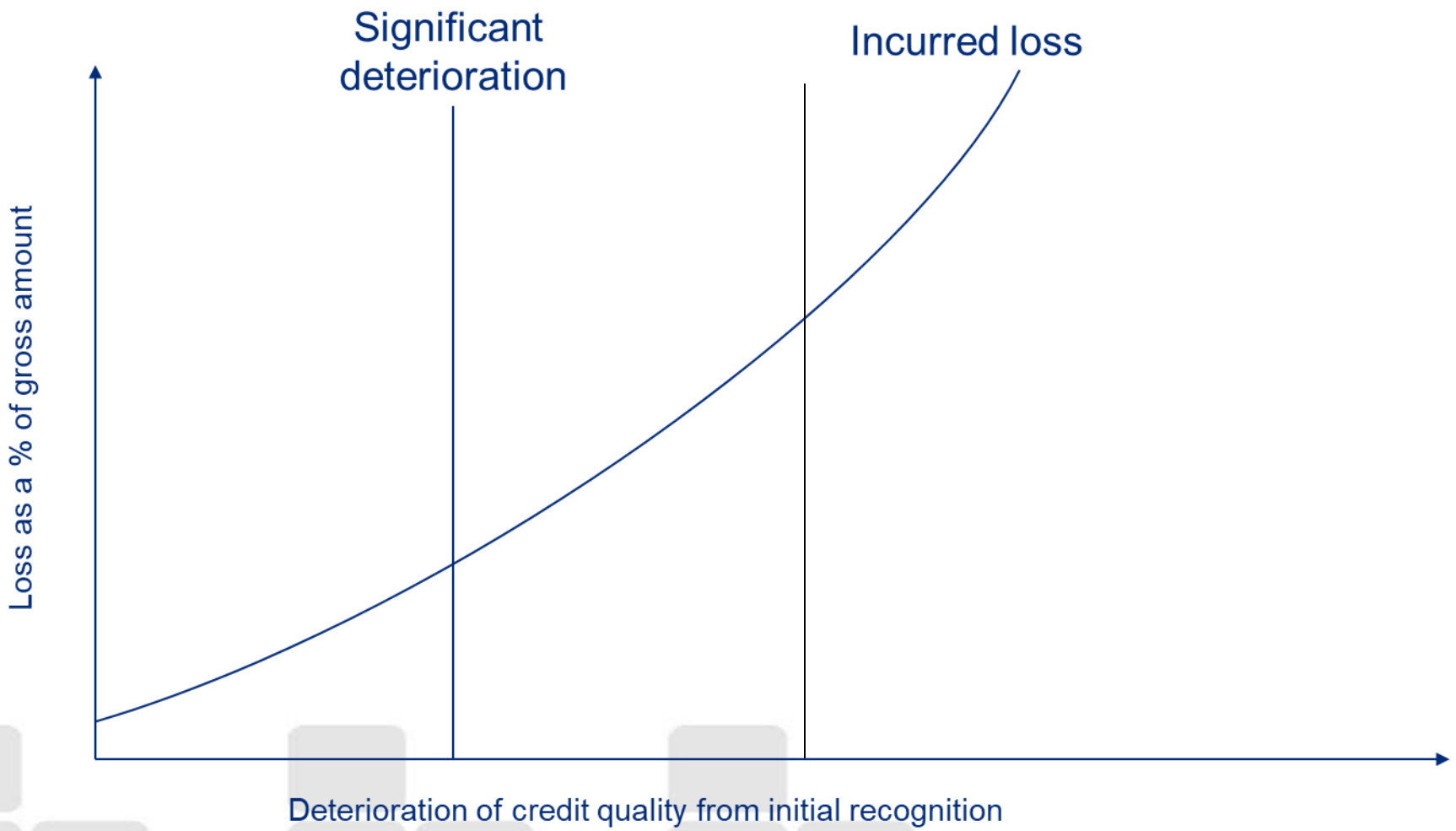
Credit Loss: Basel Perspective (continued)

- In this figure, X axis represents potential credit loss and Y axis measures the frequency of loss
- Skewed & Leptokurtic Distribution
  - Normal Distribution Vs Heavy Tailed Distribution
- A = Expected Credit Loss [ECL]:provision is set up and allowed for in pricing
- B = Unexpected Loss [UL] : capital is set aside
- C = Stress Loss : minimize the likelihood of the occurrence of a stress loss
- Basel II Capital Requirement for Unexpected Credit Loss = 99.9% one year VaR
- ECL = EAD(i)*PD(i)*LGD(i)
- EAD(i) = Exposure at Default for the ith loan
- PD(i) = Probability of Default of the ith loan
- LGD(i)= Loss given Default of the ith loan
- Overall ECL = sum of ECLs of N loans
- Focus of INDAS109 is on ECL only

Credit Loss: IAS 39 Vs IND AS 109

IAS 39	IND AS 109
Old accounting standard	New accounting standard
Used incurred loss approach	Introduced expected credit loss approach
Credit losses are recognized only when there is objective evidence of impairment.	Credit losses are determined based on anticipated future events and conditions.
The approach is reactive	The approach is proactive
It relies on historical data and actual events to determine credit losses to be recognized	It uses broader range of information including historical data, current conditions, reasonable future forecasts.

Incurred vs Expected Credit loss approach



The above figure depicts the difference between the incurred loss and expected loss model.

Introduction IND AS109

IND AS 109 accounting standard provides guidance on classification, measurement and recognition of financial instruments.
Measurement - is based on business model in which assets are held, and contractual cash flow characteristics of assets. Three categories of classification:
Amortized cost
FVOCI - Fair value through other comprehensive income
FVPTL – Fair value through profit & loss
Impairment – Expected credit loss (ECL) model for recognition and measurement of impairment losses of financial assets held at amortised cost and financial assets held at fair value through OCI

Key Terms

Header	Details
Definition of default	When a company consider a financial asset to be in “default”. E.g. when a borrower account becomes more than 90 days.
Exposure at default (EAD)	Gross exposure of financial asset for the company.
Loss given default (LGD)	Expected losses on the EAD given the event of default. This considers factors like collateral value, time value of money. We can analytically consider it as (1 – recovery rate).
Lifetime ECL	Lifetime ECL are the expected credit loss resulting from all possible default events over the expected life of a financial instrument.
12 month ECL	Portion of lifetime ECL that represent the ECL’s that result from default events on a financial instrument that are possible within 12 months after reporting date.

Key Terms

Header	Details
Probability of default	It is the estimate of likelihood or risk of default occurring over a particular time horizon. It is usually derived from past trends of default across identified homogenous portfolios.
Days past dues (DPD)	Number of days borrower has missed a payment or has been late on payment.

Internal rating grade	Internal rating description
Performing	
High grade	0 dpd
Standard grade	1 to 30 dpd
Sub-standard grade	31 to 60 dpd
Past due but not impaired	61 to 90 dpd
Non-performing	90+ dpd

Reference – Shriram finance Limited, Group's internal credit rating grades

Expected credit loss

- Expected credit loss (ECL) can be defined as difference between cashflows due under the contract (financial asset) and cash flows an entity expects to receive.
  - E.g. a company owns a home loan portfolio that contractually due to give $1M each year for next 10 years. But factoring credit risk the company only expects $0.9M for first 5 years and $0.8M for remaining period.
  - So expected credit loss is the $0.1M for first 5 years and $0.2M for remaining period.
- ECL can also be defined as unbiased probability weighted amount based on possible outcomes considering risk of credit loss even if probability is low.

$$ECL = \sum PD_t * LGD_t * EAD_t * D_t$$

  - Where PD – probability of default at time t
  - LGD – Loss given default at time t
  - EAD – Exposure at default at time t
  - D – discount factor for time t

Three Stage Framework

	Stage 1	Stage 2	Stage 3
Definition	From when a financial instrument is initially recognized, no significant increase in credit risk is observed.	From when a financial instrument is initially recognized, there is a significant increase in credit risk.	When a financial instrument is considered credit impaired.
ECL Measurement	ECL is measured based on default events possible in next 12 months.	ECL is measured based on lifetime expected credit losses.	ECL is measured based on lifetime expected credit losses.

Expected credit loss Recognition: Accounting Mechanics

- ECL for Debt Contracts Measured at Amortised Cost
  - Debit P&L and net off the cumulative provision from the amortised cost of the debt contract
- ECL for financial assets held at fair value through OCI
- ECL for off balance sheet items: Financial Guarantees
  - ECL = EAD * PD *LGD * CCF where CCF [Credit Conversion Factor] as per RBI norms is 100%
- ECL for off balance sheet item: Loan Commitment
  - ECL = EAD * PD * LGD * CCF.
  - As per Basel framework CCF is 20% if the original maturity of the loan is below one year; and 50% otherwise
- Impairment Reserve : RBI Guidelines for NBFCs

ECL for Financial Assets held at Fair Value Through OCI – A Numerical Example

- Investment in AAA rated bonds at initial recognition = 1000
- Coupon Rate = 7%pa; YTM at initial recognition = 7% pa; Term = 5 years; annual coupons in arrear
- End of Year 1; YTM on AAA rated bonds increased to 8%pa; Bonds under consideration were downgraded to AA; and yield on AA rated bonds = 9%pa
- Value of the bonds at i = 8% pa is
- = 70 * PVIFA (8,5) + 1000 * PVIF (8,5) = 960
- Value of the bonds at i=9% is
- = 70*PVIFA (9,5)+1000*PVIF (9,5) =922
- End of Year 1
  - Carrying Cost of bonds at FV = 922
  - Total reduction in Value = 1000 – 922 =78
  - Reduction attributable to market risk = 1000 – 960 = 40 = OCI Component
  - Reduction attributable to credit risk = 960 – 922 =38 = charge to P & L [ECL]

Demystifying PD Terminologies : A Numerical Example

- Basic Data

Calendar Year	Loans In force BoY	Number of Defaults	Loans Inforce EoY
2021	5,400	459	4,941
2022	4,941	681	4,260
2023	4,260	420	3,840

Numerical Example - Continued

- 12 Month PD = 459/5400 = 8.5%
- Two Year PD = [459+681]/5400 = 21.1%
- Marginal PD for Year 2 = 681/4941 = 13.8%
- Three Year PD = [459+681+420]/5400 = 28.9%
- Marginal PD for Year 3 = 420/4260 = 9.9%

Numerical Example - Continued

- PD Term Structure

Time Horizon	1	2	3
Probability of Default	8.5%	21.1%	28.9%

- Relationship between Marginal PDs & Life Time PDs

=> 0q1=q1

=> [1-0q1]* [1-1q2]= [1-0q2]

[1-0.085]*[1-1q2] = [1-0.211]

1q2=13.8%

=> [1-0q1]* [1-1q2] * [1-2q3]= [1-0q3]

[1-0.085]* [1-0.138] * [1-2q3] = [1-0.289]

2q3= 9.9%

- Roll Forward Rate Approach
- Analogous to mortality rates
- Curing Effect
- Point in Time PD = 12 month PD with a one year forward looking window- influenced by current economic conditions impacting the borrower's credit worthiness –relevant for ECL calculation
- Through the Cycle [TTC] PD- average 12 month PD -averaged over an entire economic cycle-Basel IRB Framework

ECL Calculation : A Numerical Example

- Basic Data
  - Loan Amount = 600,000
  - EIR [Effective Rate of Interest] = 10% pa
  - LGD [Loss Given Default] = 30%
  - Risk Free Rate of Interest = 7 %
  - Loan to be repaid in three equal annual instalments [not EAI]
  - PD Term Structure as discussed in the previous numerical example
  - Loan Stage for the purpose of ECL Calculations = Stage 2
  - PC[Year 1 ECL] = 600,000 * 0.085*0.3 * PVIF(7,1) = 14,305
  - PC[Year 2 ECL] = 400,000 * (1- 0.085) * 0.138 * 0.3 * PVIF(7,2) = 13,199
  - PC[Year 3 ECL] = 200,000 * (1- 0.211) * 0.099 * 0.3 * PVIF(7,3) = 3,820
  - **= 31,324**
  - If the loan was in stage 1, then ECL = 600,000 * 0.085 * 0.3 = 15,300

Methodologies for Estimating PD

- Level 1 Classification
  - Credit Scoring Models
  - Structural Models
  - Reduced Form Models
- Level II Classification
  - Credit Scoring Models
    - Logistic Regression Model
    - Multiple Discriminant Analysis (MDA) Approach
  - Structural Models
    - Merton Model
    - Vasicek Model
  - Reduced Form Models
    - Migration (or Transition) Matrix Approach
  - Inputs: Historical Data on Exposed to Risk and Default Statistics
  - Required: Forward Looking Estimates

Credit transition matrix

Credit transition matrix (CTM) shows frequency (in %) of upgrades and downgrades from one credit category to another over a specified period.

Average one year transition rates for long term rating (FY12-22) – monthly static pools

Rating category	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	13,808	98.70%	1.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	35,502	1.37%	96.41%	2.12%	0.06%	0.01%	0.00%	0.00%	0.03%
CRISIL A	67,690	0.06%	2.70%	92.85%	4.02%	0.18%	0.02%	0.03%	0.13%
CRISIL BBB	200,225	0.00%	0.05%	2.48%	91.15%	5.39%	0.17%	0.07%	0.69%
CRISIL BB	324,464	0.00%	0.00%	0.01%	3.66%	89.03%	3.68%	0.20%	3.43%
CRISIL B	272,349	0.00%	0.00%	0.00%	0.04%	7.99%	83.11%	0.43%	8.43%
CRISIL C	7,515	0.00%	0.00%	0.01%	0.00%	0.98%	19.20%	58.03%	21.77%
Total	**921,553**								

Source: CRISIL Ratings

Cumulative default rates for long term ratings (FY89-22) – monthly static pools

		One-, two- and three-year CDRs		
Rating category	Issuer months	One-year	Two-year	Three-year
CRISIL AAA	25,844	0.00%	0.00%	0.00%
CRISIL AA	60,402	0.03%	0.24%	0.58%
CRISIL A	94,208	0.32%	1.35%	2.73%
CRISIL BBB	232,247	0.84%	2.25%	4.04%
CRISIL BB	350,242	3.59%	7.54%	11.49%
CRISIL B	285,782	8.43%	16.98%	24.20%
CRISIL C	9,999	21.56%	35.46%	44.85%
Total	**1,058,724**			

Source: CRISIL Ratings

Reference – CRISIL ratings – Default and rating transition study upto fiscal 2022

Multiple Connotations of PD: A Numerical Example

- Basic Data : One Year Transition Matrix

	A	B	C	D
A	91.5%	8.0%	0.5%	0%
B	0.6%	90.6%	8.5%	0.3%
C	0.1%	2.2%	92.7%	5.0%
D	0%	0%	0%	100%

A = 0-30 days DPD

B = 31-60 days DPD

C = 61-90 days DPD

D = Above 90 days DPD

Transition Matrix Approach – Numerical Example - Continued

- Multiplying the one year transition matrix with itself we get the two year transition matrix as follows:

	A	B	C	D
A	83.7%	14.6%	1.7%	0.05%
B	1.1%	82.4%	15.6%	0.9%
C	0.1%	4.1%	86.1%	9.7%
D	0%	0%	0%	100%

- Interpretation of the Above Matrix
- Assumption of Time Homogeneity
- Allowance for Curing Effect (?)

Vasicek Model

- A loan defaults if the value of the borrower's assets (A) falls below the amount of the loan (B) to be repaid at time T. We are interested in finding the default probability:

  P [A (T) < B]

- We will now assume that A(i), the value of the ith borrower's assets is described by the process

  dA (i) = Mu(i) A(i) dt + sig(i) A(i) dX(i)

  Where Mu (i) = drift rate per unit of time

  Sig(i) = volatility rate per unit of time

  X(i) Brownian motion

- Solving the above stochastic differential equation, we get the value of the ith firm assets

  A(i) at time T

  exp[A(0) + (Mu(i) * T – (sig(i)^2) * 0.5 * T)

  +sig (i) * (T^0.5) * X(i)

Vasicek Model continued

- The probability that the ith loan defaults

$$q(i) = P\,[A(i) \text{ at time } T < B(i)]$$

$$= P[X(i) < C(i)] = N\,[Ci]$$

Where

C(i) = [ln B(i) – A(0)– Mu(i) * T

+{sig (i) * (T^0.5)] divided by [sig(i) *(T^0.5)]

C(i) = default threshold

- We will now consider a homogeneous portfolio of N loans characterized by
  - Equal Rupee amounts
  - Equal probability of default (q)
  - Flat default correlation coeeficient (Rho) between the any two loans
  - Same term T

Vasicek Model continued

- The variables {X(i)} for i=1,2…..N are jointly standard normal with equal pair wise correlations (Rho)
- We will now express X(i) as
- X(i) -= [S*(Rho^0.5)] + [{(1-Rho)^0.5}*Z(i)]
- Where S and Z(i) are mutually independent standard normal variables
- The economic interpretation of the above equation is as follows:
- S represents the systematic risk i.e., the macro economic conditions that impacts the credit worthiness of all the borrowers simultaneously
- Z(i) is the idiosyncratic (standard normal) noise component which represents borrower specific unique conditions. We will assume that Z(i)s are independent of each other

Vasicek Model continued

- When systematic risk is known, the conditional probability of default on the ith loan is

  = P[X(i)<C(i)/S=s]

  = P[{(S*(Rho^0.5))+((1-Rho)^0.5)*Z(i)}<C(i)/S=s]

  =P{Z(i)<[c(i) – S* (Rho^0.5)]/(1-Rho)^0.5]

  Conditioned on S = s

  =N[(N^{-1}(q(i)-S*(Rho^0.5))/(1-Rho)^0.5]

Where q(i) is a measure of historic default probability [TTC-PD]

S represents an economic index over the time interval [0,T]

Rho represents default correlation typically varying between 12% and 24% [Basel frame work]

Vasicek Model continued

- Vasicek model described so far can be extended to derive the cumulative distribution function and probability density function. It is described by th e two parameters 0<p, Rho <1
- Vasicek model can be used to calculate different risk measures such as VaR and Expected Loss a part from EL
- Empirical studies of the Vasicek Model
  - Currently estimates the expected loss for all types of loan portfolios equally weighted portfolios with unequal weights and different default probabilities (mixed portfolios)
  - Under estimates VaR and Expected Shortfall for portfolios with unequal weights and mixed portfolios
  - Works well on “average” but not in the tails
- Comparison with the Merton Model

Inputs for the Vasicek Model

- Historical TTC PD
- Standardised value of an macro economic variable like say GDP growth rate or disposable income as a % GDP which is connected with the default rate of the loan portfolio – both from a correlation perspective and a causal perspective
- Standardised value in this context means

[Forecasted value of the Economic Indicator – Historical Mean value of the Indicator] / Standard deviation of the Economic Indicator]

- Sources for Obtaining Economic Forecasts
  - Economic Intelligence Unit Forecasts for the Indian Economy
  - IMF Macro Economic Forecasts for India [as part of World Economic Outlook]

- Pair wise flat default correlation coefficients –typically specified by the entity Keep the Basel range of 12% to 24% as a reference interval

Regression Methodologies

- Two Variable Regression Analysis

  $Y = b_o + b_1 X + U$

- Multiple Regression Analysis

  $Y = b_o + b_1 X_1 + b_2 X_{2+\ldots..} B_n X_n$

- Logit Model [Logistic Regression]

  $Y = \ln[q/1-q] = b_o + b_1 X + U$

Where q is the default probability

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A. Grouping of Loans

Entity	Shriram Finance	HDFC	LIC Housing Finance
Grouping Basis	Secured Loans for new vehicles ; Secured Loans for Used Vehicles Gold Loans MSME Loans Two Wheeler Loans Personal Loans	Individual Loans segmented on the dimensions of (a) housing and non-housing; (b) salaried and self employed; and © geographical locations Non-Individual loan book is segmented corporate finance, construction finance and lease rental discounting	Housing Loans ; Retail Loans and Project loans

B. Staging Criteria

Entity	Shriram Finance	HDFC	LIC Housing Finance
Stage 1	Up to 30 days past due (DPD)	0-30 days past due	same
Stage 2 -SICR	30 days past due	31-90 days past due	same
Stage 3	90 days past due	More than 90 days	same
Additional Considerations	Any event such as a natural calamity The borrower seeking an emergency funding; Any legal entity in the borrower's group filing for bankruptcy	Covid Stressed borrower segments Increase In Retail Prime Lending Rate	

C. Forward Looking PD Estimation: Methodologies

Entity	Shriram Finance	HDFC	LIC Housing Finance
PD Estimation Methodology	Single Variable Linear Regression Model where the independent variable is identified basis the R-squared and the economic intuition of the relationship between the independent variable and the default rates The economic variables considered include the GDP growth, inflation and weighted average lending rate of scheduled commercial banks	The historical 12 month PDs are modelled against relevant macro economic variables to determine future 12 month PIT rates and the PD term sturcture	Transition Matrix Approach

D. Valuation of Collateral : LGD

Entity	Shriram Finance	HDFC	LIC Housing Finance
Collateral Valuation	To the extent possible the company uses active market data for valuing financial assets held as collaterals Other unquoted financial assets held as collateral are valued using models Non-financial collateral such as vehicles are valued based on data provided by third parties or management		

Three Stage Framework- Some examples – Mahindra Finance

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Credit Quality of Financial Loans and Investments

The following table sets out information about credit quality of loans and investments measured at amortised cost primarily based on days past due information. The amount represents gross carrying amount.

₹ in crores

Particulars	31st March 2023	31st March 2022
Gross carrying value of Retail loans including Finance Lease		
Neither Past due nor impaired	62,401.65	42,798.40
Past Due but not impaired:		
- 1-30 days past due	4,835.98	4,222.47
- 31-90 days past due	4,852.73	9,112.22
Impaired (more than 90 days)	3,655.10	4,864.19
Total Gross carrying value as at reporting date	**75,745.46**	**60,997.28**

₹ in crores

Particulars	31st March 2023	31st March 2022
Gross carrying value of SME loans including Bills of exchange		
Neither Past due nor impaired	4,331.40	1,912.31
Past Due but not impaired:		
- 1-30 days past due	55.05	102.78
- 31-90 days past due	20.54	80.42
Impaired (more than 90 days)	49.69	44.97
Total Gross carrying value as at reporting date	**4,456.68**	**2,140.48**

₹ in crores

Particulars	31st March 2023	31st March 2022
Gross carrying value of Trade Advances		
Less than 60 days past due	2,480.06	1,682.21
61-90 days past due	53.43	64.55
Impaired (more than 90 days)	6.93	60.66
Total Gross carrying value as at reporting date	**2,540.42**	**1,807.42**

Actuarial Involvement : Way Forward

- ECL Methodologies
- Eshimating Credit Risk Capital
- Work together with the accounting process
- Focus on Banks and NBFCs

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Thank You

Appendix A-Asset classification

1.Amortized Cost:

1. Loans and receivables: e.g. trade receivables, loans to customers, and held-to-maturity investments.
2. Debt instruments: Non-derivative financial assets with fixed or determinable payments and fixed maturity fall under this category. E.g. include bonds, notes, and debentures held for collection of contractual cash flows.

2.Fair Value through Profit or Loss (FVPL):

1. Trading securities: e.g. include actively traded stocks, derivatives, and commodities.
2. Available-for-sale (AFS) securities: Financial assets that do not meet the criteria for amortized cost or FVOCI are classified as FVPL.

It's important to note that the classification of financial assets under IFRS 9 depends on the entity's business model for managing the assets and the contractual cash flow characteristics of the assets. Entities need to carefully assess the nature of their financial assets to determine the appropriate classification and measurement category under the standard.