

8th webinar on Banking Finance & Investments

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IFRS 9 modelling for banks

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Agenda

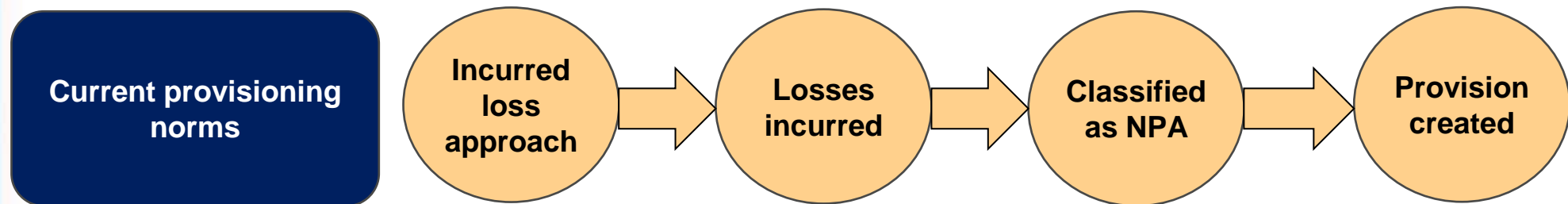
- Current credit risk provisioning followed by banks in India
- Introduction to IFRS 9 principles
- Building blocks for expected credit loss framework
- Modelling methodologies for ECL provisioning
- Key challenges and way forward
- Q/A

Overview of current credit risk framework



Credit risk represents the risk that the loans given by a bank will not be paid in full, i.e., the bank is likely to suffer some level of losses on its exposures. The current provisioning methodology used by bank to overcome credit risk is as follows:

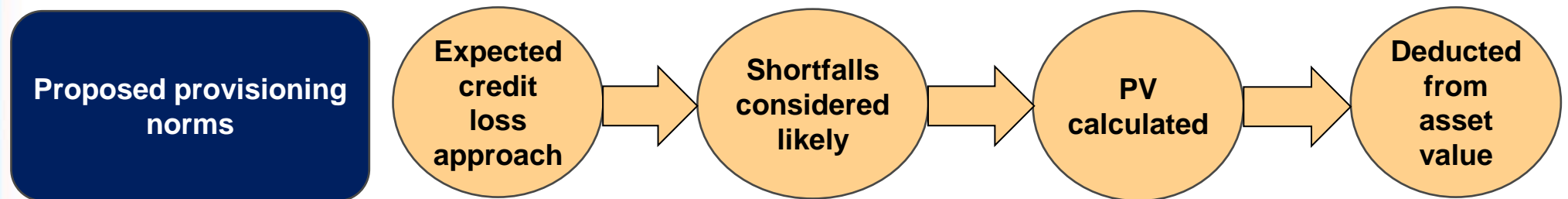
- (1) Incurred loss approach is followed by banks. According to this approach the banks are required to make provisions once losses are already incurred.
- (2) Provisions are created once the loan assets are classified as NPA.
- (3) This creates a challenge for the banks, as provisions increase only once creditworthiness has deteriorated.



Overview of proposed credit risk framework

To overcome the challenge related to the credit risk impact on the financials of the bank, RBI recently published a discussion paper on “Introduction of Expected Credit Loss Framework for Provisioning by Banks”. The proposed provisioning methodology details the following:

- (1) To follow **Expected Credit Loss (ECL)** approach instead of incurred loss approach.
- (2) Cash shortfalls that the institution considers likely to take place is accounted for by considering the probability weighted estimate of the present values of all cash shortfalls from the instrument while calculating the value of an asset.



Current provisioning norms



Provisioning categories	Description	Provisioning norms
Standard asset	Does not display any problems, and which does not carry more than normal risk attached to the business.	Generally, it is at 0.40% but there are few industry specific provisioning norms for particular industries.
Sub-standard asset	Has been classified as NPA for a period not exceeding 12 months. The current net worth of the borrower/ guarantor or the current market value of the security charged is not enough to ensure recovery of the dues to the bank in full.	15% of the total outstanding amount For unsecure exposure there will be provision of 25%
Doubtful asset	Has been classified as NPA for a period exceeding 12 months.	100% of the amount not covered by the security. For the amount realizable through security the following rates are used: 25% - up to 1 year 40% - 1 to 3 years 100% - more than 3 years
Loss asset	A loss asset is one where loss has been identified by the bank or internal or external auditors or the RBI inspection, but the amount has not been written off, wholly or partly.	100% of the total outstanding amount

Impact of credit risk



	Schedule No.	As on 31-03-2022	As on 31-03-2021
Capital and Liabilities			
Capital	1	613.95	612.75
Employees' Stock Options Outstanding		150.77	-
Reserves & Surplus	2	117,495.94	102,980.95
Minority Interest	2A	261.35	173.75
Deposits	3	820,914.16	698,302.63
Borrowings	4	199,778.16	152,248.72
Other Liabilities and Provisions	5	56,314.18	46,685.74
Total		1,195,528.51	1,001,004.54
Assets			
Cash and Balances with Reserve Bank of India	6	94,034.51	51,808.57
Balances with Banks and Money at Call and Short Notice	7	18,309.00	11,615.79
Investments	8	274,608.13	225,335.77
Advances	9	725,125.50	625,749.90
Fixed Assets	10	4,679.12	4,329.69
Other Assets	11	78,483.01	81,875.58
Goodwill on Consolidation		289.24	289.24
Total		1,195,528.51	1,001,004.54
Contingent Liabilities	12	1,293,232.86	1,053,624.91
Bills for Collection		66,947.44	50,375.27
Significant Accounting Policies and Notes to Accounts	17 & 18		

Credit risk impacts these areas of balance sheet

Definition of default proposed by RBI



- The counterparty is **classified as a non-performing** asset under the RBI guidelines.
- The exposure to the counterparty has been **restructured** by the bank and such exposure continues to be in the monitoring period.
- Bank considers that the borrower is **unlikely to pay its existing** debt. Non-exhaustive list of indicators include:
 - i. The bank puts the **credit obligation on non-accrued status**.
 - ii. The bank **sells a part of the credit obligation** at a material credit-related economic loss.
 - iii. The bank consents to a **distressed restructuring** of the credit obligation.
 - iv. The bank has filed for the **debtor's bankruptcy** or a similar order in respect of the borrower's credit obligation.
 - v. The debtor has sought or has been placed in **bankruptcy** or similar protection where this would avoid or delay repayment of the credit obligation.
 - vi. There is evidence that **full repayment based on the contractual terms is unlikely** without the bank's realization of collateral.

Assets to which ECL is applied

All advances

Financial guarantees

Trade receivables

Lease receivables

Undrawn loan
commitments

Bond investments

Debt investments held to
maturity

Contract assets

Non-fund based
commitments

Stages of impairment

The three-stage classification of financial assets as per the credit risk is shown below:

Stage 1

- It comprises financial instruments that have not deteriorated significantly in credit quality since initial recognition or which have low credit risk at the reporting date.
- For these items, 12-month expected credit losses are recognized and interest revenue is calculated on the gross carrying amount of the asset.

Stage 2

- It comprises financial instruments that have deteriorated significantly in credit quality since initial recognition (unless credit risk at the reporting date is considered to be low), but do not have an objective evidence of impairment.
- For these items, lifetime expected credit losses are recognized but interest revenue is still calculated on the gross carrying amount of the asset.

Stage 3

- It comprises financial assets which are credit impaired at the reporting date.
- For these items, lifetime expected credit losses are recognized and interest revenue is calculated on the net carrying amount.

Credit loss model

Credit Loss calculation

Credit loss

= PV

Cash Flows
Due

Cashflows
expected to
be received

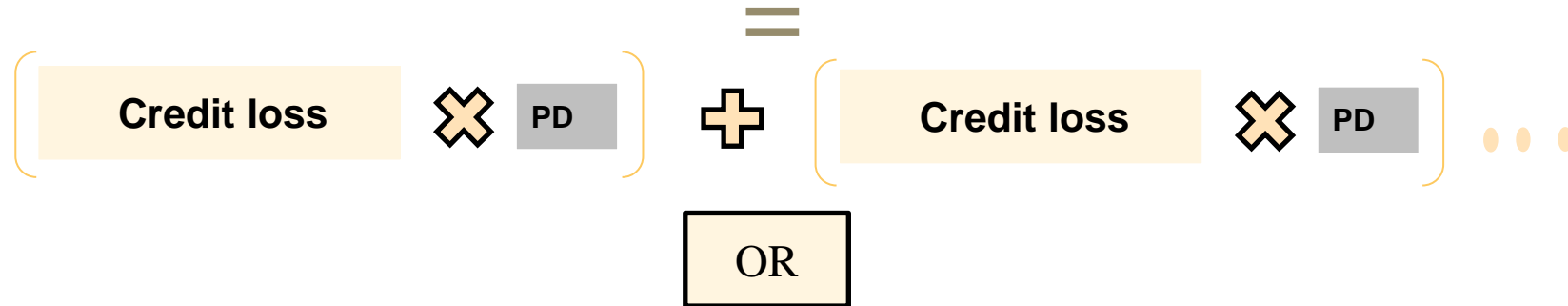
- **Credit loss** is difference between all contractual **cash flows** that are **due** to an entity in accordance with the contract and all the **cash flows** that the entity **expects to receive discounted** at the original effective interest rate (**EIR**) or credit-adjusted EIR.
- Expected credit losses (ECLs) are the sum of all possible credit losses, weighted based on their probability of occurrence.

When estimating cash flows for ECL measurement, entity considers:

- **expected life** of a financial instrument (remaining contractual term in case expected life isn't possible to estimate),
- all **contractual terms** of the financial instrument (e.g. prepayment, extension, call and similar options),
- **collaterals** held,
- other **credit enhancements** integral to the contractual terms.

Expected credit loss model

Expected credit loss



PD (Probability of Default)

‘Probability of a customer defaulting on its contract’

Key drivers:

- Customer characteristics
- Economic variables
- Determined at product level for retail portfolios and at borrower level for **wholesale portfolios**



EAD (Exposure At Default)

‘Expected amount owed to the bank at the time of default’

What is the exposure today
vs
What will be the exposure at point of default



LGD (Loss Given Default)

‘Expected loss (may be a % of EAD)’

How much of this is the bank likely to lose (*IAS 39 and IFRS 9*)

12-month ECL or Lifetime ECL

12-month ECL

The portion of lifetime ECLs that result from possible default events within 12 months after the reporting period = Credit losses over the life of the financial instrument that result if a default occurs in the next 12 months x the probability of default in the next 12 months.

Lifetime ECL

The ECLs that result from all possible default events over the expected life of the financial instrument = Lifetime credit losses x lifetime probability of default.

Lifetime ECL are therefore the present value of the difference between:

- the contractual cash flows that are due to an entity under the contract; and
- the cash flows that the entity expects to receive.

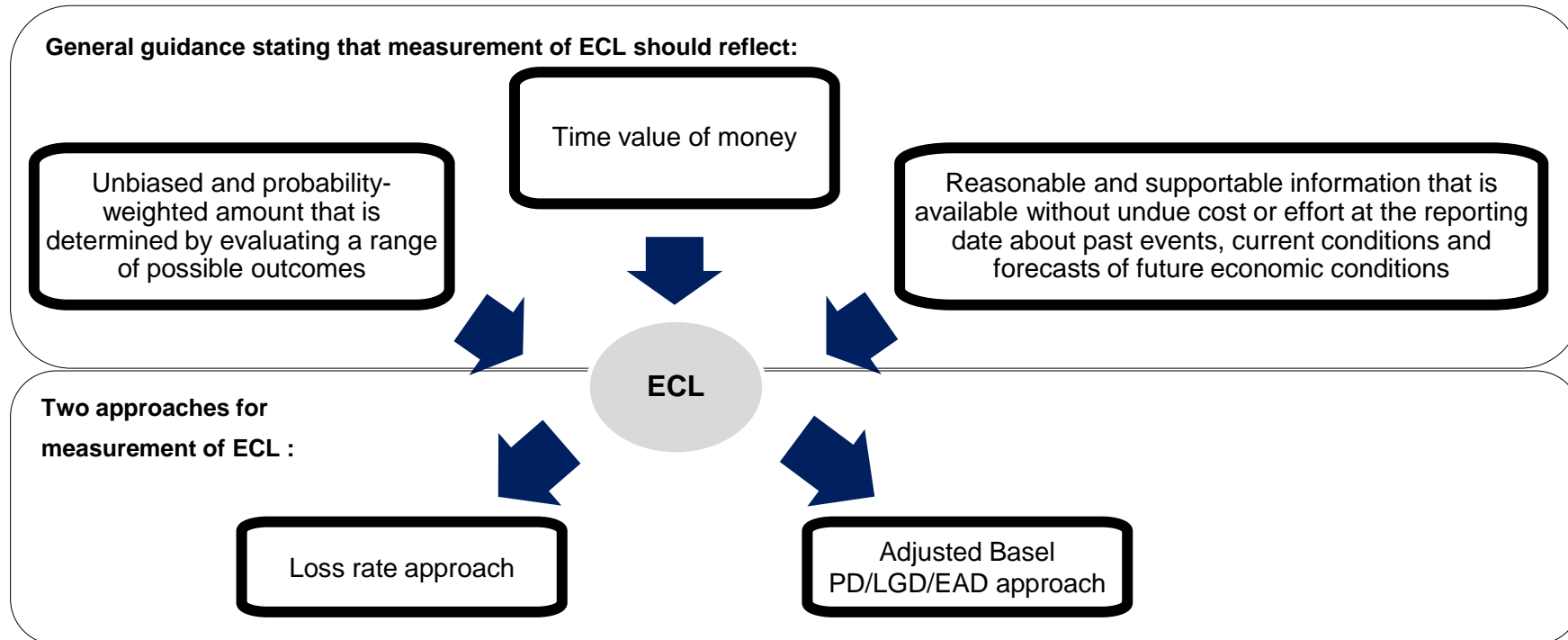
Gross Basis

- Gross carrying amount (which is the amortized cost before recognizing the impairment loss)

Net Basis

- Amortized cost (which is after the impairment loss has been considered).

Measurement methodology



- When measuring expected credit losses, entity need not necessarily identify every possible scenario. However, it shall consider risk or probability that credit loss occurs by reflecting its possibility, even if the possibility of a credit loss occurring is very low.
- Maximum period to consider when measuring expected credit losses is maximum contractual period (including extension options) over which entity is exposed to credit risk and not a longer period, even if that longer period is consistent with business practice. This means that measurement horizon of ECL should not go beyond the point where further extension options are at discretion of lender but should consider extension and prepayment options at discretion of borrower.

Approaches to measurement

Simplified loss rate approach to lifetime ECL suitable for non-financial entities (provision matrix)

Loss rate approach is most suitable for non-financial entities as it does not require sophisticated credit risk management systems in place.

Under a loss rate approach, lifetime ECL are calculated using a **provision matrix** which can be constructed using the following steps:

- **receivables are segmented** based on different credit loss patterns (e.g. based on customer type, product type, geographical region, collateral etc.),
- **ageing** of receivables is prepared (e.g. not past due, past due 1-30 days, 31-60 days, 90+ days)
- **historical loss patterns** are calculated and treated as a starting point in estimating loss rate,
- historical data is **adjusted** to consider reasonable and supportable information that is available without undue cost or effort at the reporting date about current conditions and forecasts of future economic conditions.

Adjusted Basel Approach

- Financial institutions often use Basel PD/LGD/EAD approach as a starting point in ECL calculation, which is then adjusted to meet IFRS 9 requirements.

Loss Rate Approach – 12M ECL Example



12-month Expected Credit Loss (ECL) Measurement

Loss Rate (LR) approach

Facts:

- Bank as a lender – 2,000 bullet loans with total gross carrying amount of CU500,000
- Portfolio segmented into borrower groups (X & Y) based on shared credit risk characteristics at initial recognition
- Historical defaults per 1000 loans sample: 4 defaults (Grp X) and 2 defaults (Grp Y)

Assessment:

- Bank considers forward looking information and expects an increase in defaults over the next 12 months compared to the historical rate: 5 defaults (Grp X) and 3 defaults (Grp Y)
- At the reporting date, the entity assesses that the expected increase in defaults does not represent a significant increase in credit risk since initial recognition for the portfolios – therefore Lifetime ECL is not considered.

	# clients in sample	Estimated GCV per client	Expected defaults	Estimated GCV at default	PV of observed loss	Loss rate
Group	A	B	C	D= B x C	E	F = E / B
X	1,000	CU200	5	CU1,000	CU750	0.375%
Y	1,000	CU300	3	CU900	CU675	0.225%

These Loss Rates are then used to estimate 12- month ECL on new loans in Group X and Group Y that originated during the year and for which the credit risk has not increased significantly since initial recognition

Adjusted Basel Approach – 12M ECL Example



12-month and Lifetime Expected Credit Loss (ECL) Measurement

Probability of Default (PD) approach

Facts:

Entity as a lender - Single 5-year loan for INR 10,000 (EAD – Exposure at Default) at an EIR of 10%

PD Term Structure:

Marginal PD Term Structure					
Portfolio	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Stage 1 (P1)	1.50%	1.20%	1.00%	0.90%	0.75%

ECL Computation:

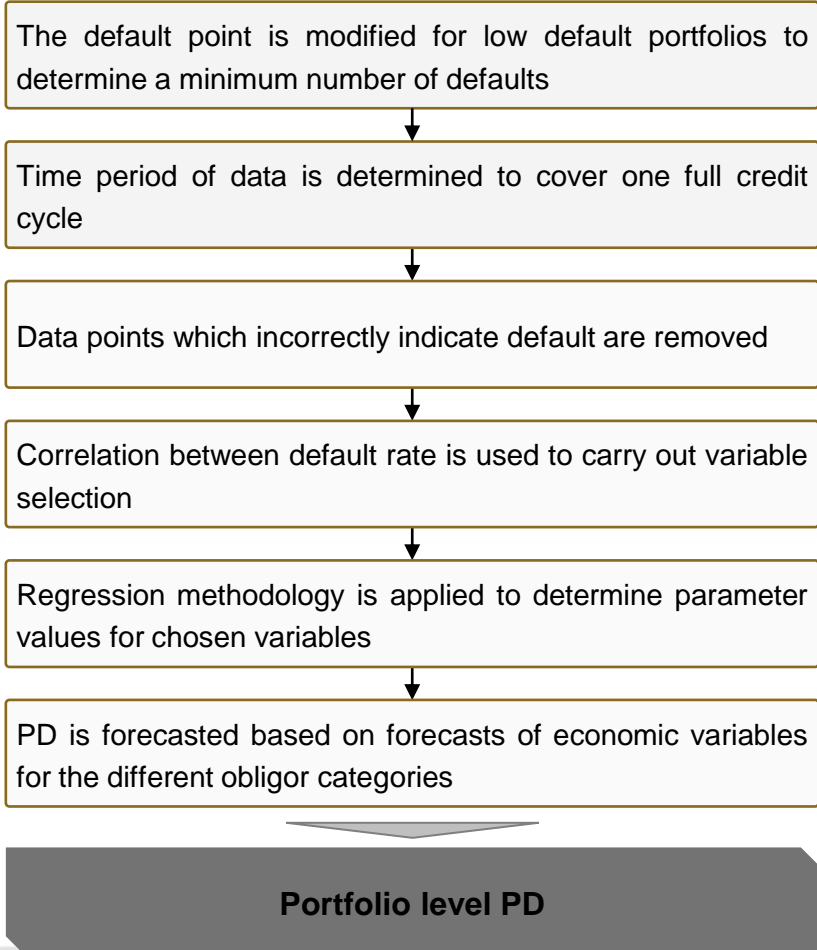
ECL Computation					
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
EAD (A)	10,000	8,000	6,000	4,000	2,000
Principal Repayment		2,000	2,000	2,000	2,000
PD (B)	1.50%	1.20%	1.00%	0.90%	0.75%
LGD (C)	25%	25%	25%	25%	25%
Discounting factor (D)	0.91	0.83	0.75	0.68	0.62
Provision (A*B*C*D)	34.09	19.83	11.27	6.15	2.33

12-Month ECL	34.09
Lifetime ECL (Sum of 5 years provision)	73.67

Common PD modelling methodologies

Model Methodology	Statistical Models	Structural models	Reduced form models	Vintage approach
	<ul style="list-style-type: none"> Estimated using statistical estimation techniques for dependent variable relationship Can use macro and obligor specific data 	<ul style="list-style-type: none"> Estimated using obligor level information PD generated for each obligor based on financial metrics of the organization 	<ul style="list-style-type: none"> Estimated from the observable prices of market instruments Calculated using the spread above treasury bonds as an indicator of risk premium 	<ul style="list-style-type: none"> Estimated empirically using historical default data of a large universe of obligors Pools created according to similar credit characteristics
Benefits	<ul style="list-style-type: none"> Intuitive relationships defined between default and default indicators Can be used with various input types 	<ul style="list-style-type: none"> Considers detailed obligor specific inputs Considers an endogenous explanation of default 	<ul style="list-style-type: none"> Market consistent approach hence no bias in estimates Flexible nature allows effective calibration 	<ul style="list-style-type: none"> Accurate estimates for portfolio level PD Easy to back test results of estimation
Drawbacks	<ul style="list-style-type: none"> Complex process involving various estimation steps Subjectivity in choice of modelling technique 	<ul style="list-style-type: none"> Assumptions may be unrealistic Can provide volatile results depending on choice of metrics 	<ul style="list-style-type: none"> Only applicable for companies with market observable prices Risk premium might arise from other factors 	<ul style="list-style-type: none"> Does not capture effects of economic cycles No consideration to default correlation

Statistical model



Required data

- Historical modified delinquency rates for portfolios
- Historical economic data for variables that can be intuitively linked to the portfolio default rate
- Historical dynamic data on obligors based on their credit worthiness characteristics

Value derived

- This model aims to explain the variation in the default rate based on the variation in certain explanatory variables. Dynamic obligor level data as well as economic factors can be used as an input to such a model
- A combination of such datasets is used to determine the PD for defined time horizons

Structural model

Merton model

- The Merton Model assesses the credit risk of a company by modelling the company's equity as a call option on its assets.
- It provides a link between the default risk and the capital structure of the firm.

The value of a firm's balance sheet metrics are adjusted for any inconsistent yearly fluctuations

The volatility of asset returns is estimated basis the return on industry indices

The rate of return is taken as the risk free rate of return prevalent in the economy

The probability of default is the probability that the asset value falls below the liability value on expiry

The expiry and other underlying factors are modified basis the required time to maturity for the liabilities

Marginal yearly PDs can be determined by changing the time to expiry of the option.

Obligor level PD

Required data

- Value of a firm's assets, liabilities and equity
- Estimated rate of return on assets (usually risk-free rate) and the estimated volatility of the market value of assets

Value derived

- Credit risk of a company is directly linked to the financials of the company and its expected rate of return on the assets
- Determines the probability of bankruptcy for the obligor incorporating all other liabilities of the obligor

Vintage approach

Pooling Method

- This model buckets individual facilities into different pools based on their common credit characteristics
- Pool level PD might be determined based on the historical average of individual pools or some predictive methodology

Each common credit characteristic of the portfolio is analysed for its discriminatory power

Common credit features are run through tests such as information value and chi square tests

Pools are determined based on a combination of parameters shortlisted as per above tests

Certain pools might be chosen based on assessment of business stakeholders in spite of test results failing

Historical observed default rate is observed over a period of time to ascertain pool level ODR

PD can be considered as constant or adjusted for portfolio level default or macroeconomic factors

Pool wise PD

Required data

- Historical portfolio details along with credit characteristics of individual obligors / facilities
- Movement of obligors from regular state to default state

Value derived

- This model groups together facilities with common credit characteristics whose probability of default would arise from similar factors
- Allows regularization of PD across portfolio while ensuring sufficient granularity based on credit risk factors is maintained

Vintage approach

Roll Rate Method

- This model considers proportion of movements between various delinquency buckets to assess proportion and period taken to reach the default state
- Portfolio granularity can be decided based on availability of data and common credit characteristics

Portfolio is divided across common credit characteristics based on business perspective and data availability



The proportion of obligors or outstanding balance across each delinquency bucket is recorded across period



Proportionate movement of obligors / outstanding across delinquency buckets is calculated



Average of movements across delinquency buckets is considered to determine historical movement analysis



Product of movement across buckets results in probability of default for each bucket



Resultant PD is adjusted based on portfolio level average or macroeconomic scenario

Portfolio level PD

Required data

- Count of obligors across delinquency buckets through the time period
- Aggregate of outstanding across delinquency buckets through the time period

Value derived

- This model allows for the PD to be updated based on the most recent credit profile of an obligor.
- Model allows for use of both count or aggregate depending on portfolio distribution

Reduced form model

Synthetic Rating Model

- The metrics with respect to the financials of an obligor are mapped to a larger universe of obligors to determine a market consistent rating.
- The expectation of default is calculated based on market observable spreads for debt related instruments with similar ratings.

The financial metrics that most effectively describe the credit risk for the obligor/facility are shortlisted



The financial metrics that can be mapped to the industry averages are defined from the shortlisted set



Based on the credit rating scale as per the industry averages, a synthetic credit rating is derived



The market linked credit spreads for a given rating are assumed to be the credit spreads for the obligor



The credit spreads are converted to a probability of default using the CDS pricing formula



A binomial survival model is used to determine lifetime marginal PDs

Obligor level PD

Required data

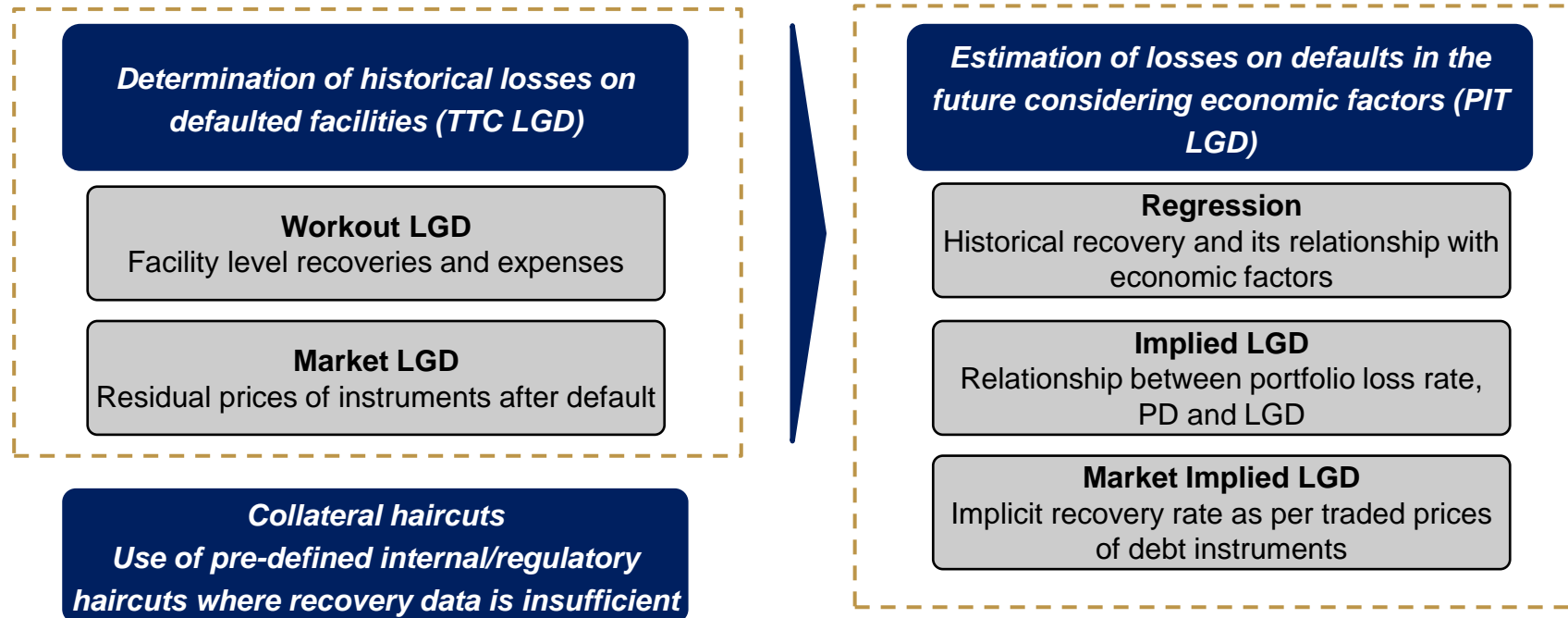
- Financial metrics for the obligor
- Financial metrics available at industry averages for credit ratings
- Credit spreads related to the credit ratings at an industry level

Value derived

- Results are based on market data and hence reflect market wide expectation of default
- PD values are within a range and therefore model does not result in unintuitive values

Common LGD modelling techniques

LGD Model development for Ind AS 109 purposes generally involves the following major steps:



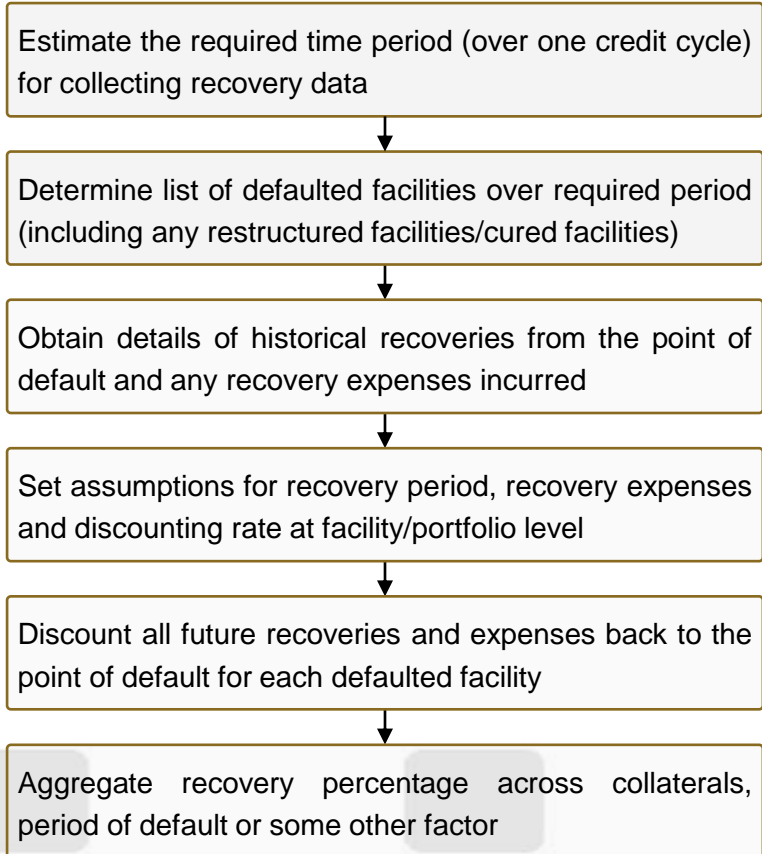
Application of LGD based on



LGD - Workout method

Workout LGD

- The workout LGD aims to determine the actual historical recoveries on defaulted facilities in the historical period considering any effect of collaterals, expenses or write-offs in the process.
- The results are then grouped basis the frequency of data available, the extent of data granularity, collateral and time of default



Required data

- List of defaulted facilities in the history
- Details of recovery at lowest granularity (from individual collaterals / unsecured)
- Details of expenses incurred during recovery period

Value derived

- LGD estimates obtained from actual recovery experience of the portfolio
- Results from the model can be frequently tested against actual default experience

LGD - Market method

Market LGD

- The observable prices of defaulted bonds and debt instruments trading in the market is observed to determine the market's estimate of recovery for the facility
- This is used as a proxy based on similar features such as residual maturity, asset cover, rating etc.

Obtain list of fixed income instruments that have defaulted in one credit cycle

Determine the average traded price of the defaulted bond over periods to determine the market expectation

Determine characteristics of the bond such as credit rating, residual maturity, seniority, covenants etc

Calculate average LGD across different combinations of the bond features

Estimate appropriate level of categorization to ensure that LGD estimates are not common across categories

Required data

- List of defaulted bonds over credit cycle
- Prices of defaulted bonds over pre-determined period
- Details of the bond features when defaulted

Value derived

- LGD estimates are consistent with the market expectations on recovery
- LGD determined as per market expectations will be unbiased estimate

LGD - Regression method

Regression

- Historical LGDs are regressed against economic variables and facility level factors to determine a relationship between the dependent and independent variables
- Forecasts of the independent variables are used to estimate the dependent variable

Determine the historical LGDs at a given frequency in the historical period



Estimate the distribution of the historical LGD to determine which function is to be used



Carry out variable selection through correlation, significance testing and statistical algorithms



Test the effectiveness of the regression equation through statistical and performance testing



Forecast the PIT LGD term structure using forecasts of the independent variables

Required data

- Historical LGD values at monthly/quarterly frequency
- Historical values of economic factors at required frequency
- Future forecasts of economic factors at required frequency

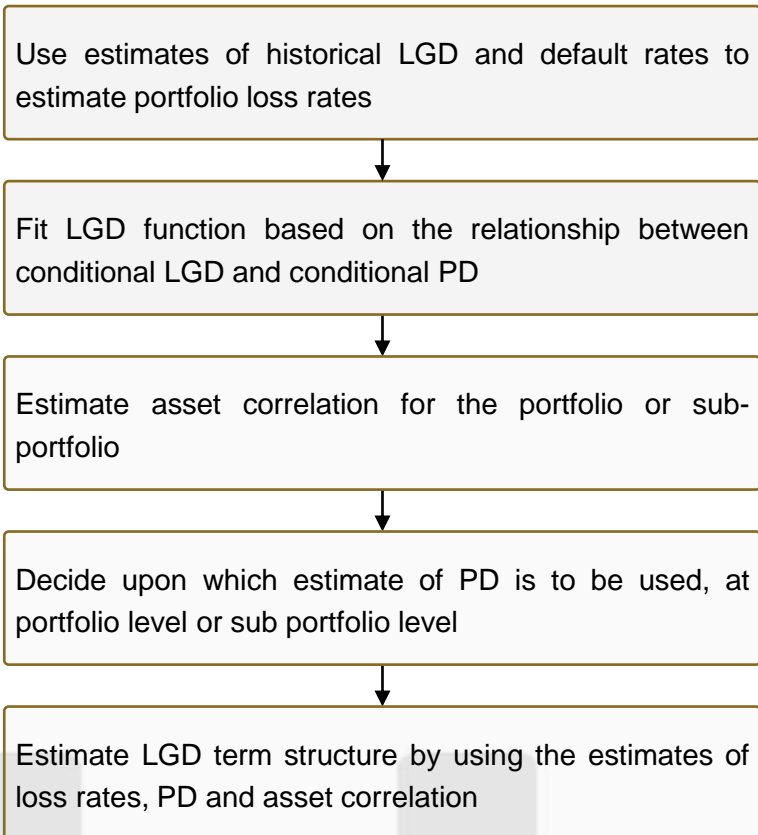
Value derived

- LGD estimates are based on a statistically proven relationship that has been thoroughly tested
- Combination of relevant factors allows the model to factor in the effect of cross relationships between explanatory variables

LGD – Jacob- Frye method

Jacob – Frye Methodology

- This method assumes a portfolio having a constant loss rate which can be explained by the assumed distributions of PD and LGD
- Assumes that conditions that provide high default rate also lead to a high LGD



Required data

- Estimate of historical LGD
- Estimate of PDs for representative portfolio

Value derived

- Useful when data for historical LGD and/or future economic forecasts is scarce
- Simplified function which is easy to fit to scarce data and calibrate for continuous model updation

Way forward for banks

The transition from incurred loss to an expected loss framework is expected to lead to wide changes in the provisioning mechanism. The following shall be the key areas of focus for banks to implement the new regime:



1

Historical data availability, accuracy and reliability for modelling PD and LGD

2

Training and upskilling of staff and building risk modelling capabilities

3

Technology and infrastructure to compute ECL for multiple portfolios at every reporting period

4

Robust model and data management policies to ensure accuracy and performance of the models

5

Robust model validation and use of challenger models and backtesting to evaluate adequacy of provisions

Questions?

Comments

Thank You

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