IRB framework, Regulatory requirements and expectations

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Anirban Basu
Reserve Bank of India

Disclaimer:

Opinions expressed here are of my own and does not necessarily reflect the opinion of RBI.

Contents

- Introduction
- IRB framework
- Work areas for banks
- Issues with Indian banks
- Use and Experience Test
- Regulatory requirement and expectations
- Modelling issues

SA	IRB
Risk weight	Long term PD
EAD	Downturn LGD
	Downturn EAD
	Maturity
	Models

Why to make life more difficult?

Tangibles

- Recognition of more collaterals
- Benefits for SME exposures in the same rating grade
- Recognition of maturity
- Recognition for better recovery management
- More risk sensitive for retail exposures

Intangibles

- Vast repository of data
- More informed and objective business decision making
- More comprehensive performance measures
- Avoidance of moral hazard - Rating agencies

Getting accreditation is the beginning of a journey with the overarching objective

to

Improve overall credit risk management CULTURE of the bank

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Probability of Default

Cohort approach- Considers beginning of the period and end of the period observations

Duration Approach- Considers movement of borrowers in the interim period as well.

- The migrated rating grades
- Time spent in those rating grades
- Consideration of borrowers with non rated status

Exposure at default (EAD)

- On balance sheet items
- Off balance sheet items

Credit conversion factor applied to off-balance sheet items for EAD calculation

EAD for off balance sheet item = CCF* Off balance sheet amount

Different methods for calculating EAD

1. Loan equivalent method (LEQ)
2. EAD factor method (EADF)
3. Credit conversion factor method (CCF)

In relation to only the available limit/Loan equivalent (***LEQ***) method

- As percentage of undrawn limit=

$$\{Out(t)-Out(t-1)\}/\{L(t-1)-Out(t-1)\}$$

Out(t) – Outstanding at default at time t

Out(t-1) – Outstanding at a date one year prior to default

L(t-1) – Limit to the borrower at a date one year prior to default

- As percentage of total limit/***EADF*** method

= {Out(t)-Out(t-1)}/L(t-1)

- In relation to outstanding amount at (t-1)/***CCF*** method

= {Out(t)-Out(t-1)}/Out(t-1)}

Issues in EAD calculation

- If limit has increased in between (t-1) and (t)

If, Out(t-1)= 97

L(t-1) = 100

Out(t)=105

L(t)=120 and was increased after 6 months when outstanding was 99 (Out(t-0.5)=99).

LEQ=105-97/100-97=266%

Assume new facility = amount of increase in the limit

Facility 1	Facility 2
Out(t)=99	Out(t)=105
Out(t-1)= 97	Out(t-1)= 99
L(t-1) = 100	L(t-1) = 120
No default	LEQ=105-99/120-99=28%

- If drawn amount is very near to the limit

If Out(t)=99.5

Out(t-1)= 99

L(t-1) = 100

LEQ=99.5-99/100-99=50%

EADF= 99.5-99/99=0.5%

CCF= 99.5-99/100=0.5%

Approach for historical EAD calculation

- Variable Time Horizon Approach

Reference point – at different time periods prior to the default point. Many EADs may be calculated corresponding to different periods like 3/6/9 months prior to default

Better method as all days' information may be captured for past one year

But extremely data intensive.

- Fixed Time Horizon Approach

Reference point – Fixed no. of days before default date, normally one year

Special case of Variable Time Horizon method

- Cohort Approach

Cohort of defaulted exposures belonging to certain prefixed period. Reference point at the beginning of the period.

Reference points, if set during normal time is better

Fixed horizon more conservative than cohort if

Borrower tend to withdraw more and more as default approaches as the time window for Fixed Horizon method on average will be longer than cohort method.

Loss given default (LGD)

Possible types of LGD calculation

- Exposure weighted LGD
- Default weighted LGD

Basel framework prescribes default weighted LGD

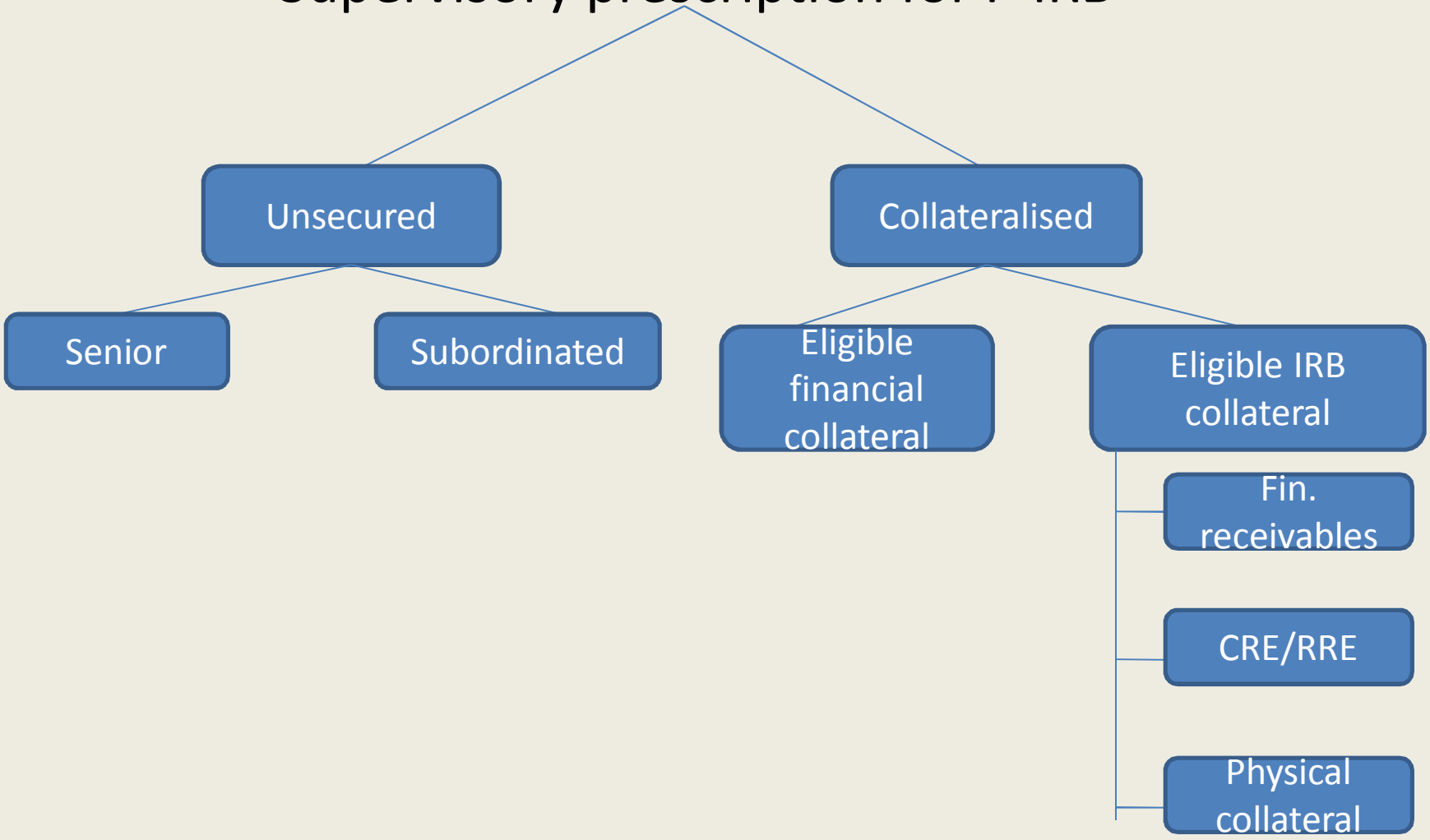
Loss given default (LGD)

Method of calculating LGD

- *Work out LGD* (from recovery history)
- *Market LGD* (from traded price after default)
- *Implied market LGD* (from credit spread of the instruments)

LGD under F-IRB

Supervisory prescription for F-IRB



- N signifies normal distribution
- R represents the correlation of a borrower to the macro-economy
- G(PD) signifies normal inverse value of PD – the default threshold (value of assets – value of liabilities)

$$K = \left[LGD * N\left\{ \frac{G(PD)}{(1-R)^{0.5}} + \frac{(R)^{0.5}}{(1-R)^{0.5}} * G(0.999) \right\} - LGD * PD \right] * \left[\frac{1+(M-2.5)*b}{1-1.5*b} \right]$$

Downturn LGD

Stressed PD

Expected loss

Full maturity adj.

Full Maturity Adjustment (FMA)

$$\left[\frac{1+(M-2.5)*b}{1-1.5*b}\right]$$

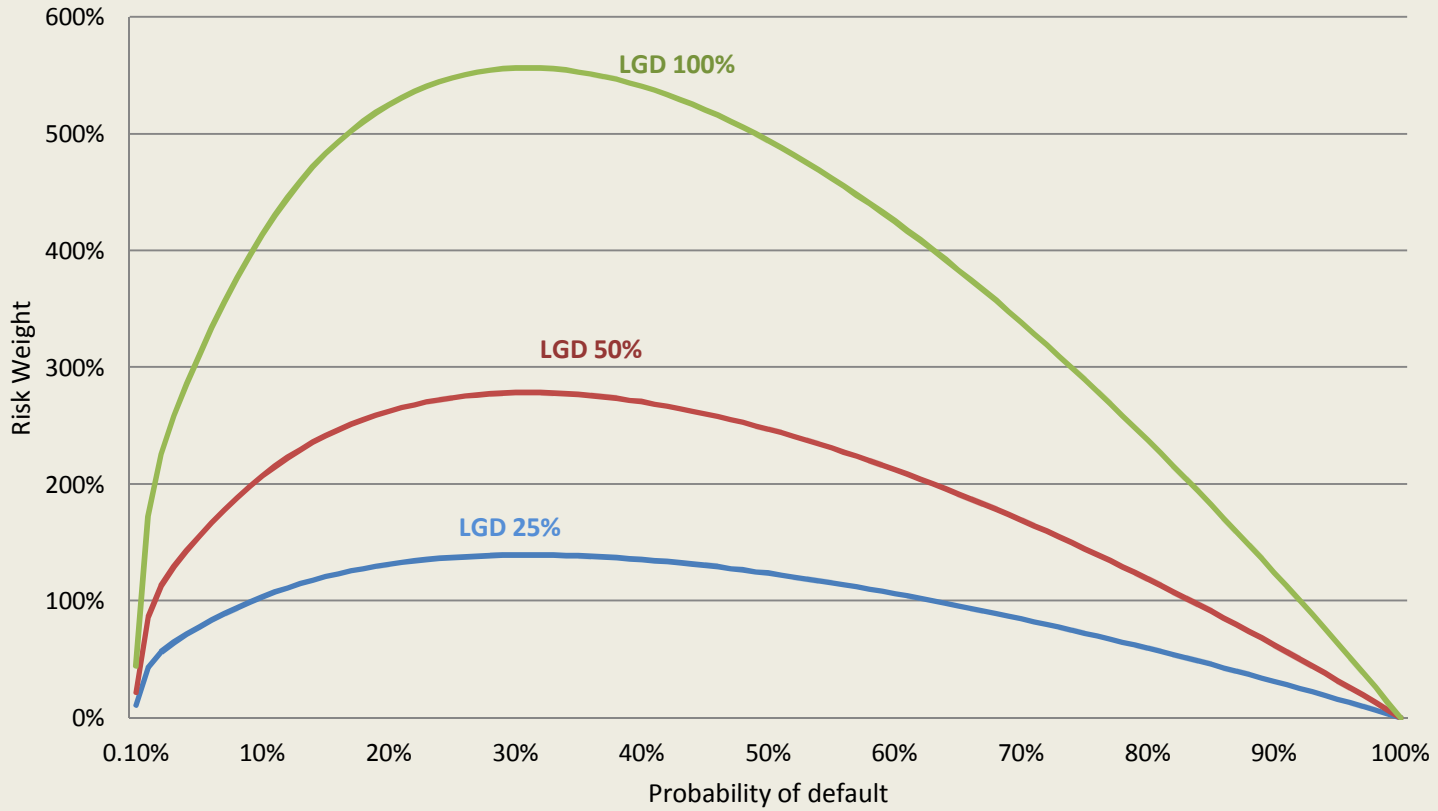
Where b= {.11852-.05478*ln(PD)}^2

So FMA = f(M,PD)

Hence, FMA and in turn cap. req. get affected both by M and PD

Examples of risk sensitivity

Same asset class with different PD & LGD



For retail asset class

- There is no separate foundation and advanced IRB in case of retail. All exposures are to be treated as per advanced IRB.

- There is no requirement for maturity adjustments in case of retail exposures.

- Correlation factors

Expected loss and provisions

- If provisions > EL, the difference may be included in Tier 2 capital upto a maximum of 0.6% of credit risk weighted asset.

- If provisions < EL, then the difference is to be deducted from common equity

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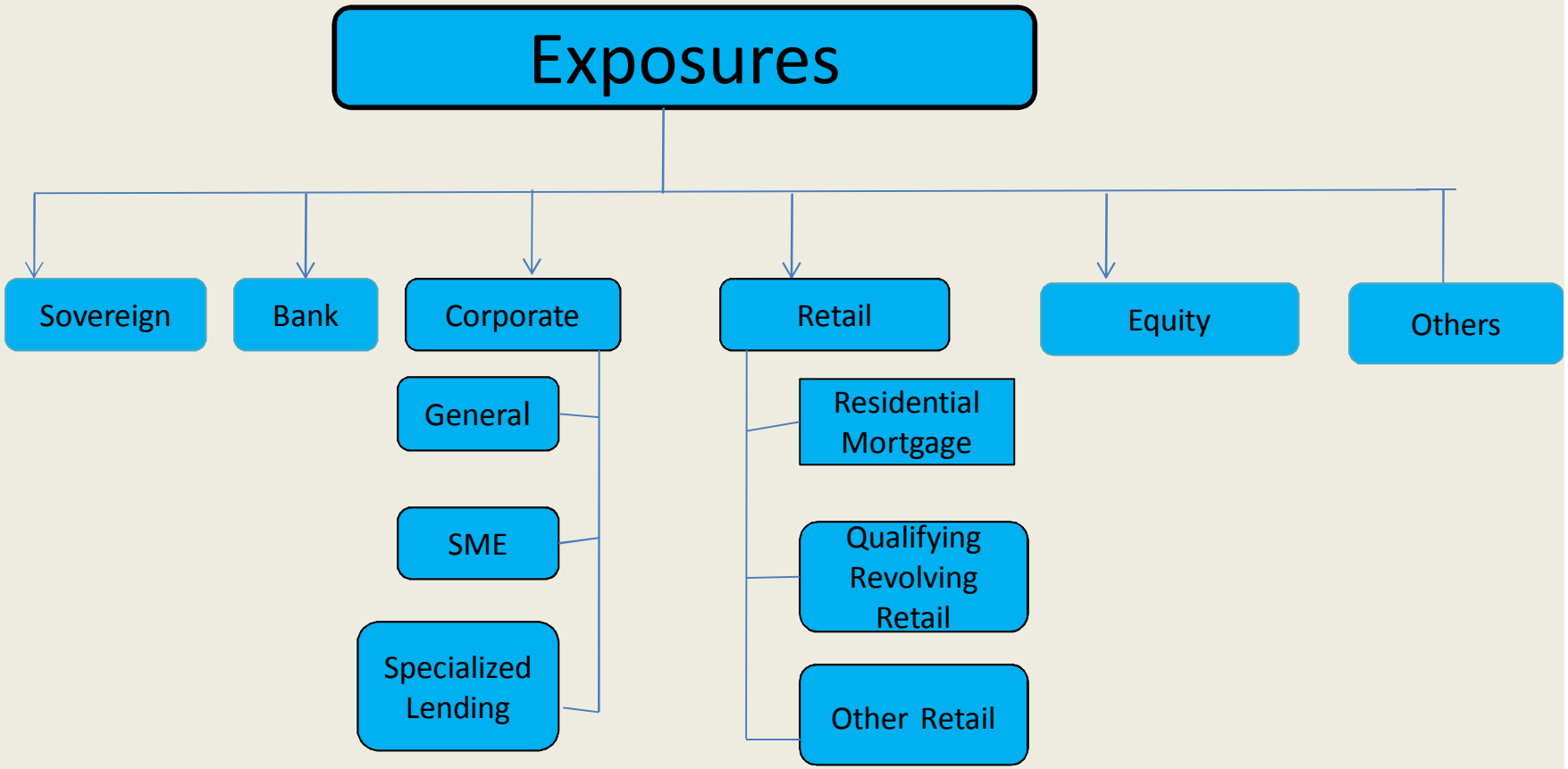
Work areas under IRB

- Categorisation of exposures
- Default data collection
- Information on CRM and recovery data
- Model building and validation
- Capital calculation
- Checks and balances

Categorisation of Exposures Under IRB



Default data collection

- At least 5 years of asset class wise past data
- Consistent definition of default
- Remapping of restructured accounts

Information on CRM and recovery

- Data for five (retail) or seven (others)years
- Year wise, exposure wise data
- Collateral wise recovery data

Model building and validation

- For data- more is better
- Validation of models

Capital calculation

- Capital calculation engine
- Estimated IRB risk parameters as inputs

Checks and balances in the whole framework

- Corporate governance

Different Approaches under IRB

- FIRB approach is available for Corporate, sovereign and bank asset classes – Banks are expected to provide their own estimate of PD and rely on the supervisory estimates for other risk components.

- Under AIRB – banks provide their own estimation of PD, LGD and EAD and their own calculation of M – For retail asset class, this approach needs to be followed, except that there is no explicit maturity adjustment.

- Within Corporate - SL sub-asset classes – If banks do not meet PD estimation requirements, specific risk weights associated with Supervisory Slotting Approach may be used.

- For equity exposures which are not held in the trading book, two broad approaches – Market based approach and PD/LGD approach.

- For Securitisation Exposure – Rating Based Approach – Supervisory Formula – Internal Assessment Approach.

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Issues with Indian banks

Asset categorisation

- Turnover/banking sector exposure for SMEs
- Specialised lending exposures
- Committed, unutilised, unconditionally cancellable exposures

Corporate Governance

- Role clarity - Audit and Validation team
- MIS to the Board or designated committee

Data management

- Veracity of data used
- Year wise, account wise default data collection based on collaterals

Collateral

- Valuation of collateral
- Identifying eligible collaterals

Models

- Initial internal validation
- Expert judgment models
- Usage of CIBIL score for retail pooling
- Granularity in SME rating

- Margin of conservatism
- Inclusion of restructured accounts
- Downturn estimates
- Risk drivers for retail LGD, EAD

Audit and validation relationship

Audit

- *Internal*
  - ✓ Mostly qualitative
  - ✓ Adherence to laid down policies
  - ✓ Control, overruling etc.

- *External*
  - ✓ Mix of quantitative and qualitative
  - ✓ Accounting data with capital calculation data
  - ✓ Adherence to laid down policies

Validation

- *External*

An independent entity

- *Internal*

Internal resources of the bank with adequate expertise but independent from the team which built or purchased a particular model.

- Over and above, validation by RBI

Indian journey for IRB approaches so far

- IRB Guidelines in December, 2011
- Application window offered April-June, 2012
- Gist of self assessments received Sep, 2012
- Meeting and correspondence with applicant bank based on self-assessment documents
- Detailed information kit containing questions sent to applicant banks in November – 2012
- Received responses from banks in Dec - 2012

- Scrutiny of responses on detailed questionnaire
- One day visits to select banks in Feb- Mar 2013
- Letter to be sent to better prepared banks (based on information submitted and discussion during one day visit) to start parallel run process
- Reporting format during parallel run period to be sent
- Data collection for FIRB LGD estimation

Transition Arrangements

- Transition period – For minimum of two years from the date of implementation of this framework.

- Minimum capital requirement during transition period - Prudential floor –

  - Year 1 –100% as per the standardised approach under Basel II.
  - Year 2 and onwards till further notice- 90%.

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Regulatory expectations for ‘Use test’

Use test

Scope of ‘Use of IRB framework’ transcends much beyond regulatory capital calculation

Main areas of embedment:

- Strategy and planning process

  - ✓Allocation of economic capital
  - ✓New business lines/products
  - ✓Acquisitions/expansions

Credit exposure measurement and management

- ✓ Credit portfolio management
- ✓ Credit approval
- ✓ Pricing
- ✓ Portfolio limit setting
- ✓ Provisioning

Reporting

- ✓ Credit portfolio reporting with rating grade details etc.
- ✓ Other MIS to Board or senior management

Implications of Use test

- A bank's IRB ratings and associated risk estimates play an essential role in its day-to-day risk measurement and management processes

- Regulatory comfort and encourage to improve risk management techniques.

- Incentive for the bank to continuously calculate accurate and up-to-date IRB risk parameters.

Concern for RBI, if

- IRB calculation only for regulatory purposes with little or no internal incentives for ensuring the quality of those components (Goodhart's law)
- a deterioration in the accuracy and robustness of the IRB components is unlikely to be picked up by the bank's internal processes
- the bank lacks a process for continuous improvement in the estimation process of the IRB components
- Artificially low IRB estimates as compared to bank's internal estimates

Regulatory expectations for ‘Experience test’

- Adequate experience in using proposed IRB framework (preferably one year or more)

- Experience will usually be counted prior to the date of application

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Corporate governance

Requirement

- General understanding of the IRB framework by the Board and senior management
- Regular, effective reporting to Board
- Independence of Risk units from Business units
- Independence of model development and validation teams
- Undertaking internal and external audit

Expectation

- Board should be able to appreciate how IRB framework improves the whole gamut of credit risk management of the bank (better tool to analyse the bank)

- Senior Management should not treat the exercise as mere regulatory compliance and should be able to use it to make better business decisions.

- Should be able to judge appropriateness and effectiveness of credit rating and risk estimates by reviewing the reports

- Ensuring appropriate control in place
- Effective role in policy formulation related to IRB approaches
- Fixation of credit risk appetite preferably based on risk parameters
- Proper Audit Trail should record data on any change done in the system which may affect risk parameter estimation (e.g. overruling credit rating)

Documentation

Requirement

- Proper and updated documents should be there in respect of all aspects IRB framework of the banks

Expectation

- All the policy related documents should be in place after approval from the Board/designated committee

- Update policy and process documents on a regular basis and not an one time exercise for regulatory compliance

- Should be comprehensive enough (with records and reports) for a new employee or regulator to have a proper understanding of all the components of IRB framework

Specialised lending (SL) exposures

Requirement

- Slotting of SL exposures as per Appendix or mapping RW as per external rating.

Expectation

- Different rating system for each of the SL categories.
- If rated under corporate model then the needs to convince RBI on the appropriateness of the same
- Mapping with external rating as and when applicable.

Calibration of risk parameters in general

Requirement

- Estimates should be based on historical experience and empirical evidence and not purely based on human judgment.

Expectation

- Usage of historical data is a must for any model.
- Mere human judgment should not be a substitute of empirical data

Calibration of PD

Requirement

- Minimum of five years of data from any one of the alternative sources.

Expectation

- Rating grade wise data requirement for minimum five years.
- Mapping of new rating with old ones if rating model has undergone changes.
- Simple average PD instead of weighted average PD

Third party data management sign-off

Requirement

- Bank should get a sign-off certificate from a third party in relation to robustness of data in the IRB framework

Expectations

- Data quality firewall (correctness, completeness)
- Consistency in data belonging to different systems
- Data security and backend modification

- Smoothness in inter-system data movement
- Historical data taken for models
- Historical data taken from physical records
- Timely update of transaction and reference data
- Sufficiency of data back-up system

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Models

Requirements

- All the models used by the banks should be well understood by the users.

Expectations

- Model documentation should be comprehensive even in case of vendor models
- If the user is not same as developer understanding is more important (assumptions and limitations)

Relevance of data used in models

Requirement

- Data used to build the model still representative of current portfolio

Expectation

- Test like Population Stability Index(PSI)
- If vendor model then necessary calibration

Validation of models

Requirement

- All the models should be internally validated

Expectation

- Both initial and on-going validation should be done.
- Bank should set prefixed acceptable ranges for validation results

Validation of models

Requirement

- Validation should be carried out independently

Expectation

- Validation and development of a model should necessarily be done by different officers.

- Initially some dispensation but eventually separate teams altogether

- Reporting of these two units at reasonably higher level.

Models- Overarching objective

- Meaningful assessment of borrower and transaction characteristics
- Meaningful differentiation of risk
- Reasonably accurate and consistent quantitative estimates of risk

Pre-requisites for models

- Design of the model should be conceptually and intuitively sound
- Accuracy of the predictive power in terms of risk parameters' estimates
- Applicability and limitation of the models

Modeling issues

Quantitative techniques - Integral part

But

Judgment is also critical in model building as well as regulatory assessment of model estimates.

Cases where judgments play crucial roles

- Scarce or incomplete data
- Assumptions used in the model
- Selection of predictor variables
- Overrides of model outcome

Difficult to encounter clear cut cases and hence weighing the pros and cons of alternative

Judgments– Intuitive and consistent

Quantitative validation

Quantitatively, banks should validate

- Discriminatory power
- Calibration
- Stability

Quantitative validation may also involve

- Benchmarking

Qualitative validation

- Robust model risk policy (or other related policies) that detail sound model and system development, validation, release and control processes.

- Where validation results are breaching prefixed threshold, plans for remedial action, management response and progress should be documented.

- Officers involved should have the requisite skill sets

- Board and Senior Management should receive the results of the model validation process including details of remediation measures

As a regulator how do we look at models?

- ✓ Regulatory compliance???
- ✓ Is the data representative (either internal or external)
- ✓ Business decisions
- ✓ Comprehensibility (more or vendor models)
- ✓ Validation
- ✓ Conservatism
- ✓ Limitations

In IRB context, a model can be used for

- Estimation of credit rating of a borrower
- Estimation of PD, LGD, EAD
- Pooling of retail exposures
- Other possibilities explored by any of the banks here?

Some additional issues

- No consideration for inventory as collateral
- Restructured advances as default for historical PD, LGD calculation
- Current definition of default should be made applicable to all historical defaults being considered for historical PD, LGD,EAD calculation
- Full detail of LGD data to be collected simultaneously for FIRB banks as well
- Internal and supervisory demarcation of asset classes are same?
- Proper framework to override model results

Self assessment for aspiring banks

- Risk and Governance - Is your risk and capital governance framework sufficiently robust?

- Use Test - Are you confident that your bank's approach meets the use test of IRB framework?
  - ✓How well is capital management linked to the bank's risk profile?

- Data- Have you fully considered the effort required to meet all data requirements for IRB?

Introspection time

Before setting on the journey for IRB adoption

- Drive – External or internal?
- Adoption of IRB – a rigorous and continuous process and not an event
- Motive for banks – capital optimisation???
- Option and not obligation

Thank you