Internal Rating Based Approach- Regulatory Expectations

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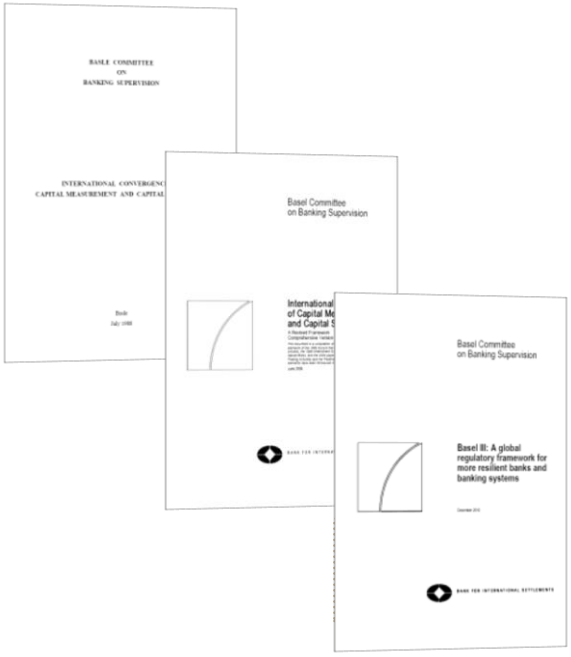
What was Basel 2 designed to achieve?

- **Risk sensitive minimum bank capital requirements**
- A framework for formal dialogue with your regulator
- Disclosures to enhance market discipline



Basel II

- Implemented in two stages.
  - Foreign banks operating in India and the Indian banks having operational presence outside India migrated to Basel II from March 31, 2008.
  - All other scheduled commercial banks migrated to these approaches from March 31, 2009.
- Followed Standardized Approach for Credit Risk and Basic Indicator Approach for Operational Risk.
- As regards market risk, banks continued to follow SMM, adopted under Basel I framework, under Basel II also.
- All the scheduled commercial banks in India have been Basel II compliant as per the standardised approach with effect from April 1, 2009.

Journey towards Basel II Advanced Approaches

- In July 2009, the time table for the phased adoption of advanced approaches had also been put in public domain.
- Banks desirous of moving to advanced approaches under Basel II have been advised that they can apply for migrating to advanced approaches of Basel II for capital calculation on a voluntary basis based on their preparedness and subject to RBI approval.
- The appropriate guidelines for advanced approaches of market risk (IMA), operational risk (AMA) and credit risk (IRB) were issued in April 2010, April 2011 and December 2011 respectively.

Status of Indian banks towards implementation of Basel II advanced approaches

- **Credit Risk**
- Initially 14 banks had applied to RBI for adoption of Internal Rating Based (IRB) Approaches of credit risk capital calculation under Basel II framework.
- seven banks have been shortlisted for detailed scrutiny for migration to IRB-Foundation Approach.
- These seven banks are undergoing parallel run process for IRB capital calculation.
- **Market Risk**
- Currently ten banks have applied for adoption of Internal Models Approach (IMA) of market risk.
- Out of these, preliminary examination has been completed for two banks and the issues identified with those banks have already been highlighted.

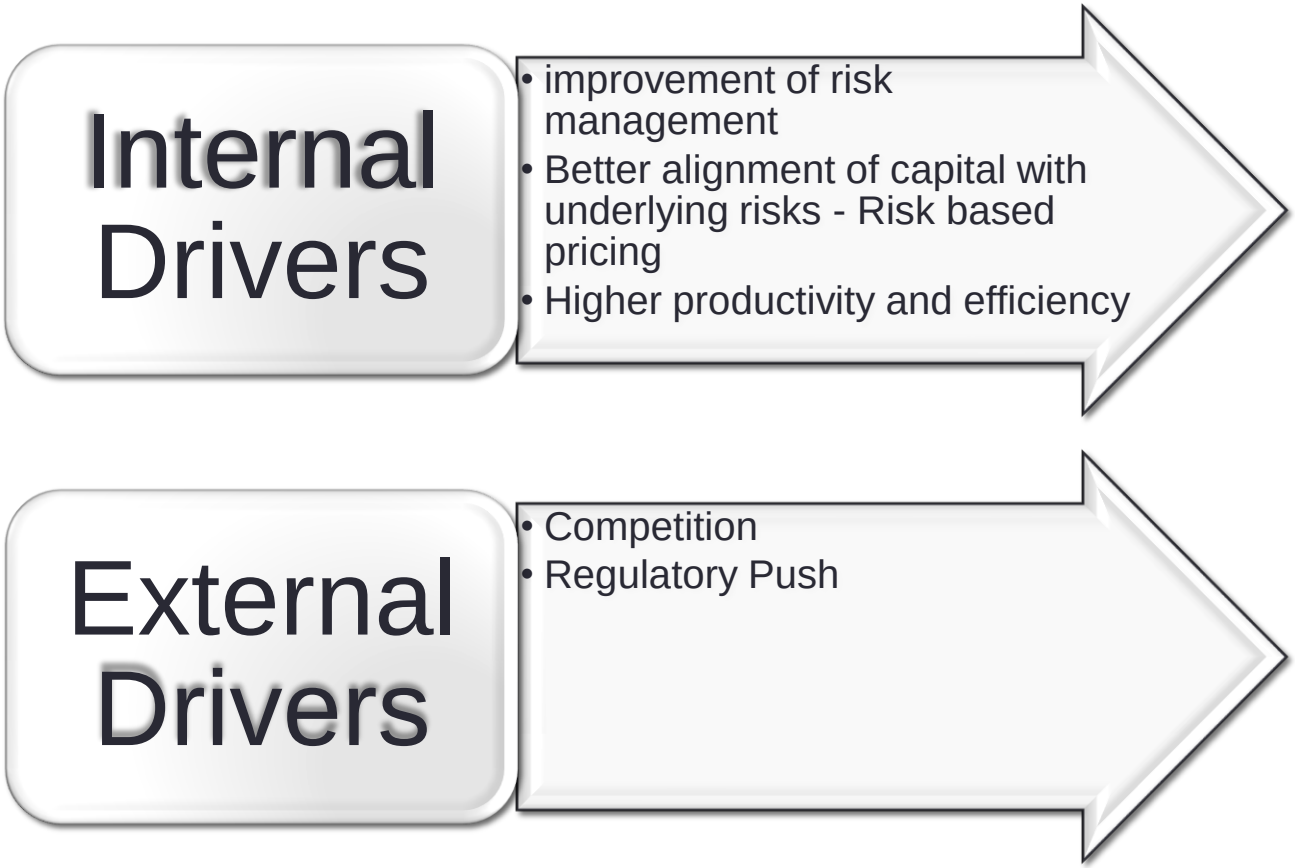
Status of Indian banks towards implementation of Basel II advanced approaches

- **Operational Risk**
- Under operational risk, 13 banks have applied for The Standardised Approach (TSA) for regulatory capital calculation
- Out of these, two banks have been granted approval for parallel run of TSA based on the off-site and on-site assessments.
- 10 banks have conveyed their intention for migration to the Advanced Measurement Approach (AMA) .
- Their eligibility for parallel run of AMA is being examined.

Objectives – Advanced Approaches

- Greater emphasis on banks' own assessment of risk
- Encourages improvement of risk management which also includes focused collation and analysis of data - data quality improves when used for decision making
- Creates a risk sensitive framework to align capital more closely with underlying risks

Drivers for Adoption of Advanced Approach



Basel II Advanced Approaches

- Unlike the most of the advanced countries where Basel II was primarily driven by banks, in the Indian context, it is being driven by the regulator.

- Basel II can best be summarized as the beginning of a journey with an objective of improving the risk management system on a continuous basis.

- More importantly, no bank should set sail on this journey with the sole intention to reach the destination of less capital requirement.

Basel II Advanced Approaches

- Regulators, however, will not mind if during the journey, because of more efficient risk management processes a bank is able to reap the benefit of reduced capital requirement.
- Banks should however be clear about the fact that adoption of advanced approaches is just an option and not an obligation for them.
- Banks need to take their decision to move to advanced approaches based on their intrinsic organizational capability and risk management system, practices and culture.

Pre-requisite for Adoption of Advanced Approach

- Robust data management process should be in place, tested and documented
- Internal Model development
- Validation, including model predictive power assessment
- Incorporating model outputs in business decision making

Basel II Advanced Approaches- IRB

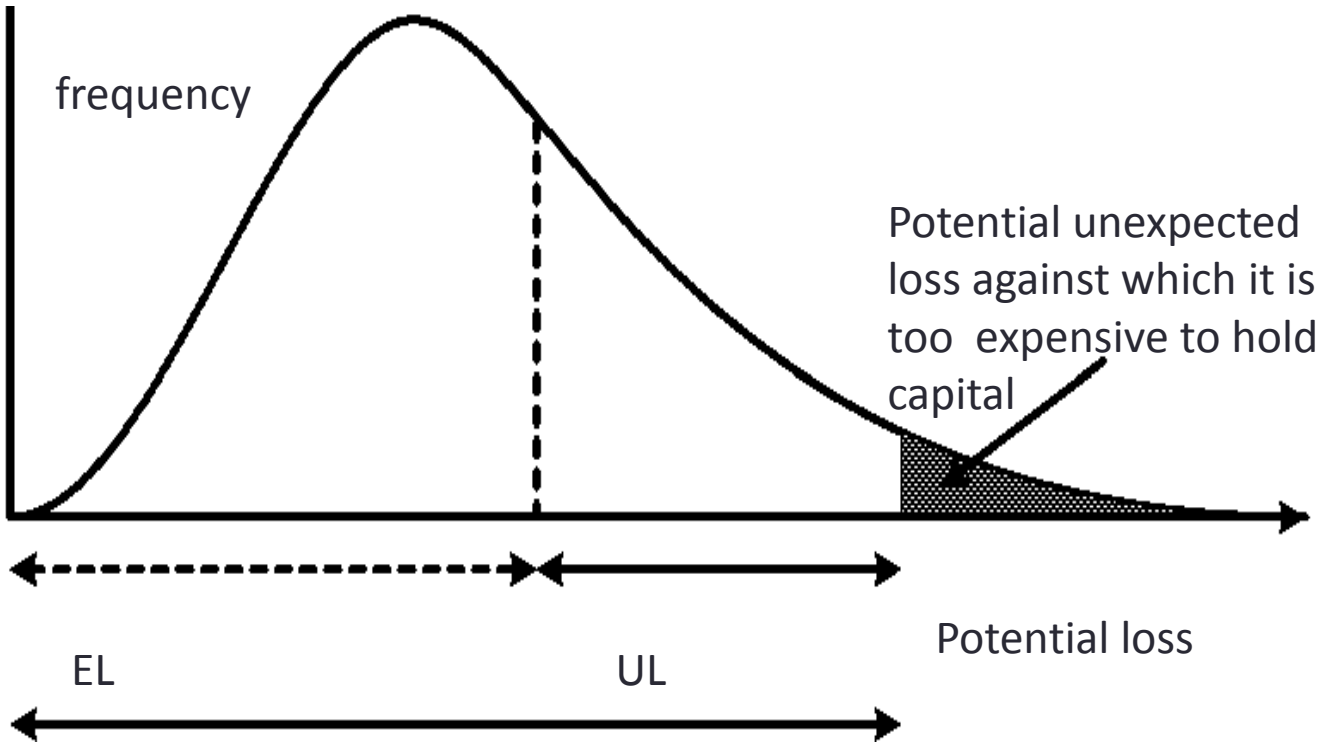
- The Basel II framework provides two broad methodologies to banks to calculate capital requirements for credit risk, namely, Standardised Approach (SA) and Internal Rating Based (IRB) Approach.
- The Standardised Approach measures credit risk based on external credit assessments.

Basel II Advanced Approaches- IRB

- The IRB Approach allows banks, subject to the approval of RBI, to use their own internal estimates for some or all of the credit risk components [Probability of Default (PD), Loss Given Default (LGD), Exposure at Default (EAD) and Effective Maturity (M)] in determining the capital requirement for a given credit exposure.
- Banks may then compute the capital requirement by using a prescribed capital formula.

Foundations of the IRB Risk Weight Formula

- Credit losses vary from year to year depending on the number and severity of default events.
- The average level of losses a bank can reasonably expect to experience is referred to as the ‘expected loss (EL)’ and is cost of doing business – covered by provisioning and pricing policies.
- Banks hold capital for potential ‘unexpected losses (UL)’ – This reduces the probability of insolvency down to a target level.
- PDs, LGDs, EADs are the building blocks that determine the credit loss distribution and amount of capital to be held.
- In the credit loss probability distribution, the tail (if UL exceeds the economic capital) indicates the potential unexpected loss (with a miniscule probability) against which it is judged to be too expensive to hold capital.


frequency
Potential unexpected loss against which it is too expensive to hold capital
Potential loss
EL
UL

Foundations of the IRB Risk Weight Formula

- The formula is derived from Asymptotic Single Risk Factor (ASRF) model.
- Large no. of diversified borrowers with each representing a very small portion of total exposures. All idiosyncratic risk is completely diversified away and the IRB model is portfolio invariant. – This allows the model to be applied to a wider range of countries and banks.
- Only one systematic risk factor.

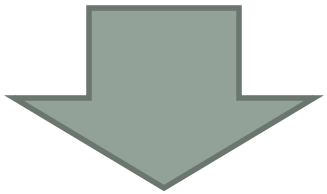
The IRB risk weight function then calculates the unexpected loss assuming that all the exposures are equally affected by one single systematic factor.

Foundations of the IRB Risk Weight Formula

- Expected loss = PD*LGD*EAD
- Probability of default (PD)- Percentage of borrowers that default in a rating grade in one year (in %)
- Loss given default(LGD)- Percentage of exposure the bank might lose in case borrower defaults (in %)
- Exposure at default(EAD)- Estimate of the amount outstanding in case of borrower defaults (in Rs.)

Calculation of unexpected loss

UL = (EL+UL) – EL



Conditional expected loss

appropriate conservative value of systematic risk factor

Foundations of the IRB Risk Weight Formula

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

Downturn LGD

Stressed PD

Exp. loss

Full maturity adj.

Asset Value Correlation (R)

$$= 0.12 * \left\{ \frac{1 - e^{(-50 * PD)}}{1 - e^{(-50)}} \right\} + 0.24 * \left[1 - \left\{ \frac{1 - e^{(-50 * PD)}}{1 - e^{-50}} \right\} \right]$$

Lowest PD=0 implies highest R of .24 and

Highest PD=1 implies lowest R of .12.

With lowest possible PD of .03 correlation will be 23.82

- Correlations (R) vary by asset class and can have a large impact on capital outcomes.

Maturity adjustment

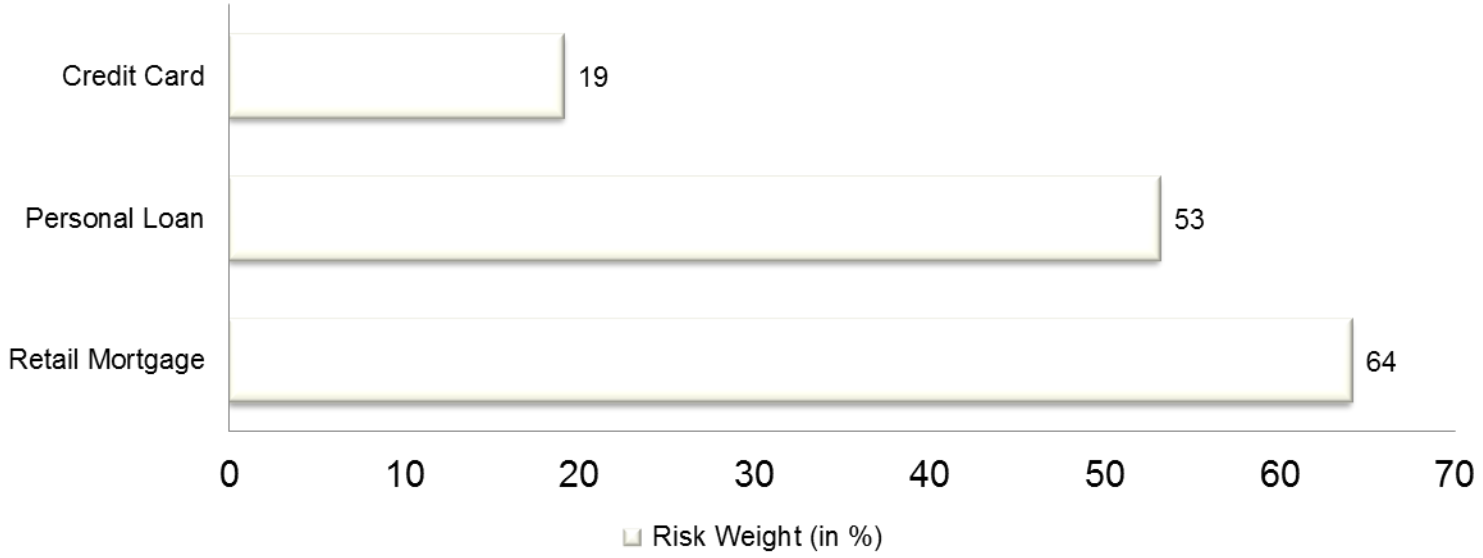
$$\left[\frac{1+(M-2.5)*b}{1-1.5*b}\right]$$

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

Examples of risk sensitivity

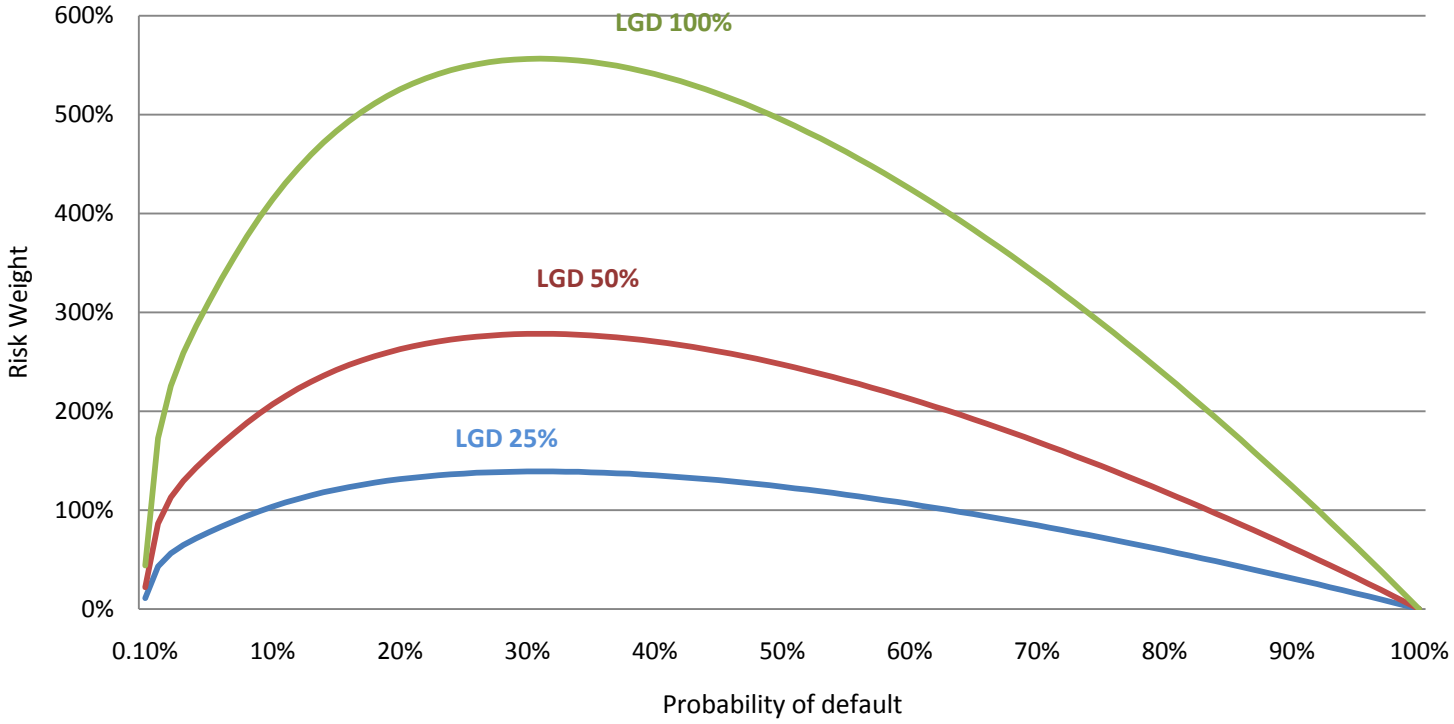
Different asset classes with identical PD, LGD & EAD

- PD of 0.9%, LGD of 55% and EAD of Rs. 50 Lakh

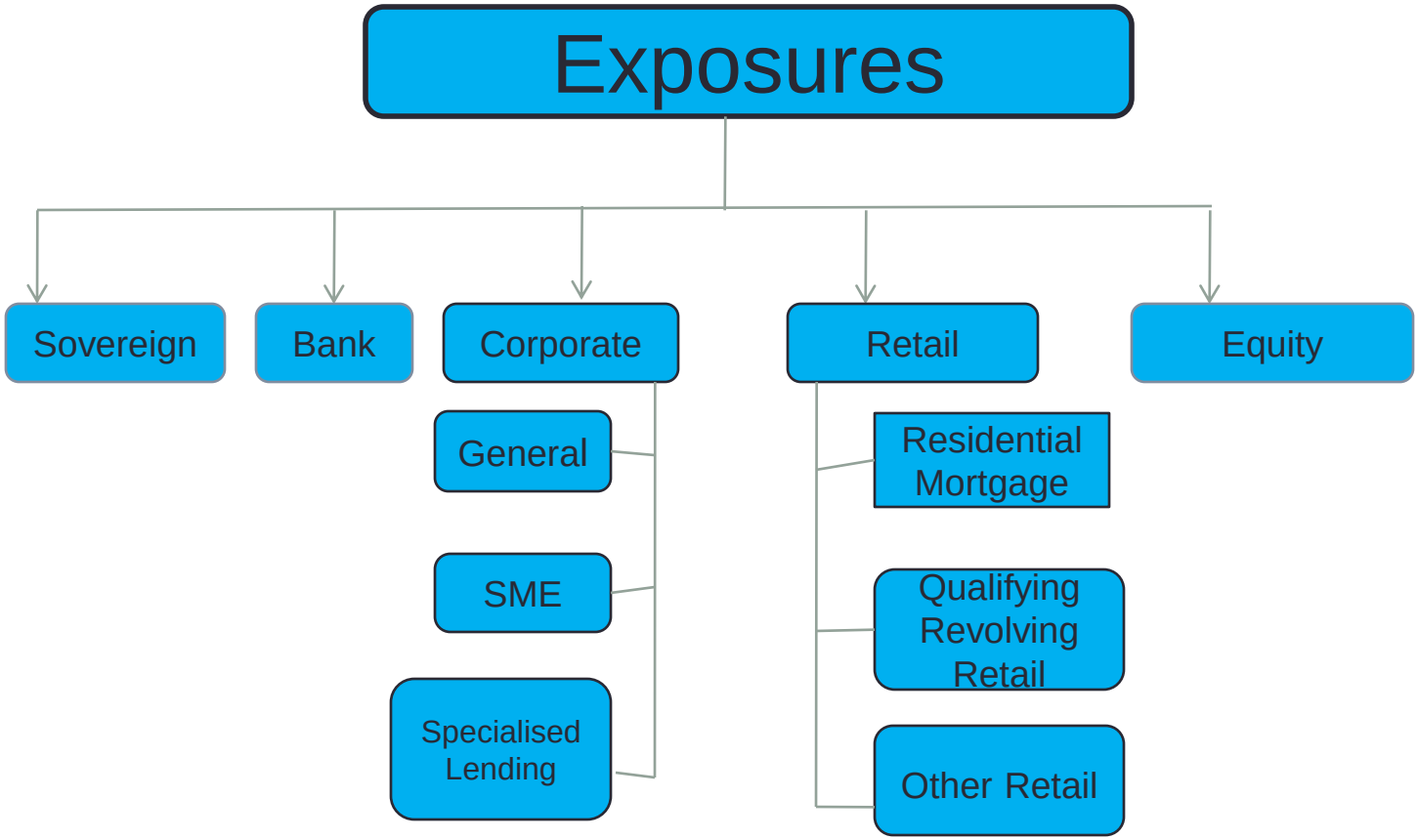


Examples of risk sensitivity

Same asset class with different PD & LGD



Categorisation of Exposures Under IRB



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.

Different Approaches under IRB

- In the absence of sufficient data points, if banks find it difficult to apply IRB approach to the exposures to RBI, DICGC, Central and State Governments and exposures which are explicitly guaranteed by the Central or State Governments, they may be treated as per Standardised Approach with the prior approval of RBI.
- Similarly, if banks find it difficult to apply IRB approach to the exposures to the exposures to ECGC, BIS, IMF and other MDBs, they may continue to be treated as per Standardised Approach with the prior approval of RBI.
- The other asset class may include fixed assets and any other exposures which the bank is not able to categorise under the five asset classes viz. Corporate, sovereign, banks, retail and equity. Banks need to take approval from RBI for categorising the exposures under this category. This may be treated as per Standardised Approach with the prior approval of RBI.

Specialised lending(SL) exposures

- Five Types

1. Project Finance
2. Object Finance
3. Commodities Finance
4. Income producing real estate (IPRE)
5. High volatility commercial real estate

- Supervisory risk weights based on supervisory slotting criteria.
- Exposures are categorised into slots (strong, good, satisfactory, weak and default).
- Only in case of absence of sufficient data points for modelling PD, LGD and EAD for these exposures.

Qualifying criteria for retail exposures

- Exposure to individual person/persons or small business (without any limit for individuals)
- Exposure to a single retail borrower should not be more than 0.2% of total retail portfolio of the bank
- Low value of loan amount (exposure < Rs 5 crore
- The exposure must be one of a large pool of exposures.

Point to remember

- 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

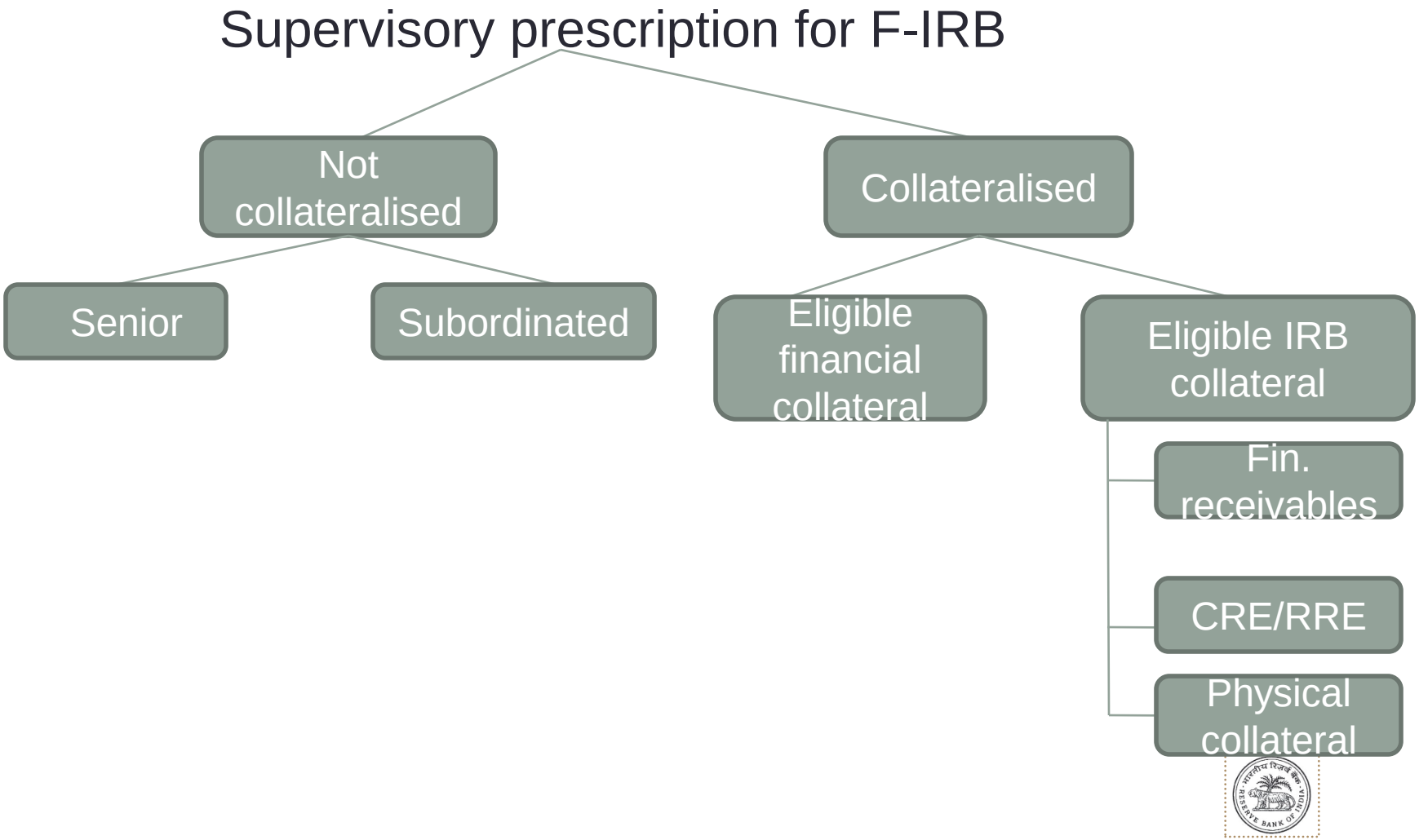
Probability of Default (PD)

- borrower specific with 1 year time horizon
- Minimum value of 0.03 for corporate, retail and bank exposures. No minimum prescribed for sovereign.
- Underlying minimum historical observation period is five years
- For both foundation and advanced approaches the bank has to calculate the PD on its own

Loss given default (LGD)

- Facility specific
- Loss in economic sense and not in accounting sense
- For F-IRB, LGD prescribed by supervisor
- For A-IRB banks to calculate own LGD

LGD under F-IRB



LGD under A-IRB

Criteria for own estimate of LGD

- Should be downturn LGD and can’t be less than long run default weighted average LGD
- LGD estimates must be grounded in historical recovery rates and, when applicable, must not solely be based on the collateral’s estimated market value
- Estimates of LGD must be based on a minimum data observation period that should ideally cover at least one complete economic cycle but must in any case be no shorter than a period of seven years.

Exposure at Default (EAD)

- EAD calculation depend on whether an exposure is

1. On B/S (straight forward calculation)
2. Off B/S but not market related
3. Off B/S market related items like Forex, Int. rate contracts

EAD under F-IRB

- Prescribed CCF for Off B/S **non** market related items.

- For market related off B/S items, current exposure method is used to calculate EAD.

- Total exposure= sum (current credit exposure+ potential future exposure)

- Current credit exposure= positive MtM values of these instruments

- Potential future exposure=prescribed CCF applied on notional principal amount

EAD under A-IRB

- Banks are allowed to calculate EAD (and hence CCF) on their own subject to fulfilling certain conditions.

Caveat: own CCF may not be used for the exposures which are assigned 100% CCF under the foundation approach.

- Exposures for credit risk will be assumed as zero if it is on central counterparty in relation to Securities Financing transactions and derivative transactions.

Effective Maturity (M)

For F-IRB

- M=2.5 yrs. (exception is repo style transactions where M=6 months)

For A-IRB

- Barring with certain exemptions (based on size of borrower) M=max(1 year, remaining effective maturity in years).

But in all cases, M<=5 years.

Calculation of remaining effective maturity

Remaining effective maturity: $\sum_t t * CF_t / \sum_t CF_t$

t= period in no. of years when payments are due

CF= Interest, principal due from borrower on payment dates

If this calculation is not possible then nominal maturity (more conservative).

Expected loss and provisions

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

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

Transition Arrangements

- Time Frame – The earliest date of making application – April 1, 2012;
- As per RBI guidelines on IRB approaches, the banks desirous to move to IRB approach from the standardized approach can provide their intent to RBI during the period of three months from April 1, 2012 to June 30, 2012 and submit the application by September 30, 2012. This application window concept was primarily introduced in order to ensure uninterrupted period of parallel run as a part of regulatory validation exercise of various models and processes involved.
- Parallel run started for select banks from September 2013.
- Transition period – For minimum of two years from the date of implementation of this framework.
- Minimum capital requirement during transition period - Prudential floor –

  Ist year –100% as per the standardised approach under Basel II.

  year 2 and onwards- 90%.

General Regulatory Expectations

- The general regulatory expectations of any bank applying for accreditation for IRB approach are given as under:

❖ Scope –

➢ An IRB bank should generally adopt IRB approach across all material asset classes, business units (portfolio segments) and the entire banking group; however, RBI may permit a bank to adopt a phased roll out.

An overriding consideration for allowing partial use is that banks must submit an acceptable rationale for any requested carve outs and the rationale should not be based on minimising regulatory capital charge. In case of temporary exemptions, the implementation plan should be exacting, yet realistic, and the roll out period should not be long, preferably not more than 24 months.

General Regulatory Expectations

- A parallel run of at least 12-18 months are expected.
- Permanent exemptions may be given to non-significant business units that are immaterial in size and perceived risk. Capital requirements for such portfolios will be determined according to standardised approach.
- The temporary or permanent exemptions should not be more than 15% of assets/net revenue, of the applicant bank.

General Regulatory Expectations

- IRB Quantification Methodology and Validation –
  - **Two-dimensional rating systems** - IRB rating systems must be two-dimensional (i.e. separately reflect PD (obligor) and LGD (facility) considerations) – Banks using slotting criteria for SL are exempted from this criteria.
  - **Meaningful assessment and differentiation of risk** - IRB ratings/risk estimates must be able to rank risk and do so consistently throughout the institution and through time (consistency of ratings around portfolio boundaries ??);
  - IRB ratings/risk estimates must be conceptually sound. All relevant, material and available information and methods should be taken into account;
  - It must be based on current information – Timely refresh of rating of individual and regular review of risk estimates and methodologies.
  - Ratings profiles should exhibit neither excessive concentrations nor granularity.

General Regulatory Expectations

- **Calibration** – IRB risk estimates must be calibrated to -
- PD: long-term average;
- LGD/EAD: downturn average; shouldn't be less than default-weighted long-term average;
- IRB risk estimates must include a margin of conservatism; where estimation methods and data are less satisfactory and the likely range of errors is larger, the margin of conservatism must be larger.

General Regulatory Expectations

- **Estimates to be grounded in historical experience and forward looking –**
- IRB risk estimates must be grounded in historical experience and empirical evidence (i.e. not based purely on subjective or judgemental considerations) – Also, it may require adjustments due to changes in internal or external environments or due to lack of representative mix of data of good or bad years.
- IRB ratings/risk estimates should be responsive to changes in credit quality ahead of (higher) loss experience rather than lag such experience.

General Regulatory Expectations –Understanding of Models

- *"For the use of the educated and the religion of fools" Robert Scanlon*
- *A model is a representation containing the essential structure of some object or event in the real world.*
- It is only a representation of the real world; Not Reality.
- Consequently one inherent characteristic of models is that they "*are necessarily incomplete.*"
- Challenge is to capture the essential structure of the object we are trying to model be it credit risk, market risk or operational risk.
- Does not obviate human intervention and critical judgement.

General Regulatory Expectations –Understanding of Models

- We do not necessarily need to understand the black box
- But we do need to understand the various choices being made in creating the black box and its full potential
- Be able to interpret the output
- Be confident that the output from the models is Relevant, Reliable & Stable
- Business Decisions
- Regulatory Compliance

Understanding of Models

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?

General Regulatory Expectations

- **Validation** -
  - An IRB institution must have in place robust, documented processes designed to validate the (on-going) accuracy of its IRB rating systems and associated risk estimates (***quantification validation***), and the operational integrity and consistency of those systems and estimates (***process validation***).
  - Consistent with this, the institution will be expected to have in place a suitably robust model risk policy (or other related policies) that detail sound model and system development, validation, release and control processes.
  - Initial Validation, on-going validation and reporting validation results to appropriate level. Where validation results are negative, plans for remedial action, management response and progress should be documented.

General Regulatory Expectations

- **Validation** - Check Points-
  - Initial and on an ongoing basis
  - End-to-end documentation of modeling process and supporting manuals
  - Validation processes should include :
    - Conceptual Soundness
    - Ongoing Monitoring
    - Benchmarking not only of model results but also model parameters
    - Identify / Review key assumptions, their potential limitations and their impact on the total risk metric for the organisation
    - Outcomes analysis process including back testing
  - Process for resolution of model deficiencies
  - Should be done by people independent of model developers
  - Should have the requisite skill sets
  - Board and Senior Management should receive the results of the model validation process including details of remediation measures

General Regulatory Expectations

- Governance and Operational Integrity -
- **Oversight -** The process of IRB application and approval should ideally include Board's sign off for application for IRB. It should be preceded by their internal/external building up process, self assessment, checking and validation – The board and senior management must demonstrate that they have ultimate responsibility for the performance of bank's rating systems and associated IRB risk estimates.
- Good understanding
- Must actively discuss the appropriateness and effectiveness of the bank's credit risk ratings and risk estimates
- To ensure that the bank implements effective and comprehensive controls and undertakes effective and independent review

General Regulatory Expectations

- Reporting to them – should be sufficient to enable them to confirm the continuing appropriateness, effectiveness and integrity of the rating system and risk estimates.
- Senior management should be more active than the board or designated board committee in assessing and ensuring appropriate and effective functioning of the institution's rating systems and the accuracy of associated IRB risk elements.
- Senior management (or an appropriate subset) should recommend and, within delegation, approve material changes and exceptions to policies and procedures.

General Regulatory Expectations

- **Independence** – Functional independence of business units responsible for rating systems and those responsible for loan origination (also validators and model builders/model selection).
- Regardless of a bank's structure, an independent internal audit or similarly independent unit must have responsibility for assessing (at least annually) that the development, implementation and validation processes are operating as designed and are effective.

General Regulatory Expectations

- **Transparency** – Banks should have in place policies that require all aspects of a bank's IRB rating and quantification system to be well documented (including in policies, procedures documentation, records, reports and other documentation relating to the system's development, operation, control and oversight).
- Documentation must be current and consistent with actual practice.
- There must be evidence of a regular and effective review process.

General Regulatory Expectations

- **Accountability** – To ensure proper accountability, a bank's policy should identify people responsible for the performance of its IRB system and establish performance standards.
- The responsibilities should be clearly defined and documented.
- People should also have the knowledge, skills, tools and resources necessary to carry out their responsibilities.

General Regulatory Expectations

- Data Management –
  - Applicant banks must be able to segment their IRB credit portfolios into IRB asset classes and sub-asset classes defined under the Basel II Framework.
  - probability of default (PD) estimates must be assigned to all obligors and loss given default (LGD) and exposure at default (EAD) estimates must be assigned to all credit facilities within the corporate, sovereign, bank and retail asset classes. Effective maturity (M) must also be correctly calculated and assigned to all facilities within the non-retail (i.e. corporate, sovereign and bank) asset classes.

General Regulatory Expectations

- PD and LGD ratings must be reviewed/refreshed at least annually; more frequently in the case of higher risk/problem exposures or if new material information comes to light.
- Institutions must gather and retain data, including on key borrower and facility characteristics, of sufficient detail, scope, reliability and consistency – may also help in on-going improvement in the bank's IRB system.
- If needed, third party data management sign-off.

General Regulatory Expectations

- Use –
  - A bank's IRB ratings and associated risk estimates must play an essential role in its day-to-day risk management processes- Regulatory comfort and encourage to improve risk management techniques.

General Regulatory Expectations

- Experience – A bank must have a credible track record in the use of internal ratings information.
  - A bank must demonstrate that it has been using a rating system broadly in line with the IRB minimum requirements for at least three years prior to qualification.

Variation in RWA

Risk based variation

- Risk differential in portfolios
- Difference in collateral and recovery management
- Difference in risk management practices
- Partial Use

Variation in RWA

Practice based variation

- Risk parameter quantification
- Data used in the model (period and representativeness)
- Supervisory slotting vs. corporate curve
- Usage of margin of conservatism
- Downturn estimate of risk parameters
- Defaulted Exposure- Best estimates of EL.

Major Findings of SIG- Banking Book- Non- Retail Exposure

- Credit risk is the key source of overall RWA variations at the bank level, accounting for 77% of the dispersion (Chart 2). The other sources of RWA variability are market risk (11%), operational risk (9%), and capital floor adjustments (3%).1
- Within the banking book, the analysis indicates that a major portion (more than 60%) of the variability in risk weights for credit risk is driven by the relative share of different asset classes based on EAD. The remaining dispersion is due to different risk weights within asset classes, which may reflect either differences in actualrisk (in which case the differences are risk-based) or its measurement (which would be practice-based).

Major Findings of SIG- Banking Book- Non- Retail Exposure

- There are, however, important practice-based drivers that contribute to RWA variation. The significant practice based drivers were:
- Capital Floor Adjustment
- Partial Use- Choice of credit risk approach (Standardised,FIRB or AIRB)
- Definition of default – due to discretionary elements into the definition of default for some asset classes.
- Treatment of defaulted exposures by banks
- Margins of conservatism in IRB parameter estimates applied by banks – to address deficiencies in data and model uncertainties – or to make estimates more forward looking

Major Findings of SIG- Banking Book- Non- Retail Exposure

- Adjustments for cyclical effects – Issues relating to robust estimates of long-run PD and downturn LGD
- Treatment of low default portfolios
- PD master scales - differences in the granularity of master rating scales and rating systems, as well as differences in the level of PDs assigned by different banks to internal rating grades that were mapped to identical external rating grades.
- Wide variation in approaches to the modelling used to estimate LGDs and PDs – also included issues on lack of data or lack of quality of data, etc.
- A rough translation of these differences into potential impact on banks' capital ratios suggests that the observed risk-weight variations across banks could result in significant variations in capital ratios; in some cases, capital ratios could vary by more than 2 percentage points in either direction.

THANKS

THANKS