Rating models development in modern world:
Challenges in rating models development projects in heavily regulated environment

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Agenda

1. Introduction
2. Challenges in rating models development projects
3. Calibration as a methodologically challenging area in rating model development
4. How to achieve compromise between most accurate credit risk estimates and requirements of different stakeholders?
The old statement that the main purpose of rating models is to differentiate between “Good” and “Bad” customers is not valid any longer in modern world

The main purpose of a model is to differentiate between “Good” and “Bad” customers

[Diagram showing the distribution of Good customers and Bad customers]
Rating models are required to support multiple objectives, and are therefore subject to various requirements

- Accurate Asset Valuations/Early Warning
- Central role in any approved IRB framework
- TTC PDs are required
- Ratings/PDs are input to various Pillar 2 risk models
- Rating/PD models are central part of any stress testing framework
- Risk disclosure is moving in the direction to be more ratings specific
- Disclosure requirements of models details, performance etc.
- PIT PDs for life time of the loan are central part of coming IFRS9
- Improved customer selection and streamlining of credit processes
- Active differentiation of customers by value and incorporation of risk considerations in pricing decisions
- Risk disclosure is moving in the direction to be more ratings specific
- Disclosure requirements of models details, performance etc.

Business applications:

1. Pillar 1, IRB setup
2. Pillar 2, ICAAP, Stress testing
3. Pillar 3, Risk Disclosure
4. Provisions, IFRS 9
5. Credit process optimisation
6. Risk-based pricing
7. Increase Returns
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Typical 4 main areas of GAPs of model development in the FSA process

- Regulatory Assessment Approach
- Ranking Model Development, Risk Factors Selection
- Calibration to PD, SM/Uncertainty buffers
- Strategical choices
Stakeholders influence on the main model development steps results in a final model far from the "ideal" one

Typically modest requirements from Pillar 2 team, stress testing team, IFRS9 where rating models are playing central role
Challenges in different phases

**Strategy and project organization**

- Project drivers and agenda: Business value, Compliance or Capital efficiency; BUs, Risk or Finance department?
- Global vs country local models
- Rating philosophy, PIT or TTC?
- External vs Internal data for development
- Impact on other rating models
- Governance structure in responsibilities between different parts of organisation
- Decision-making process (many different decision making bodies, decisions not necessarily very clear, time-consuming, etc.)
- One or several applications?
- Level and timing of non direct stakeholders as GIA, IT, etc. involvement to make most of value of it

**Data**

- Adequacy, quality, completeness and representativeness of the data. Data accessibility.
- What is included in adequate selection of data?
- Mismatch in bank portfolio coverage of external vs internal will be questioned by FSA
- External data not as detailed as internal wishes, e.g. adjustments to financial statements will be missing, default definition differs from internal, not include qualitative factors
- Sufficient enough number of defaults needed per risk factor. Are many models can be build with this assumption?
- Approximation of missing values – problems later with RWA and ratings distribution unexpected results
- Data availability for retrospective portfolio rerating and RWA estimation by FSA demand for several snapshots
- Use of internal non-rating data (for instance, scoring data and/or payment remarks)
Challenges in different phases - continued

Single factor analysis

- Significant level of BUs competence in rating modelling is needed to get value from the process - educate the expert group on the aims and approach for the models
- Inclusion of pure expert risk factors from BU - FSA risk later
- Long list of factors as wide as possible, always questioned by FSA later
- Finding factors that discriminate among good customers with low probability to default
- Rank ordering form of factors based on external data to consider for pure TTC models
- Acceptance from the expert group for statistical factors can be challenging

Multifactor analysis

- Choice of more accurate and complex models other than logistic regression?
- Possible model risk, based on distribution assumptions
- High correlation among factors.
- The model should capture several “risk-dimensions” that corresponds to the expert group’s view on risk assessments.
- Finding a set of factors that are robust, i.e. has a high explanatory power in different segments and over time.
- Simple models not always best ones! analysis of alternative assumptions and approaches to model design
- Challenge in BUs cooperation at this stage
Challenges in different phases - continued

- Challenge to achieve rating philosophy (PIT, TTC) needed
- Model based SM vs MS based SM
- How much conservatism? No direct guidance, can be interpreted differently by different FSAs. Additional add on requirements from local FSA
- How to incorporate regulatory floors in calibration?
- IFRS9 requires PIT PD, whereas RWA requires TTC PD
- Low Default portfolios calibration challenges
- Coming RTS on PD estimation to consider
- Economic cycle estimation is needed for PIT and TTC PD estimation, as well other, parameters as for example asset correlations
- EBA: The application of the margin of conservatism should not be used as an alternative to correcting the models and ensuring their full compliance with the requirements of the CRR
- In draft RTS it has been clarified that results of stress tests should be taken into account in the assessment of the adequacy of the calculation of LRADF and the dynamics of rating systems.

- Internal decision makers usually rely 100% on developers recommendations – formal approval
- Capital effects as a part of initial validation
- Capital effects can only be measured for the calculated rating, a full RWA impact analysis “impossible” without shadow re-rating of whole portfolio
- Measuring Capital effects on sample can give misleading results
- How many rating grades are allowed not pass tests? What happens on “corners”?
- “Testing tool” for individual customers can be misused in BUs with no proper education
Challenges in different phases - continued

**Implementation**
- FSA Review can be prolonged – challenge for implementation
- New PD master scale – impacting all models
- Timing for implementation in a big organization
- “Big bang” or continues rerating for new model? (parallel reporting)
- Heavily involvement of BUs from very beginning will ease acceptance at the end
- Running full BU acceptance before FSA approval can be challenging if FSA will require significant updates
- How to explain regulatory conservatism to BUs? The (over-) conservatism demanded by Regulators for internal models may impair the effectiveness of the internal uses.
- Business Expert vs Statistical Judgment

**FSA process**
- Different agenda of different regulators
- Single Supervisory Mechanism with ECB involvement to consider
- Should regulators be focused on RWA effect reviewing rating models? No capital savings to the price of worse accuracy?
- Regulatory Consistency Assessment Programme (RCAP): Tendency to approve “similar” to other banks models, challenge with new and non-conventional ones
- Central supervision for the significant banking groups
- Regulation is perceived as being more rule based instead of principle based
- Increased consistency in models output? and comparability? No way for advanced technique and creativity in model development
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The classical view on calibration will not hold, and it will be much more complex in reality….

Here we calibrate to an average long run probability of default ("central tendency").
Considering country dimension for global models with one Master Scale and optimal bucketing, statistical optimization procedures make calibration more complex.
Safety Margin requirements in calibration; one example from local regulator perspective

SM for volatility in time of PDs and degree of PITness of rating model, see next slide

- **Conservative estimate of LRDF** – Based on external information/expert judgment
  - PD shall be based on LRDF
    - Safety Margin which compensates for time series of less than 5 years
    - Safety Margin for the length of the time series

- **Safety Margin** – Data
  - Safety Margin for the number of observations available

- **PIT-estimate** – Based on historically observed internal experience
  - Estimates are based on empirical data
  - Estimates are based on the most explanatory factors
  - Estimates may be based on less than 5 years of data

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Difficult task to implement SM framework in methodologically consistent way
As TTC PDs are needed for RWA calculation, the PIT PDs are required for IFRS9 and Stress Testing, which makes calibration even more complex....

- **Model validation, PIT PDs**
  It is more natural to validate PIT PD against realized DF for each year.

- **IFRS 9, PIT PDs**
  For life time loan EL estimation PIT PDs for each year of the loan maturity are needed.

- **Stress testing, PIT PDs**
  ‘Point-in-time risk parameters’ (PDpit and LGDpit) should be forward looking projections of default rates and loss rates and capture current trends in the business cycle. In contrast to through-the-cycle parameters they should not be business cycle neutral. PDpit and LGDpit should be used for all credit risk related calculations except RWA under both, the baseline and the adverse scenario. Contrary to regulatory parameters, they are required for all portfolios, including STA and F-IRB.’

EBA – ‘Methodology EU-wide Stress Test 2014’
Version 1.8, 3 March 2014, P 26

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**RWA, TTC PDs**
For calculation of capital buffer against unexpected losses, the through-the-cycle PD (unconditional of the states of economic cycle, PD) should be used in the RWA formulas.

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**Dual Ratings, PIT vs TTC PDs** are required for key Regulatory and BUs Objectives
As typical rating models are “hybrid” ones, the PIT - TTC PDs decomposition framework is needed on the top of rating models (see references below)

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How to achieve compromise between the most accurate credit risk estimates, business value and requirements of different stakeholders?

**Accurate credit risk estimates in ideal world**
- Incorporate both statistics and experts opinion in best possible way
- Use more advanced modeling techniques
- Take advantage of external data sources to increase population
- Take advantage of other internal data to increase discriminatory power
- Create multi purpose model for capital, pricing, provisions, stress-testing, Pillar 2, etc.

**Requirements in real world**
- TTC PDs for RWA calculation
- PIT PDs for pricing, stress-testing and IFRS 9
- Different views of different national regulators to address in one model
- Models evaluated mostly by its RWA effect
- Regulatory requirements of over-conservatism
- Estimate exact future RWA effect before implementation
- …

**Way forward**
Prioritize BU (and/or credit risk management) agenda over capital savings or just regulatory compliance agenda
More accurate model is more preferable over RWA savings in long term perspective
Implement dual PIT-TTC PD framework on top of rating models
Take active approach and defend model if you have solid grounds and believe in it!
Thank you!