

Session 2

Internal Models



IAIS-ASSAL Training Seminar

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Agenda

1. Background

2. Internal Model Framework

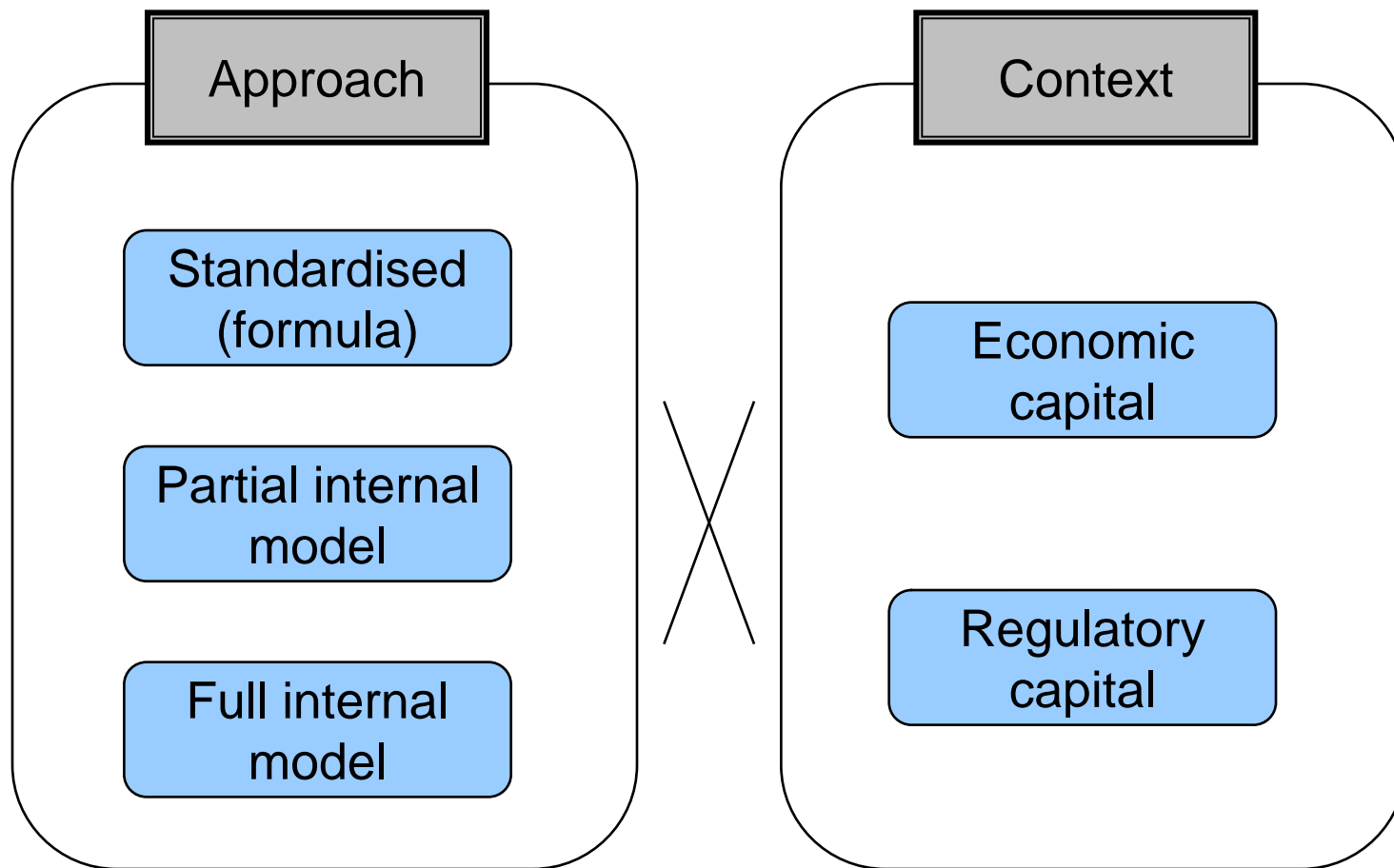
- Process
- Measures
- Diversification Effect

3. Supervisory Approval Criteria & Process

- Statistical quality test
- Use test
- Calibration test
- Documentation test



Options



Range of approaches allowed,
reflecting nature, scale &
complexity of risk & business



Rationale & Caution

- Standardised (formula)
 - Should be designed to reasonably reflect overall risks
 - Feasible for small & medium sized insurers
- Rationale for internal model
 - More tailored to complex business & risk characteristics
 - More risk-responsive
 - Better integrate risk & capital management, strategy & governance process
- On the other hand...
 - Quality of risk management & governance is vital
 - Highly sensitive to assumptions
- Subject to prior supervisory approval for regulatory capital purpose



Partial Internal Model

- Why not full internal model?
 - Smooth transition to full internal models
 - Deal with instances such as merger
 - Cost-benefit consideration (e.g. IT system cost)
- Scope
 - Acceptable provided scope is properly defined subject to supervisory approval
 - Transitional plan (but could be allowed as permanent solution)
- “Cherry-picking” not allowed
 - May invoke supervisory actions



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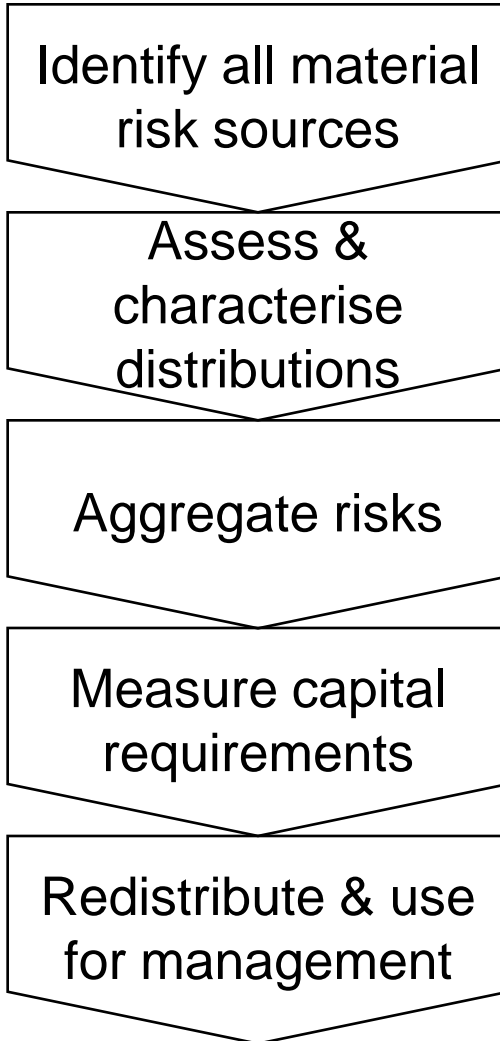
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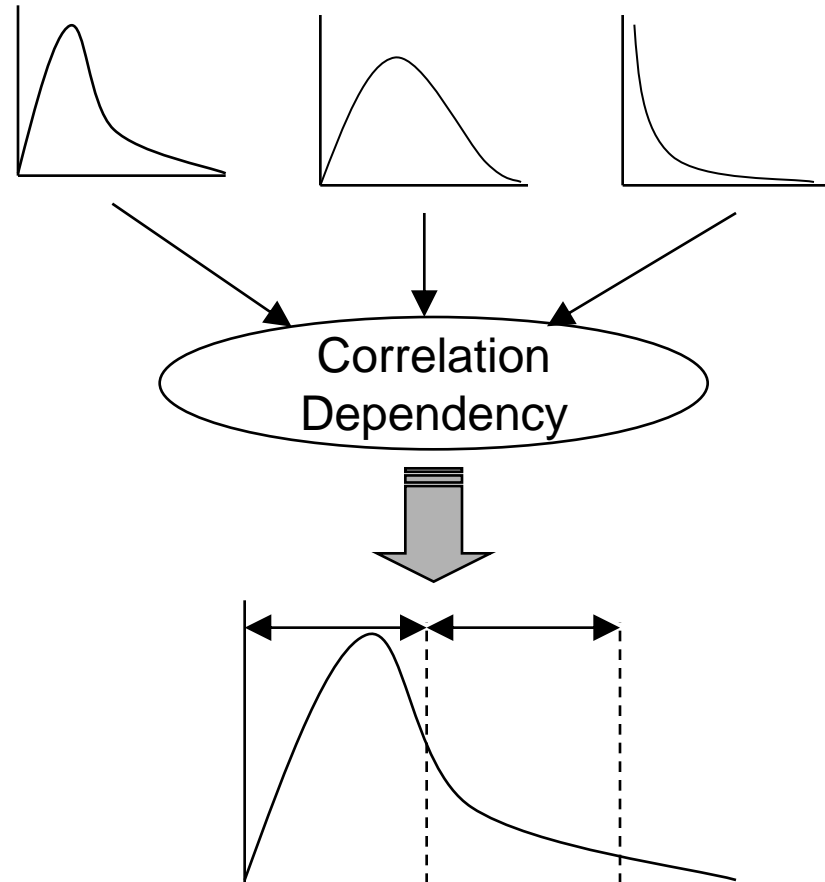
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Process



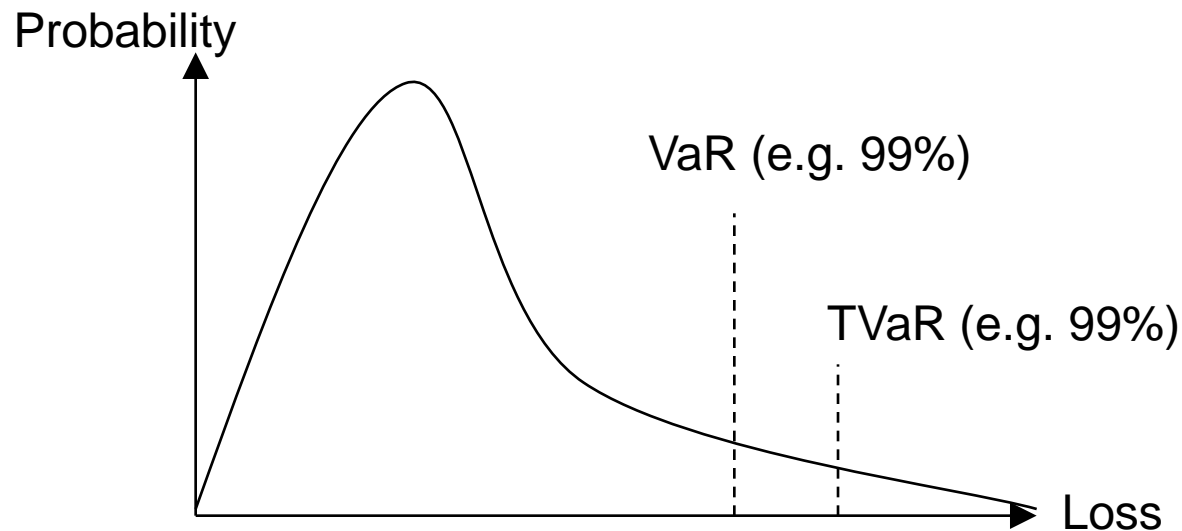
Underwriting, credit, market, operational, liquidity etc,





Measures

- Value at Risk (VaR)
 - Possible maximum loss over a specific time horizon (e.g. 1 year) at specific confidence level
 - e.g. 99.5% for Solvency 2
- Tail Value at Risk (TVaR)
 - Average VaR beyond a specific confidence level
 - e.g. 95% for Swiss Solvency Test





Diversification Effect

- Diversification effect exists
 - Horizontal (within risks)
 - Vertical (between different risks)
 - Business lines
 - Geographical
 - Across entities
- Whether & to what extent should it be allowed?
 - Dependencies increase in times of stress
 - Limited availability of data, especially stressed situation
 - Lack of fungibility of capital & transferability of assets
 - Robustness and reliability for supervisory actions



Example

Recognition of diversification in selected solvency regimes

Solvency Regime	Intra-Risk	Inter-Risk	Group or Company Level
Basel II Pillar 1	<p>No, for credit risk, although minimum capital calibration for IRB reflects an assumed degree of diversification, with assumptions most applicable under IRB.</p> <p>Yes for market risk under internal models approach, and to some extent under the standardised approach.</p> <p>No, for operational – under standardised, Yes for AMA; not required but allowed if supported – with considerable latitude allowed in calculation of dependencies.</p>	No, capital is additive between three risk categories.	No, but calculation is done at group level, which may involve netting of intra-group exposures.
Basel II Pillar 2	Possibly, through ICAAP, but subject to supervisory interpretation.		
Canadian Insurance Minimum Continuing Capital and Surplus Requirements (MCCSR)	<p>Yes, some diversification benefits within the risk components of mortality, morbidity and segregated fund guarantee risk.</p> <p>No diversification benefit is given for credit, lapse, or disintermediation risks.</p>	No, capital is additive between risk categories.	Yes, to extent risks that can be diversified are consolidated across legal entities.

(Source) Joint Forum “Developments in Modelling Risk Aggregation”



Example

US Insurance Risk Based Capital (RBC)	Yes , asset concentration factors, number of issuers for bond holdings, formula for market risk; in addition, specific recognition of diversification across liabilities.	Yes , covariance calculation computed for component RBC risk charges, but restricted due to assumption of less-than-perfect correlation.	No , capital is determined at the legal entity level for each separate entity.
Swiss Solvency Test Standard Model	Yes , recognition of risk diversification for market and insurance risks, which are aggregated with a VarCovar method with appropriate distributions and scenarios; credit risk is treated as under Basel II.		(No standard model for groups)
Swiss Solvency Test Internal Model	Yes , recognition of risk diversification for all risk categories, with no difference between intra- and inter-risk aggregation; however, credit risk can be treated as under Basel II.		Yes , cluster model plus possibly a consolidated view. Also, modelling of internal group transactions.
Solvency II (EU) Standard Formula	Yes , recognition of risk diversification: sub risks are aggregated with Var/Covar methods.	Yes , recognition of some risk diversification: <ul style="list-style-type: none"> • Aggregation by Var/Covar method. • Correlation between credit and non-life risks is 0.5, most other correlations are 0.25 • No diversification between operational risk and other risks. 	No , but group wide consolidation is possible for insurance groups <ul style="list-style-type: none"> • No cross-sectoral diversification
Solvency II (EU) Internal Model	Yes , diversification benefits recognised if methodology is approved by supervisor.		

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Statistical Quality test

- Appropriateness of methodology
 - Assumptions underlying models
 - Model inputs & parameters
 - Statistical measures
 - Back testing
 - Expert judgment
- Need high quality data to produce reliable results
 - Appropriate
 - Credible
 - Accurate
 - Complete



Statistical Quality Test

- Internal data
- External data to supplement internal data
 - Industry data
 - National data
 - Data from reinsurers
 - Data from vendors
- Need to be cautious when using external data
 - Data pool is typically larger & covers wider spectrum of market
 - May not be entirely appropriate for specific insurer
 - May need to adjust data due to difference in features between data source & insurer



Use test

- Should not be used only for regulatory purpose
- Internal model & results should be embedded in
 - Strategic decision making
 - Risk & capital management
 - Governance & internal controls
 - Operational process & procedures
- Should not be limited to “rocket scientists”
- Board & senior management
 - Overall control
 - Understanding of results & limitations
- Key personnel at appropriate level



Calibration Test

- Consistency with regulatory requirements
 - e.g. specific level of confidence
 - e.g. treatment of diversification effect
 - Difference between economic capital & regulatory capital should be explicit & explained
- May need to recalibrate/modify model
- Level playing field among insurers
 - Adjustment through supervisory approval process
 - Comparability is best achieved by dialogue between industry & supervisor



Documentation

- Why important?
 - Ensure smooth handover as personnel changes overtime
 - Avoid “black box”
- Need to document
 - Design & construction
 - Justification of underlying methodology & assumptions
 - Major changes
 - Instances where not performing effectively
 - Reliance on external vendors/suppliers & appropriateness
 - Governance



Validation

- Initial approval
 - Approval
 - Approval with conditions (e.g. additional capital requirement, improvement of model within specified time)
 - Reject
- ...and work continues
 - Ongoing review of performance
 - Follow-up on conditions
 - ...and new applications
- Notify supervisors of material changes
 - Model change policy may be agreed in advance
 - Minor changes without seeking prior supervisory approval, allowing quicker & more flexible reaction



¡Muchas gracias!



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