POLITECNICO
DI MILANO

Solvency II

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AGENDA

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1. Introduction to SII
2. Pillar I
3. Pillar II
4. Pillar III
5. SII capital requirements features
6. Basic Risk Free Yield Curve
7. SCR calculation

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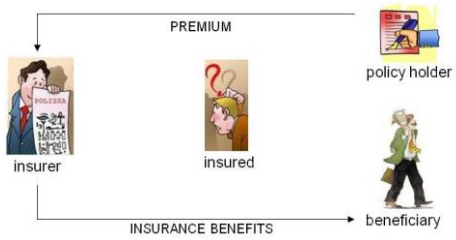
SOLVENCY



Has the insurer reserved enough money? (liabilities)

Is it solvent no matter of how adverse the financial and/or demographic situation can be?

insurer

INSURANCE BENEFITS

beneficiary

SI - milestones

This Solvency I regime was in place till 01/01/2016.

The most important milestones

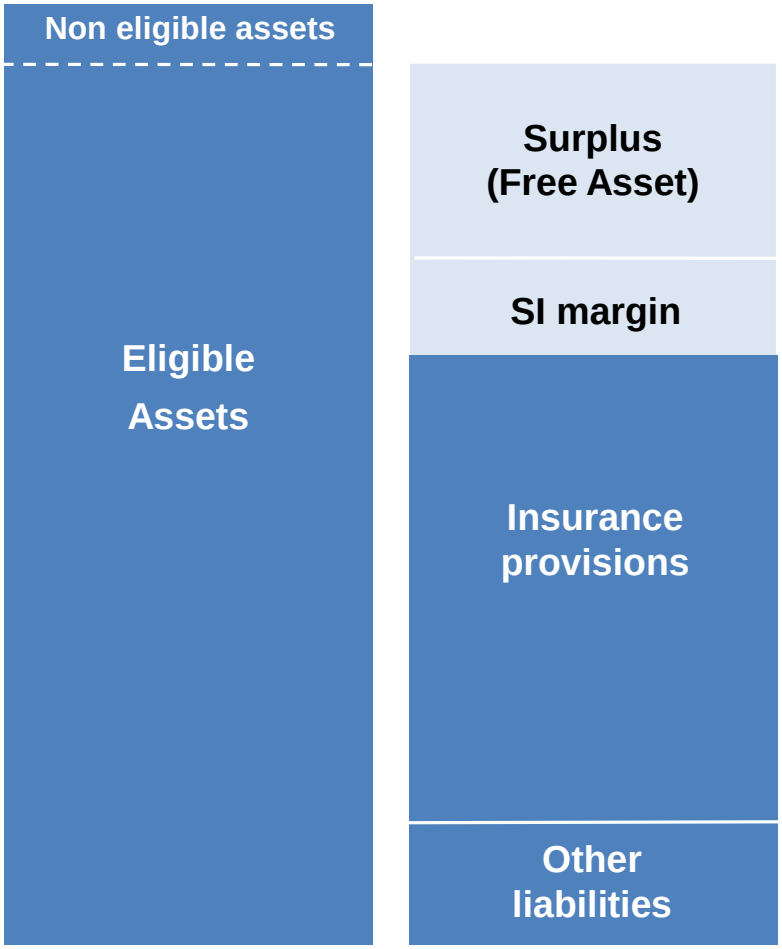
• 1970's: establishment of the EU's insurer solvency regime

• 2002: birth of Solvency I, the Directive under which the changes made to the EU's insurer solvency regime were grouped (it did not fundamentally change the requirements, that's why a more wide-ranging reform -SII- was later required)

• 2003, 20 September: date by when Member States were required to adopt their laws to comply with the new Directive

• 2004, 01 January: first day of application of the measure to the supervision of accounts

SI - outlines



Insurers are required to detain a Free Capital at least equal to the SI margin.

The Insurance provisions (or Technical Reserves) cover the expected risks

while

the SI margin is meant to be a cushion to cover the unexpected risks

SI - outlines

The SI margin is calculated

• for Life Companies: as a function of the amount of mathematical reserves and positive capitals at risk (different percentages are adopted for different insurance types)

• for Non Life companies: as a function of the volume of premiums and claims (it is the maximum value between the two calculated based on the last year incoming premia and the last three/seven years average claims)

adjusted if needed based on the reinsurance policies in force

It is clear that these criteria do not reflect the real risk bear by the insurance: the more conservative the pricing is, the higher the prices/reserves and so the SI margin

From SI to SII

DRAWBACKS OF SI

- it is not risk sensitive
- it does not encourage risk management politics and t does not reflect the risk management best practices adopted by the market
- it does not allow an easy supervision of the insurance groups, especially those which are present in different EU countries

ADVANTAGES OF SII

- it directly links the capital requirement to the risk profile of the insurance portfolios
- it encourages the companies to adopt risk management politics and to achieve the best practices in the market
- It introduces an harmonized EU-wide insurance regulatory regime. This eases the comparisons and the supervision of groups

SII - Key objectives

Solvency II is an EU legislative programme to be implemented in all 28 Member States (UK included, Switzerland excluded). The legislation replaces 14 existing EU insurance directives.

Key objectives:

- **Improve the consumer protection:** ensure a uniform and enhanced level of policyholder protection across the EU. A more robust system gives the policyholders a greater confidence in the products offered by the insurers.

- **Modernise the supervision review process:** it is more focused in evaluating the risk profile of the insurers and the quality of their risk management and governance systems rather than in monitoring the compliance and the capital.

- **Foster EU market integration and increase the international competitiveness of the insurers:** harmonizing the supervisory regimes

SII - Governance Structure

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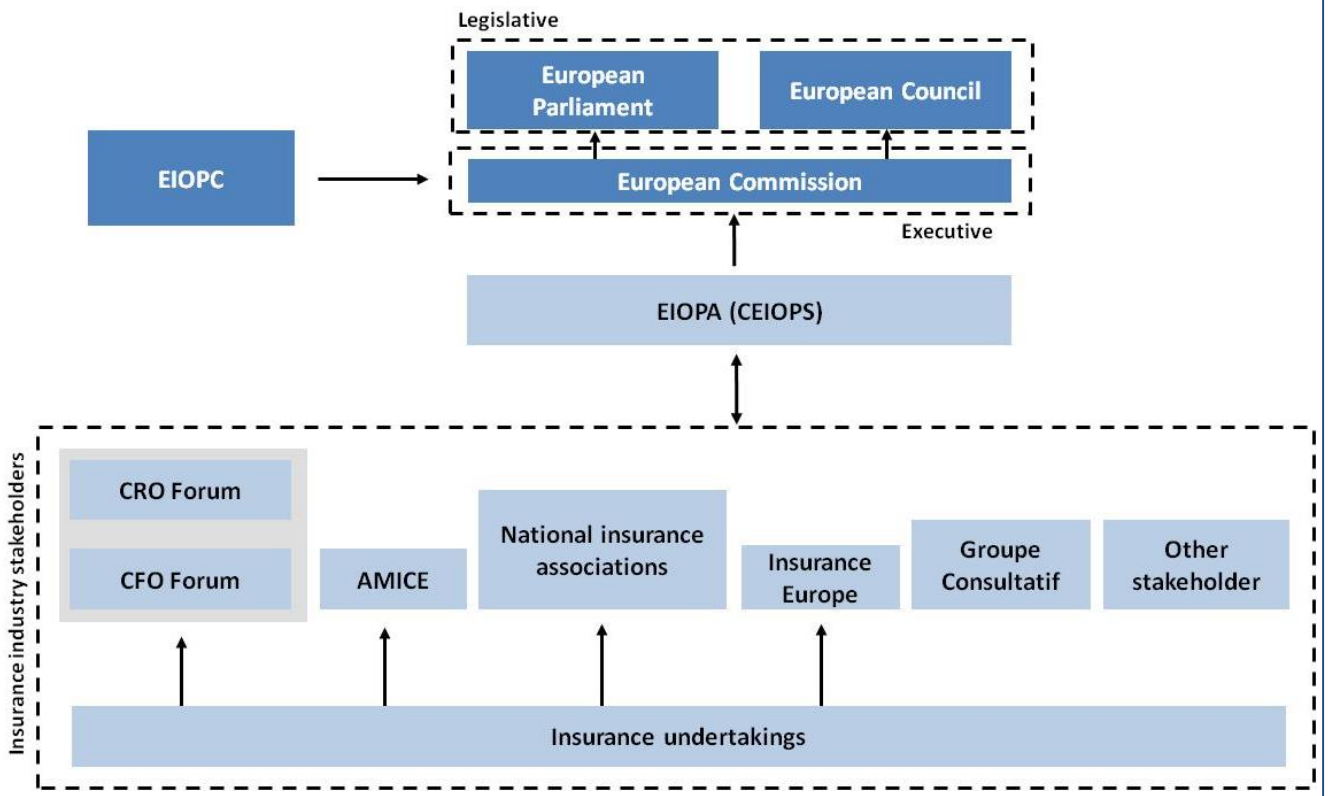
The SII directive was designed to effect financial services legislation though a standard framework, termed the "Lamfalussy Process", which his made up of four levels

	Definition	It includes	Developed by	Decided by
Level 1	SII Framework Directive Omnibus II Directive	Principle framework	EU Commission	EU Parliament and Council
Level 2	Implementing measures	Detailed measures	EU Commission + EIOPC Committee	EU Commission + EIOPC Committee
Level 2.5	Technical Standards	Implementing technical std	EIOPA	EU Commission
Level 3	Supervisory Guidance	Guidance for Supervisors convergence	EIOPA	EIOPA
Level 4	Valuations	Compliance and adoption monitoring	EU Commission	EU Commission

SI - Governance Structure

The consultation structure works as follows



SII - diving into the Directive

Level 1 - Primary legislation

It is the “Solvency II Framework Directive”, formally entitled the “Directive on the taking up and pursuit of the business of insurance and reinsurance”. It states the legal basis for its adoption and the procedures that were used and replaces the EU’s existing 14 insurance and reinsurance directives (it must be transposed into national laws)

The SII Directive contains 142 Recitals, explaining the background to the legislation and its aims and objectives. The Recitals start with “Whereas” and each one is preceded by a number in brackets. The Recitals are not part of the Directive itself, but can be used by Member States to get a better understanding when drafting the necessary measures.

It was agreed by the European Commission, Council of the EU and Parliament in 2009 and published in the Official Journal on 17 December 2009. Certain provisions of this Directive, including the implementation deadline, were amended by the Omnibus II Directive. After much delay, this was adopted by the Council of the EU in April 2014 and entered into force on 22 May 2014, following publication in the Official Journal.

SII - diving into the Directive

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Level 2 - Implementing measures

The Implementing measures spell out the detailed requirements that insurers must meet. Much of Solvency II's impact on insurers are a consequence of the implementing measures rather than the Solvency II Directive.

They are set out in Delegated Regulation 2015/35 of 10 October 2014, published in January 2015 and they do not need to be transposed into national laws having a direct effect in EU Member States

The Omnibus II Directive amends the legal form of Solvency II Level 2 implementing measures to be compliant with the regulatory structure required by the EU's Lisbon Treaty. Legally, these take the form of Delegated Acts, Regulatory Technical Standards and Implementing Technical Standards. (Level 2.5)

SII - diving into the Directive

Level 2 - Implementing measures

Delegated acts are legislative provisions made by the European Commission which supplement the Directive.
They specify how a Directive provision operates. The Directive must explicitly grant the Commission powers of delegation, defining the objectives, content, scope and duration of the delegation.

The Commission must consult experts from Member States when preparing a delegated act, but is not bound by their opinions. The European Parliament and Council have two months (plus a possible one month extension) to consider acts and they have separate rights either to adopt or to reject them.

The Delegated Acts, which take the form of a Regulation, were adopted by the Commission on 10 October 2014. Following approval of the European Parliament and the Council of the EU, the Regulation entered into force on 18 January 2015.

SII - diving into the Directive

Level 2 - Implementing measures

Implementing technical standards are legislative provisions made by the European Commission on the basis of advice received from EIOPA. They determine the conditions of application of delegated acts. They are purely technical and do not imply strategic decisions or policy choices.

EXAMPLE - Solvency and Financial Condition Report (SFCR)

DIRECTIVE	DELEGATED REGULATION	IMPLEMENTING TECHNICAL STANDARDS
Article 51 requires undertakings to prepare SFCRs Article 53 lays down applicable principles for SFCRs	Article 56 gives the Commission powers to adopt delegated acts, specifying the information to be disclosed and the deadlines.	Article 56 requires EIOPA to develop draft ITS specifying the templates to be used for SFCRs. It then gives the Commission powers to adopt those ITS.

SII - diving into the Directive

Level 3 - Supervisory Guidance

EIOPA is tasked to issue supervisory standards, recommendations and guidelines to enhance convergent and effective application of regulations

This guidance is used as a tool to increase supervisory convergence. It is not binding on Supervisory Authorities, but does present an opportunity to harmonise outcomes from Supervisory Authority decisions.

EIOPA designed Guidelines and Recommendations on how to put Solvency II's detailed provisions into effect to help national supervisors. EIOPA published final reports in July 2015 and published the guidelines in the EU's official languages in September 2015.

EIOPA may issue guidelines in accordance with Article 16 of the EIOPA Regulation. Guidelines do not need to be approved by the Commission, Parliament or Council.

SII - diving into the Directive

Level 4 - Valuations

The European Commission is responsible of ensuring that member states are complying with the legislation. If they were not, the Commission would take enforcement action.

SII - diving into the Directive

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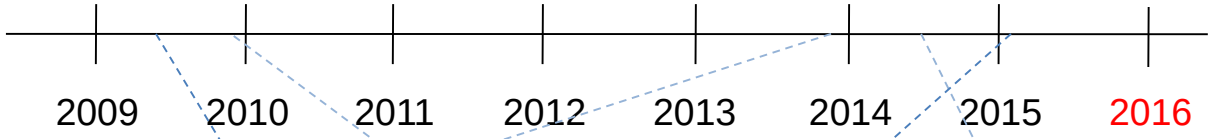
TIMELINE



LEVEL 1

- Directive 2009/138/EC of 25 November 2009 on the taking-up and pursuit of the business of insurance and reinsurance (Solvency II directive)
- Directive 2013/58/EU of 11 December 2013 postponing the application date of Solvency

LEVEL 2

Final advice on L2 implementing measures: in 2009 European Commission asked an advice to EIOPA (CEIOPS) for the implementing measures

Implementing measures – Delegated Acts
January 2015: Commission Delegated Regulation (EU) 2015/35 of 10 October 2014 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II)

The Solvency II Framework Directive (2009) on the financial position of insurance undertakings has had to be adapted in response to:
- new architecture for its implementing measures introduced in the Lisbon Treaty (2009)
- new financial supervision measures introduced in Regulation 1094/2010 establishing the European Insurance and Occupational Pensions Authority.
These changes are implemented through the **"Omnibus II directive (2014/51/EU)**

SII - diving into the Directive

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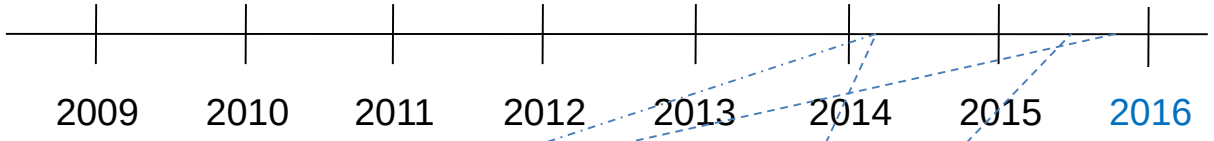

LEVEL 2.5 and 3

ITS and guidelines - set 1
- IM approval
- Matching adjustment
- SPV
- ….

ITS and guidelines - set 2
- Exposures to whom are to be treated as exposures to the central government
- Equity dampener
- Capital add on
- Credit assessment
- RSR
- Public disclosure

SII - a three pillar program

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SII is a programme of regulatory requirements split up into three main areas.

SOLVENCY II

Pillar 1 Capital requirements	Pillar 2 (*) Governance & Supervision	Pillar 3 (**) Reporting & Disclosure
1. Harmonized calculation of technical provisions 2. "Prudent person" approach to investments instead of current quantitative restrictions 3. Two capital requirements: the Solvency Capital Requirement (SCR) and the Minimum Capital Requirement (MCR)	1. Enhanced governance, internal control, risk management and own risk and solvency assessment (ORSA) 2. Strengthened supervisory review, harmonized supervisory standards and practices	1. Common supervisory reporting 2. Public disclosure of the financial condition and solvency report (market discipline through transparency)

(*) I Supervisors will monitor system of governance, capital structure and capital requirements

(**) Including business and performance, system of governance, risk exposure, concentration, mitigation

Pillar I - Capital Requirements

Major challenges and changes for the companies

- new accounting rules and algorithms to be implemented
- a new approach for monitoring the solvency
- a higher exposure to financial markets in terms of capital requirements, that is an incentive to make use of proper techniques for the risk mitigation
- material changes on capital requirements and own funds, that vary among different Line of Business (LoB) and products
- all the “risk adjusted” performance indicators need to be reviewed, this affects both the pricing of the new products and the profitability of the existing ones
- the strategy for selling products must take into consideration the diversification and the cross-subsidisation
- the quality of data in terms of completeness, accuracy and coherence must be improved

Pillar I - Capital Requirements

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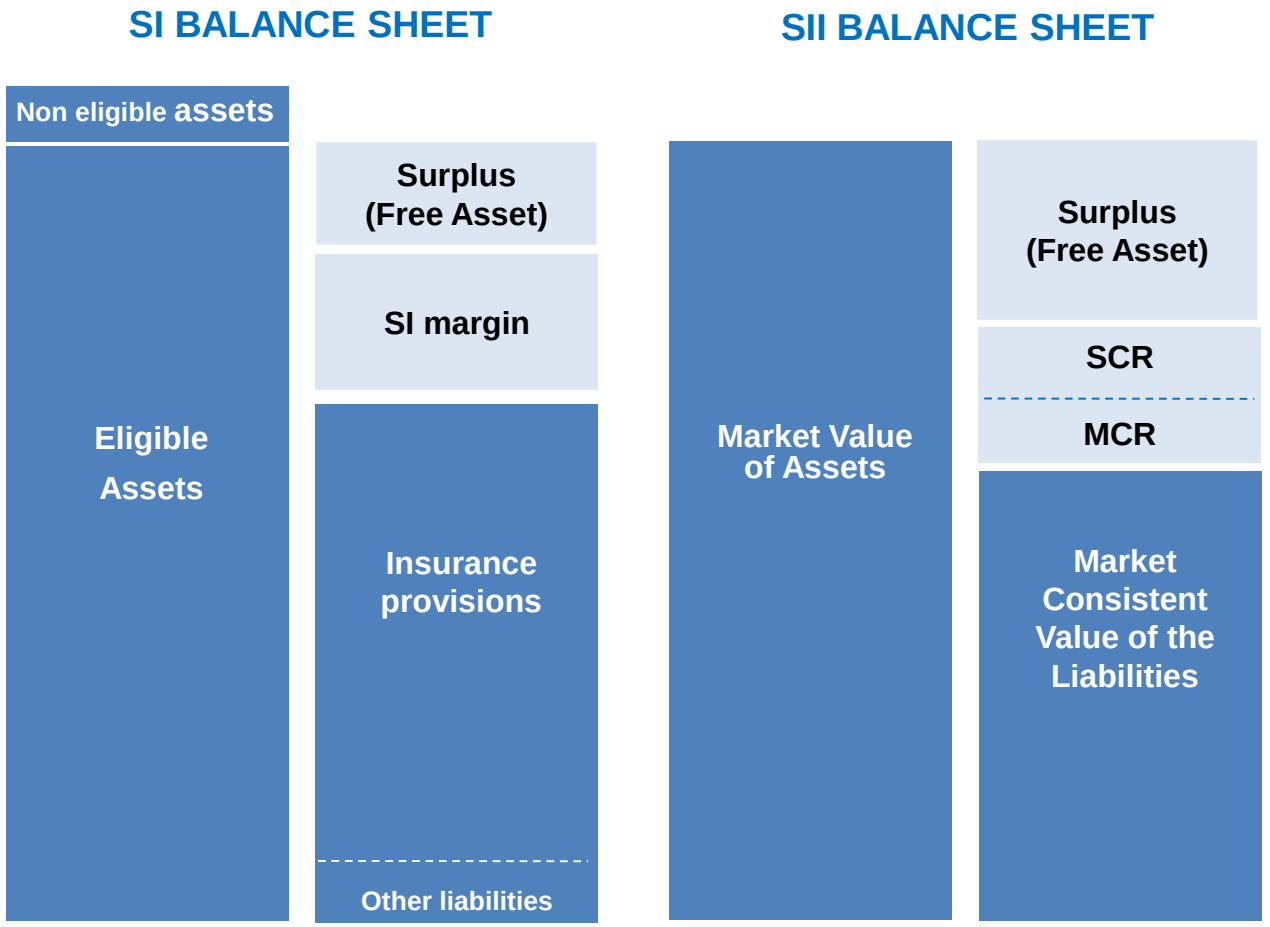

Pillar I - MCR, SCR and OF

MCR: Minimum Capital Requirement

- too high risk for the policyholders
- in case this minimum threshold was breached, the competent Supervisor Authority would take a remedial action
- it is calculated via linear formula with a floor and a cap on the SCR

SCR: Solvency Capital Requirement

- policyholders are reasonably covered
- it identifies a capital level such that the Insurer can face unexpected losses keeping on being solvent with a probability of 99.5% within 1 year
- it can be calculated via Standard Formula or Partial or Full Internal Model

OF: Own Funds

- they must be greater that the SCR
- they are classified into different levels of quality, with minimum requirements on both MCR and SCR

Pillar I - how to calculate the SCR

SF: Standard Formula

- it is defined by EIOPA at European level
- several capital requirements are defined for predefined risks on the base of specific formulae and stress parameters
- these single capital requirements are aggregated through predefined correlation matrixes

IM: Internal Model

- it is defined by the company, focusing on its own risk profile
- the company can modify the list of risks used in SF focusing on the ones it is actually exposed to and it can also modify the stress parameters, the formulae and the aggregation procedure

PIM: Partial Internal Model

- it is a mixture of the two, where some parameters or formulae can be modified if some risks are not suitable as defined by the SF

Pillar I - IM requirements

Both Partial and Full Internal Models are subject to prior supervisory approval on the basis of harmonized processes and standards to ensure that policy holders and beneficiaries are provided with an equivalent level of protection as the one granted by the SF

They should satisfy the following standards

- Use Test — article 120
- Statistical quality standards
- Calibration standards
- Profit & Loss attribution
- Validation standards
- Documentation standards

— articles 121-126

They should also provide an appropriate calculation of the SCR (article 112) and be an integrated part of the undertaking's risk management process and systems of governance (articles 44(5), 112 and 116)

Pillar I - IM requirements

Use Test

- Fit to the business
- Understanding the IM
- Support decision making and integration with ORSA

Companies are asked to explain upon request of the supervisory authorities the different uses of the internal model and how they ensure consistency between the different outputs where the internal model is used for different purposes

Statistical quality standards (1/2)

- Probability Distribution Forecast (PDF)
- Adequate, applicable and relevant actuarial techniques
- Information and assumptions for the PDF
- Data used in the the IM
- Ability to rank risks

Pillar I - IM requirements

Statistical quality standards (2/2)

- Coverage of all material risks
- Diversification effects
- Risk mitigation techniques
- Future management actions
- Understanding External Models and data

Calibration standards

- Different time periods of risk measure
- Demonstrate the protection provision for policy holders
- Rescaling modelled risks

Pillar I - IM requirements

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Profit & Loss attribution

- Profit & Loss
- Major Business Units
- Categorization of risks
- Attribution of the overall profit or loss to risks and BU

Validation standards

- Processes
- Tools

Document. standards

- Independent knowledgeable third part understanding
- Appropriately structured, detailed and complete
- Minimum content defined
- Changes to the IM

Pillar I - External Models

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Calculation Kernel

it is the technical model used for the quantification of capital requirements for all risk categories. As the quantification covers all risk categories it will include elements that are not necessarily statistically modelled.

External Models

an external model is the use of a third party model to feed into the calculation kernel with economic scenario generators and catastrophe models being the most common examples. Where a managing agent uses proprietary / externally supplied software as the platform for their calculation kernel this does not in itself constitute an external model.

Pillar II - Governance & Supervision

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Corporate Governance and effective risk mgm

- companies must define an exhaustive risk framework to be integrated within the capital management
- the control functions Risk Management, Compliance, Internal Audit and Actuarial must be settled (even in outsourcing)
- the top management has to show to the Supervisory Authorities that it understands and well manage the risks the company is exposed to
- the Board of Directors is in charge of the integrated management of risk and capital

ORSA (Own Risk and Solvency Assessment)

- companies must assess their owns risk profile, solvency and internal capital need
  - considering the business strategy
  - forward looking on a continuative basis

Supervisory process

- Supervisors Authorities can ask for a capital add on where there is a lack of Governance or where the SCR calculation is deemed not to be prudent

Pillar II - Governance & Supervision

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Major challenges and changes for the companies

- internal governance structure review, paying attention to the control functions
- high responsibility for the Board of Directors, that must formalize the guidelines for the risk management
- processes and procedures for identifying, measuring, monitoring and reporting the risks must be defined
- the risk valuation is connected with the business strategy: the business plan must include capital projection, capital requirements and remedial actions if any
- incentive schemes (penalties – capital add on) are assigned to the Companies which do not completely fulfil the tasks
- spreading of a risk culture

Pillar II - Control Functions

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Risk Management

- effective operation of the risk management system
- monitor the risk management system
- monitor the general risk profile of the undertaking as a whole
- detailed reporting on risk exposures
- identify and assess emerging risks

REQUIREMENTS

- fulfil with ORSA requirements
- liaise closely with the users of the outputs of the internal model
- cooperate closely with the actuarial function

Pillar II - Control Functions

Internal Audit

- establish, implement and maintain the audit plan
- take a risk-based approach in deciding its priorities
- report the audit plan
- issue recommendations
- verify compliance with the decisions taken by the BoD

REQUIREMENTS

- the persons carrying out the internal audit function shall not assume any responsibility for any other function

Pillar II - Control Functions

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Compliance

- compliance policy
- compliance plan
- assess the adequacy of the measures adopted by the insurance or reinsurance undertaking to prevent non-compliance

Actuarial Function

- coordinate the calculation of the technical provisions
- assess appropriateness of methodologies and assumptions for the TP calculation
- assess adequacy of information system used for the TP calculation
- compare best estimate against experience
- TP data quality and report
- opinion on underwriting policy and reinsurance arrangements

Pillar II - ORSA

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Own Risk and Solvency Assessment (ORSA) - Article 45

The ORSA can be defined as the entirety of the processes and procedures employed to identify, assess, monitor, manage, and report the short and long term risks a firm faces or may face and to determine the own funds necessary to ensure that overall solvency needs are met at all times.

The ORSA must be conducted as part of the risk management system and as a regular 'assessment' it is also the key output from that system. It should include an assessment of overall capital needs, taking account of the risk profile, approved risk tolerance limits and business strategy. Whilst calculation of the SCR will look at regulatory capital requirements arising over a one year time horizon, the ORSA will consider economic capital requirements over a business planning timeframe. The ORSA should also be an integral part of the business strategy, taken into account in strategic decisions and should be used to help identify and manage risk. The ORSA should also make the link between actual reported results and the capital assessment.

The ORSA is not subject to regulatory approval, but the results of each assessment will form part of ongoing regulatory activities. The ORSA is a requirement for all firms whether using the standard formula or an internal model to calculate regulatory capital requirements. An ORSA does not require an internal model, but where an internal model is used it is an integral tool to the ORSA process.

Pillar II - ORSA

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Risk Management System

ORSA is a solvency assessment focused on a a risk management process

the process should include a continuous monitoring of both regulatory and internal capital requirement and solvency

indeed the forward looking assessment may cause the risk position to change

it is a potential source of intervention by the supervisors

Pillar II - ORSA

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ORSA process is composed of

Risk appetite	set by the Board, part of strategy, widely understood and used
Risk identification and assessment	risks not captured in standard model, short and long term risks and emerging risks
Risk measurement	continuous assessment, projecting of the capital position
Risk monitoring and reporting	sufficiently granular, appropriately communicated
Link to business strategy	forward-looking and captures the impact of strategic decisions
Stress testing	makes risk management real - strategic thinking of business response to stressed scenarios
Governance structure	clear and transparent organisational structure, use of lines of defence for the ORSA

Pillar II - ORSA

Forward Looking assessment

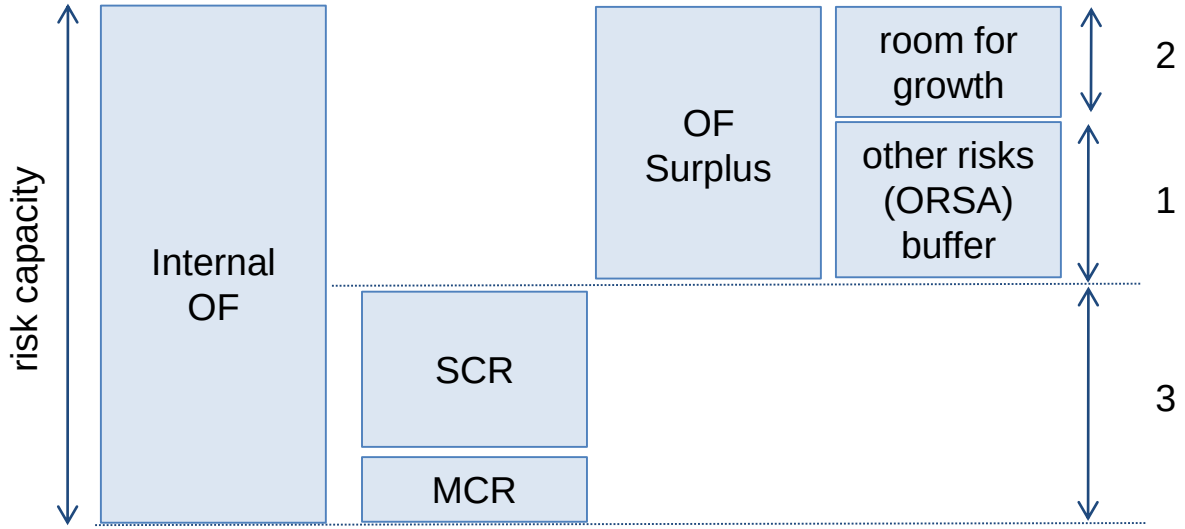
	T+2	T+2	T+3	T+n
	Budget Exercise	Business projections based on planned strategic moves, growth assumptions and product innovations		
SCR REQUIREMENTS	3 €	4 €	8 €	
POTENTIAL ADD-ON (ORSA OUTCOME)	1 €	2 €	2 €	
INTERNAL CAPITAL NEED	4 €	6 €	10 €	
EXPECTED CAPITAL AVAILABLE	8 €	8 €	9 €	

A contingency plan is triggered, using predefined action plans:

- dividend reduction
- asset liquidation
- capital raise
- ...

In this simple example the forward looking assessment puts in evidence that the risk position is going to change and a remedial action has to be taken

Pillar II - ORSA



1. Evaluating risks not covered in Pillar I and decide whether or not it is necessary to define further Own Fund requirements either to cover a specific risk and/or to allocate a safety buffer for unexpected losses

2. Prioritize the opportunity for growth and the new business

3. Optimize the capital management in case of limited availability (e.g. decreasing the dividends, adjusting the products mix, rising capital)

Pillar III - Reporting & Disclosure

Harmonized EU-wide reporting formats are crucial to ensure a consistent implementation of European regulatory and supervisory frameworks across Europe

Companies must disclose qualitative and quantitative information both to the market (public disclosure) and to the supervisors (private disclosure)

REPORTING STANDARDS			EVENT DRIVEN
Solvency and Financial Condition Report (SFCR)	Regular Supervisors Reporting (RSR)	Quantitative Reporting Tables (QRT)	Updates required by the supervisors
annual qualitative / quantitative to the market to achieve transparency and foster discipline	annual qualitative / quantitative to the supervisors further information not disclosed to the public	annual / quarterly qualitative / quantitative to the supervisors financial and solvency information	when needed qualitative / quantitative to the supervisors events that change the risk profile of the company

Pillar III - Reporting & Disclosure

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Solvency and Financial Condition Report (SFCR)	narrative information in quantitative and qualitative form supplemented, where appropriate, with quantitative templates (business and performance, system of governance, risk profile, valuation for solvency purposes, capital management) By 14 weeks since the YE closure for Solo, 20 for Group
Regular Supervisors Reporting (RSR)	they include • the solvency and financial condition report disclosed by the company • the regular supervisory report (business and performance, system of governance, risk profile, valuation for solvency purposes, capital management) • the ORSA supervisory report (qualitative and quantitative results, main assumptions, company's overall Solvency need and comparison with regulatory capital requirements, deviation from SCR) • annual and quarterly quantitative templates By 14 weeks since the YE closure for Solo, 20 for Group

Pillar III - Reporting & Disclosure

Quantitative Reporting Tables (QRT)

- more than 30 topic tabs to be completed
- reporting for Solo and Group separately
- additional information on the use of long-term guarantee measures (twice the quantitative calculation)

By 5 weeks since the quarterly closure for the Solo and 11 for the Group

Pillar III - Reporting & Disclosure

Reporting Phase

01/01/2016 — 01/01/2020

Preparatory phase | **Transitional period**

Gradual approach to Solvency II regime

Period not exceeding 4 years in which companies submit the reporting information on decreasing deadlines

During this period, **transitional measures** can be adopted, with the aim of avoiding market disruption and limiting interferences with existing products as well as ensuring the availability of insurance products (for example on TP and equity risk)

Pillar III - Reporting & Disclosure

Reporting during the transitional period (01/01/2016-01/01/2010)

SOLO RSR and Annual QRT

the deadlines shall decrease by two weeks each financial year, i.e.

- YE16 RSR to be sent within 20 weeks from closure
- YE17 RSR to be sent within 18 weeks from closure
- YE18 RSR to be sent within 16 weeks from closure
- YE19 RSR to be sent within 14 weeks from closure

GROUP RSR and Annual QRT

- YE16 RSR to be sent within 26 weeks from closure
- YE17 RSR to be sent within 24 weeks from closure
- YE18 RSR to be sent within 22 weeks from closure
- YE19 RSR to be sent within 20 weeks from closure

NB The ORSA supervisory report included in the RSR has to be sent within 2 weeks after concluding the assessment

Pillar III - Reporting & Disclosure

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Reporting during the transitional period (01/01/2016-01/01/2010)

SOLO Quarter QRT
the deadlines shall decrease by one week each financial year, i.e.
- During 2016 Quarter QRT to be sent within 8 weeks from closure
- During 2017 Quarter QRT to be sent within 7 weeks from closure
- During 2018 Quarter QRT to be sent within 6 weeks from closure
- During 2019 Quarter QRT to be sent within 5 weeks from closure

GROUP Quarter QRT
- During 2016 Quarter QRT to be sent within 14 weeks from closure
- During 2017 Quarter QRT to be sent within 13 weeks from closure
- During 2018 Quarter QRT to be sent within 12 weeks from closure
- During 2019 Quarter QRT to be sent within 11 weeks from closure

SOLO SFCR
the deadlines shall decrease by two weeks each financial year, i.e. SAME AS RSR

GROUP SFCR
All the deadlines above are applicable to Group reporting with an additional period of 6 weeks
i.e. SAME AS RSR + 6 weeks

Pillar III - Reporting & Disclosure

Major challenges and changes for the companies

- SFCR e RSR reports require a lot of sensible information, even those related to the business strategy
- great effort expected, even for the national supervisors
- High level of data quality requested (completeness, accuracy, adeguacy, traceability, reconciliation)

SII - Major impacts

Major impacts arising from SII application

Higher volatility in the Balance Sheets

- The market value evaluation turns out in a higher volatility of the profits and the own funds
- Companies have to increase the frequency of monitoring the market changes
- Companies have to speed up the decision process to properly face adverse movement of the market

The capital requirement reflects the risks

- The SCR varies according to the risks actually borne by the companies
- The OF varies consequently and so the Solvency Ratio

Spreading of risks mitigation techniques

- To decrease the SCR
- It depends on their costs and adeguacy to reduce the exposure to some risks

SII - Major impacts

Major impacts arising from SII application

The pricing reflects the risk

- Because of the SCR

Innovation in the products design

- Especially in the segments where the demand of the products is very sensitive to their prices
- Higher transparency

Business

- Companies which can easier raise the capital can benefit SII
- The more the portfolios are diversified, the less the SCR, the more the Company benefits

SII - Higher competitiveness

Advantages coming form a higher competitiveness

Higher transparency on the risks

- higher awareness of the risk profile
- mitigation actions can be put in place before the risks turn into losses

Lower capital requirements

- a more sophisticated model (Internal Model) can reduce the SCR
- the cost of implementing a better risk assessment is amortized through a lower capital requirement

Higher diversification in the investment phase

- better processes of risk management can allow companies to invest in more aggressive but more profitable asset classes
- lower capital requirements coming form some asset classes can free capital to be invested in alternative asset classes

SII - Higher competitiveness

Advantages coming form a higher competitiveness

Risk adjusted returns

- a better capital management and capital allocation allows the companies to seek for higher returns
- a higher transparency on the risk adjusted returns turns out in a better appraisal from the market analysts, that can encourage the investors to give their money

Better credit rating

- a better and more transparent disclosure of the relevant information to the analysts and to the investors
- a more sophisticated risk management is praised by the market analysts

SII - Winners and losers

WINNERS

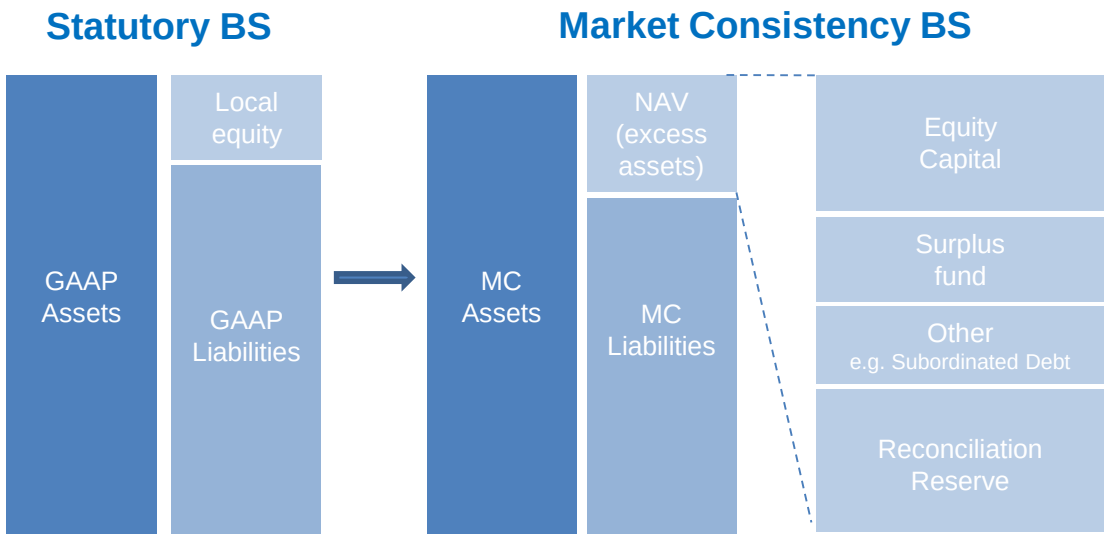
- companies with a well diversified business
- companies able to well manage the capital thanks to a good risk management
- companies that sell unit linked products and have a good asset liability matching
- companies that can move from high returns to high risk adjusted returns
- companies with a high capital surplus that can take over minor companies to better diversify the total portfolio

LOSERS

- companies with a rigid and not diversified business
- companies with a limited access to the free capital
- companies whose portfolios have a bad credit rating and/ or are too aggressive (e.g. equity and derivatives)
- companies whose products are not properly priced

SII - Valuation method

1. Introduction to SII
2. Pillar I
3. Pillar II
4. Pillar III
5. **SII capital requirements features**
6. Basic Risk Free Yield Curve
7. SCR calculation



Assets and Liabilities are valuated under an Economic Market Consistent approach, using the methods prescribed in the international accounting standards, at the amount for which they could be exchanged (assets) and transferred/settled (liabilities) between knowledgeable and willing parties in an arm's length transaction

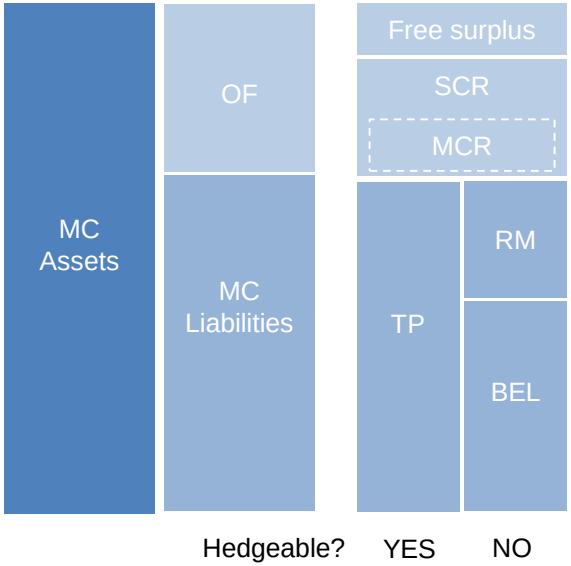
IFRSs principles applicable in SII:

- going concern approach
- assets and liabilities valuates separately
- materiality criteria

Valuation hierarchy :

- default valuation method (marking to market)
- other similar financial instruments market prices with adjustments if needed
- mark to model

SII - Valuation method



The Solvency Capital Requirement should deliver a level of capital that enables an insurer to absorb significant unforeseen losses and gives reasonable assurance to policyholders that payments will be made as they fall due

The Minimum Capital Requirement reflects an absolute minimum level of required capital below which supervisory action will automatically be triggered

The Risk Margin covers the risk of variability in future cash flows relating to insurance liabilities (it expresses the risk premium related to the liabilities). It is equivalent to the cost of providing an amount of capital equal to the SCR to support the insurance liabilities over the life time thereof

The Best Estimate Liabilities equal the expected present value of future cash flows, using the relevant risk free yield curve, based upon current credible information and realistic assumptions.

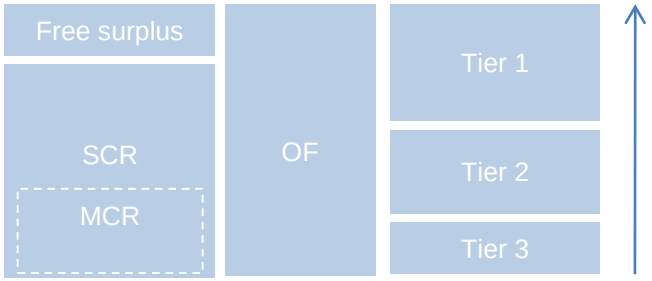
The Technical Provisions express the liabilities in an insurance BS. They can be calculated as the sum of BEL+RM or as a whole in case there was a portfolio of liquid traded financial instruments able to replicate the insurance cash flows.

The Solvency Ratio defines three possible levels of capitalization:

SR = OF / SCR

- OF < MCR the company is insolvent, authorization withdrawn
- MCR < OF < SCR the company needs to take remedial actions
- OF > SCR the company is well capitalized

SII - OF classification



Increasing quality

- permanent availability
- subordination
- long duration
- no duty of capital reimbursement
- no costs
- no other duties

Tier 1 capital is the highest ranking with the greatest loss absorbing capacity, such as equity. Tier 2 capital is composed of hybrid debt and Tier 3 of deferred tax assets.

SCR
- Tier 1, Tier 2, Tier 3
- Tier 1 > 50%
- Tier 3 < 15%

MCR
- Tier 1, Tier 2
- Tier 1 > 80%
- no ancillary own funds

SI regulations introduced a new unfunded instrument, the Ancillary Owns Funds: committed but unpaid lines of capital (prior approval by the regulators).

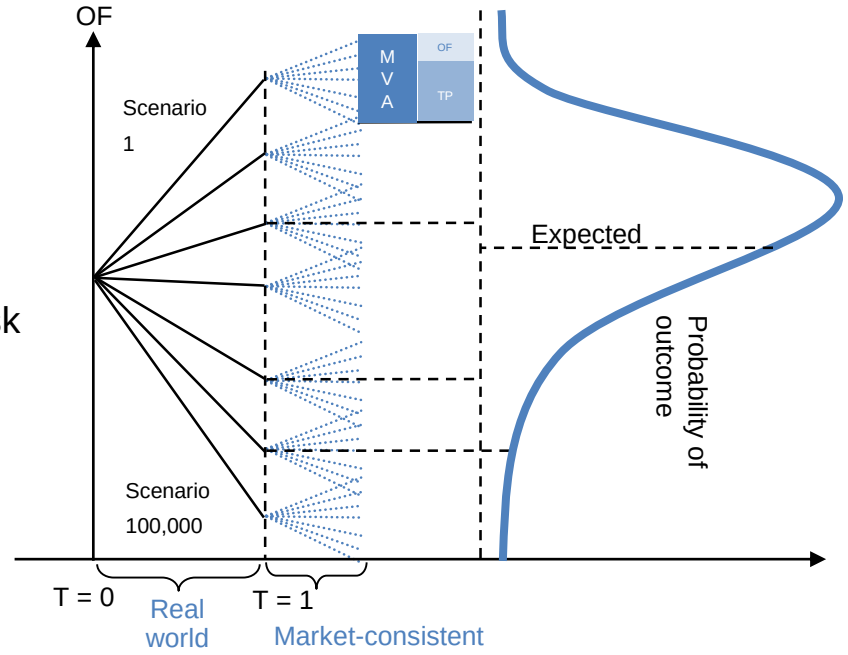
A counterparty (the donor) agrees to increase its investment in an insurer (the recipient). To be eligible as AOF the capital needs to be callable by the recipient on demand with no conditionality, the underlying item needs to be eligible Basic Own Fund capital. An AOF is notched down one tier from the underlying BOF item. For example, contingent equity is Tier 2; however, under AOF's contingent becomes Tier 3

SII - SCR definition

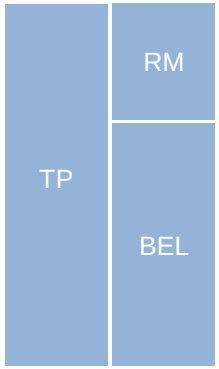
The SCR should correspond to the Value at Risk of the Basic Own Funds of an insurance or reinsurance undertaking subject to a confidence level of 99.50% over a one-year period: i.e. to the capital that an insurance undertaking has to hold in order to grant its capability of satisfying its insurance obligations in the next twelve months. Alternatively, the SCR is the capital that an insurance undertaking has to hold in order to grant that the extreme event does not happen more than 1 in 200 times.

Risks to be included

- Non life underwriting
- Life underwriting
- Health underwriting
- Market risk
- Counterparty default risk
- Operational risk
- Intangible risk



SII - Technical Provisions



The Best Estimate Liabilities correspond to the probability weighted average of future liabilities cash-flows. The cash flows projection used in the calculation of the BE should take into account all the uncertainties in the cash flows

The Risk Margin is calculated on the basis of the assumption that the whole portfolio of insurance and reinsurance obligations is transferred to another insurance or reinsurance undertaking

$$BEL = MV[claims] + MV[expenses] - MV[premiums]$$

BEL should be calculated gross of reinsurance (without deducing the amounts that can be retrieved from reinsurance contracts)

The Cash Flows must take into account the investment risk

The discount rate to adopt must be Risk Free. The way of defining the most suitable risk free rate yield curve was the most discussed topic when setting the directive.

SII - Technical Provisions

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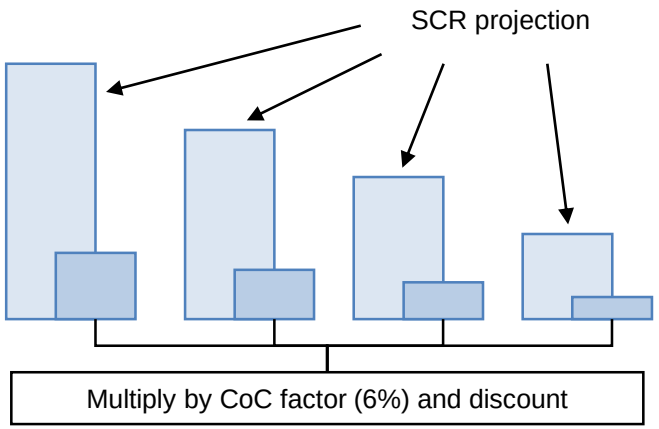
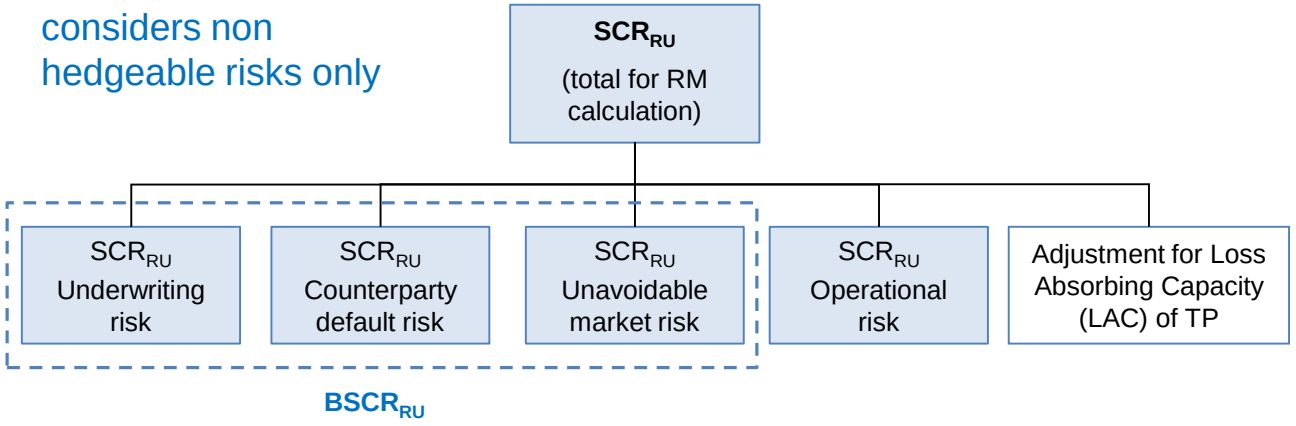


Steps for the RM calculation

- SCR future projection
- CoC application
- discounting @ risk free rate
- sum of the amounts

$$RM = CoC \cdot \sum_{t \geq 0} SCR_{RU}(t)/(1+r_{(t+1)})^{t+1}$$

The RM calculation considers non hedgeable risks only



SII - Basic Risk Free Rate YC

The rational of SII is the economic valuation of the whole balance sheet, where all assets and liabilities are valued according to market consistent principles.

The calculation of liabilities by insurance and reinsurance undertakings has to be performed using the appropriate risk-free interest rate term structure, that EIOPA is required to publish each month.

There are 4 steps to follow to build the BRFR

1. consider appropriate inputs and providers
2. apply the Credit Risk Adjustment (CRA)
3. extrapolate / interpolate
4. apply the Volatility Adjustment (VA)

SII - Basic Risk Free Rate YC

1. CONSIDER APPROPRIATE INPUTS AND PROVIDERS

- the risk-free interest rates are primarily derived from swap rates
- in absence of financial swap markets, or where the information is not sufficiently reliable, the RF interest rate is based on the country's government bond rates.
- currently market data with maturities lower than 1 year are not considered, but this will be further discussed
- based on the academic literature and the methods applied by the practitioners, EIOPA has analyzed a set of metrics and criteria commonly used to make a deep, liquid and transparent assessment of the interest rates (DLT assessment).
- as the National Competent Authorities have a better knowledge of the financial markets of each currency, the DLT assessment of EEA currencies was made by each National Competent Authority (NCA).

SII - Basic Risk Free Rate YC

1. CONSIDER APPROPRIATE INPUTS AND PROVIDERS

- EIOPA documentation:
  - technical documentation of the methodology to derive EIOPA's risk-free interest rate term structures, EIOPA-BoS-15/035, 19-06-2015.

- EIOPA spreadsheets:
  - monthly VA information provided by EIOPA (EIOPA_RFR_yyyymmdd.zip):
    - EIOPA_RFR_yyyymmdd_VA_portfolios.xlsx,
    - EIOPA_RFR_yyyymmdd_PD_CoD.xlsx.

- Market data and relative sources:
  - swaps and overnight interest rates →Bloomberg,
  - sovereign bonds → Bloomberg,
  - bonds other than government bonds or other assets → Markit – iBoxx indices.
  - default statistics → Standard & Poors statistics,
  - euro area → European Central Bank - all the issuers of the Euro zone are mapped with a single 'yield market index': the relevant maturity of the ECB curve for all government bonds of the Euro zone is used (daily observations of annual spot rates).

SII - Basic Risk Free Rate YC

2. APPLY THE CREDIT RISK ADJUSTMENT (CRA)

- a Credit Risk Adjustment is applied to consider that a portion of the rate in a swap transaction (or a government bond) bears the risk of default of the counterparty (it would not be risk free without this adjustment)
- the CRA is applied as a parallel downward shift on the PAR rates market yields observed for maturities up to the LLP (Last Liquid Point)
- the adjustment is determined looking at the difference between the floating swaps rates (that embed the credit risk) and the overnight indexed swap rates of the same maturity, where both rates are available from deep, liquid and transparent financial markets
- the adjustment is equal to the 50% of the average of that difference over a time period of one year. Where necessary the adjustment is capped or floored to ensure that it is not lower than 10 basis points or higher than 35 basis points.

SII - Basic Risk Free Rate YC

3. EXTRAPOLATE / INTERPOLATE USING SMITH WILSON

- the basic risk free interest rate term structure is constructed from a finite number of market data points, corresponding to the reference instruments. Both interpolation between these data points, where necessary, and extrapolation beyond the Last Liquid Point (LLP) shall be done using the Smith-Wilson methodology

- the interest rate curve is extrapolated from LLP to a macroeconomic long term equilibrium rate, the Ultimate Forward Rate (UFR) for those periods in the more distant future for which data are not available. The UFR corresponds to a convergence maturity of 60y for the Euro and of max(60y,LLP+40y) for other currencies; it is in general equal to 4.20%, but for CHF and JPY (3.20%) and for Brazilian, Indian, Mexican, Turkish and South Africans currencies (5.20%) (*)

- the alpha parameter that controls the convergence speed is set as the lowest value which makes the curve reach the UFR with a tolerance of 1bps. A lower bound for alpha is set to 0.05.

(*) EUR UFR will remain unchanged until the end of 2016. EIOPA is currently reviewing the methodology to derive the UFRs. A public consultation was issue in April 2016.

SII - Basic Risk Free Rate YC

4. APPLY THE VOLATILITY ADJUSTMENT

- the VA was introduced by Regulator to reduce the impact of short term market volatility on the balance sheet of undertakings; undertakings that apply a VA shall not apply a Matching Adjustment.
- the VA is added as a parallel upward shift to the zero coupon spot rates of the basic risk-free curve till the LLP
- the resulting rates are extrapolated using Smith-Wilson to produce the full zero-coupon curves of the relevant risk-free rate including VA: the base YCs ultimately converge to the same UFR, irrespective of the VA (this is not the case for the stressed YC)
- the VA expresses a portion (65%) of the spread between the interest rates that could be earned from assets included in a reference portfolio and the basic risk free rates. It is defined at currency level and might be corrected at country level if the country increase in the volatility is significant

SII - Basic Risk Free Rate YC

4. APPLY THE VOLATILITY ADJUSTMENT

$$VA = 0.65\ (S_{RC-crncy} + \max(0\ , S_{RC-country} - 2S_{RC-crncy}))$$

where

- $S_{RC} = S - RC$ is the risk corrected spread (that may be negative) calculated as the difference between the spread S and the risk correction RC, the latter is also known as Fundamental Spread (FS)
- S is the spread between the interest rates derived from the reference portfolio and the basic interest rate term structure. It is calculated as a weighted average of the average spreads of governments and corporate bonds included in the reference portfolio

  $S = w_{gov} * \max(0, S_{gov}) + w_{corp} * \max(0, S_{corp})$
- RC is the portion of the spread actually at risk (realistic assessment of expected losses, unexpected credit risk or any other risk) in the reference portfolio

  $RC = w_{gov} * \max(0, RC_{gov}) + w_{corp} * \max(0, RC_{corp})$
- examples of weights for the preparatory phase in 2015 are: Euro, $w_{gov} = 38.7\%$ $w_{corp} = 48.2\%$; Italy, $w_{gov} = 62.0\%$ $w_{corp} = 25.1\%$; Germany, $w_{gov} = 22.4\%$ $w_{corp} = 68.5\%$; United Kingdom, $w_{gov} = 16.7\%$ $w_{corp} = 30.3\%$.

The risk corrected currency spread can be negative, and so the VA

SII - Basic Risk Free Rate YC

4. APPLY THE VOLATILITY ADJUSTMENT

The VA calculation is based on the representative / reference portfolio

- currency/country Reference Portfolio
  portfolio of bonds, securitizations, loans (including mortgages loans), equity and property covering the BE obligations denominated / olds in that currency / country based on insurance market data collected by the means of the regulatory reporting

The Reference Portfolio allows to collect these information

- MVA, required to calculate the weights and the risk corrected spreads
- Durations, required to make the spreads maturity dependent and to select the relevant market indexes
- Credit Quality Steps (rating), required to calculate the spread S and the risk correction RC and to select the relevant yield market indexes
- Asset classes, understood as economic sectors, to select the relevant yield market indexes

SII - Basic Risk Free Rate YC

4. APPLY THE VOLATILITY ADJUSTMENT

The VA calculation depends on the Risk Correction (RC)

- currency / country Risk Correction
  the portion of the spread that is attributable to a realistic assessment of expected losses, unexpected credit risk or any other risk of the assets. It is based on the inputs stemming from the currency / country representative portfolio

- For central governments and central bank bonds
  RC = FS = 30% LTAS, where LTAS is the Long Term Average over the last 30y (daily historical data) of the Spread over the risk free interest rates of assets of the same duration, credit quality and asset class

- For other assets
  RC = FS = max(PD+CoD, 30%LTAS)
  - PD is the credit spread corresponding to the Probability of Default (derived from empirical 1y transition matrixes)
  - CoD is the spread corresponding to the Cost of Downgrades (derived from empirical 1y transition matrixes)
  - LATS is the Long Term Average Spread

SII - Basic Risk Free Rate YC

4. APPLY THE VOLATILITY ADJUSTMENT

Further notes on the VA:

it is rounded to the nearest integer basis point and applied to all maturities till the LLP

it is not added to the par swap rates adjusted for the CRA, but it is added to the zero coupon spot rates of the basic risk free interest rate term structure obtained after using the Smith Wilson method

the resulting curve is then extrapolated using the Smith Wilson technique and, therefore, the relevant risk free rate term structure included the VA is a parallel shift over the basic one only until the LLP; after this maturity both converge to the same UFR.

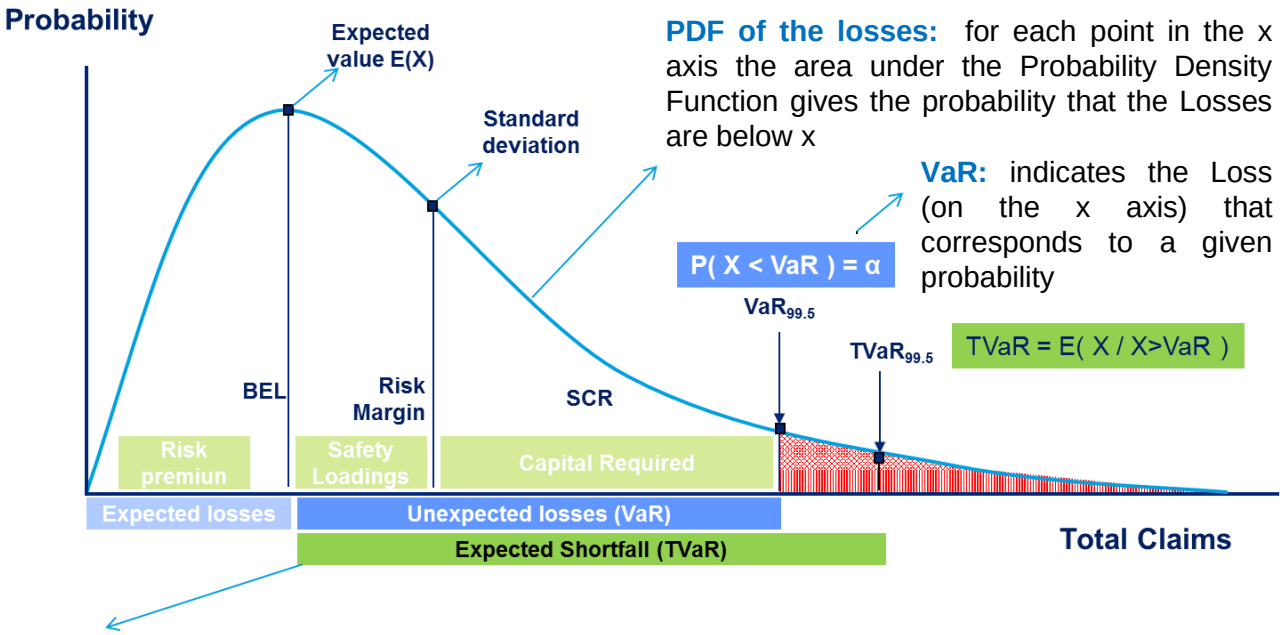
SII - Basic Risk Free Rate YC

MATCHING ADJUSTMENT

The Matching Adjustment is made in respect of a predictable portfolios of liabilities whose assets are characterized by fixed cash flows and are held to maturity; it is applied as a parallel shift on the whole basic risk free curve to decrease the spread of the assets given the lower risk will faced since they are held till maturity. EIOPA publishes only the fundamental spread to be used, then undertakings must calculate the MA themselves.

SII - SCR as a VaR @99.50%

The **Solvency Capital Requirement** (SCR) should correspond to the Value-at-Risk of the basic own funds of an insurance or reinsurance undertaking at a confidence level of 99.5% over a one-year period. The parameters and assumptions used for the calculation of the SCR reflect this calibration objective

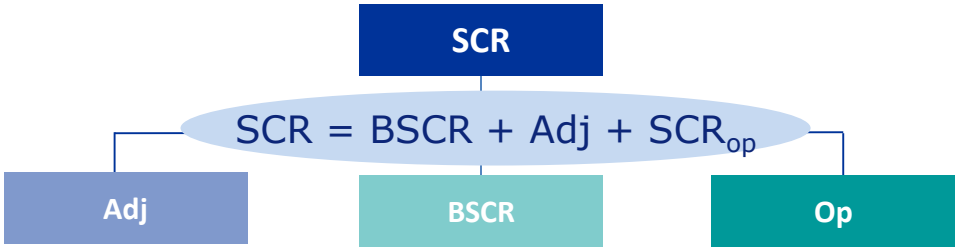


PDF of the losses: for each point in the x axis the area under the Probability Density Function gives the probability that the Losses are below x

VaR: indicates the Loss (on the x axis) that corresponds to a given probability

Expected Shortfall of TVaR: indicates the average value of the Losses that can occur with a lower probability than the one used to calculate the VaR

SII - SCR calculation



The **Solvency Capital Requirement** (SCR) is calculated as a sum of

- Basic Solvency Capital Requirement (BSCR)
- Operational Risk SCR
- Adjustments
  - for the Loss Absorbing Capacity (LAC) of the Technical Provisions (TP)
  - for the Loss Absorbing Capacity (LAC) of the Deferred Taxes (DT)

SCR - Operational Risk

The **Operational Risk** indicates the risk of incurring in losses due to the inadequacy of internal processes, human resources or systems or losses due to exogenous events

Op

It includes the regulatory risk, but not the ones deriving from the strategic decisions or the reputational one. It is calculated as:

$$SCR_{op} = \min(0.3 * BSCR, Op) + 0.25 * Exp(ul)$$

Where

- BSCR denotes the Basic Solvency Capital Requirement
- Exp(ul) denotes the amount of expenses incurred during the previous 12 months in respect of life insurance contracts where the investment risk is borne by policy holders
- Op denotes the basic capital requirement for operational risk charge

$$Op = \max(Op_{premiums}, Op_{povisions})$$

where $Op_{premiums}$ and $Op_{provisions}$ denote the capital requirement for operational risks based on earned premiums / technical provisions

SCR - Operational Risk

$$Op_{premiums} = 0.04 * (Earn_{life} - Earn_{life-ul}) + 0.03 * Earn_{nonlife}$$
$$+ \max[0 , 0.04 * (Earn_{life} - 1.2 * pEarn_{life} - (Earn_{life-ul} - pEarn_{life-ul}))]$$
$$+ \max[0 , 0.03 * (Earn_{nonlife} - 1.2 * pEarn_{nonlife})]$$

Where

- $Earn_{life}$ denotes the premiums earned during the last 12 months for life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts;
- $Earn_{life-ul}$ denotes the premiums earned during the last 12 months for life insurance and reinsurance obligations where the investment risk is borne by the policy holders without deducting premiums for reinsurance contracts;
- $Earn_{non-life}$ denotes the premiums earned during the last 12 months for non-life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts
- $pEarn_{life}$ denotes the premiums earned during the 12 months prior to the last 12 months for life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts;
- $pEarn_{life-ul}$ denotes the premiums earned during the 12 months prior to the last 12 months for life insurance and reinsurance obligations where the investment risk is borne by the policy holders without deducting premiums for reinsurance contracts;
- $pEarn_{non-life}$ denotes the premium earned during the 12 months prior to the last 12 months for non-life insurance and reinsurance obligations, without deducting premiums for reinsurance contracts

SCR - Operational Risk

$$Op_{provisions} = 0.045 * \max(0, TP_{life} - TP_{lifeul}) + 0.03 * \max(0, TP_{nonlife})$$

Where

- TP_{life} denotes the technical provisions for life insurance and reinsurance obligations;
- $TP_{life\text{-}ul}$ denotes the technical provisions for life insurance obligations where the investment risk is borne by the policy holders;
- $TP_{non\text{-}life}$ denotes the technical provisions for non-life insurance and reinsurance obligations

SCR - Basic SCR

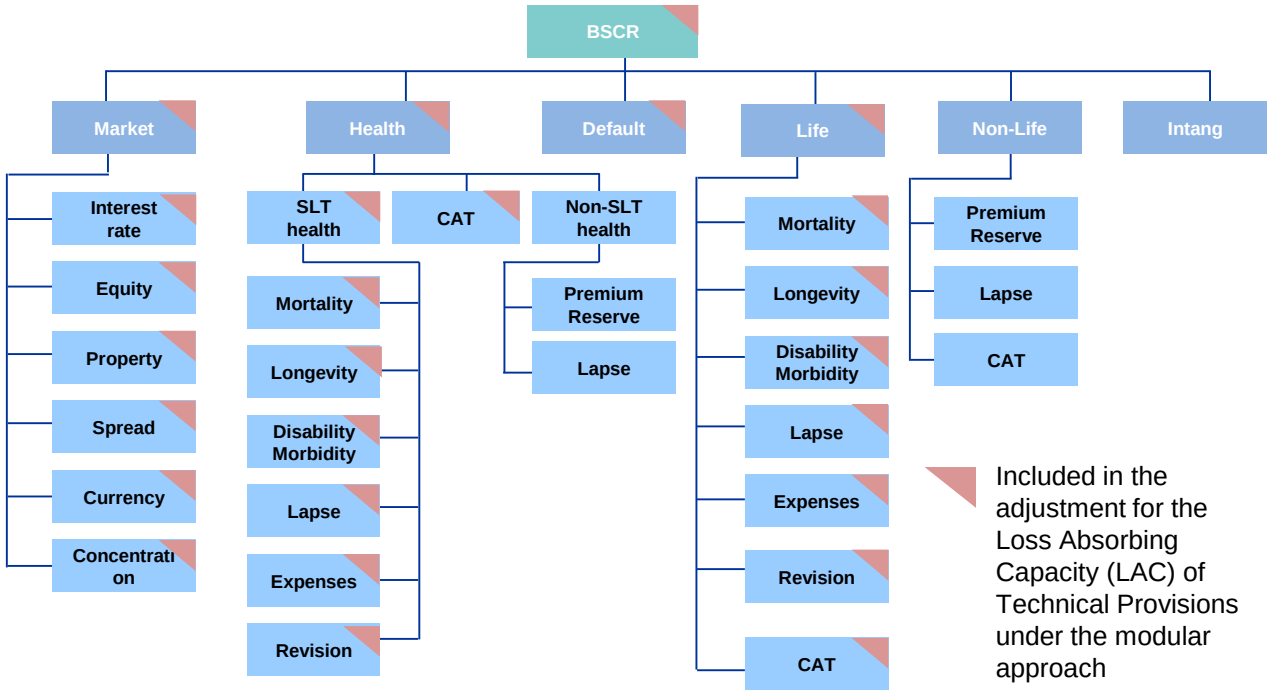
The **Basic SCR** is a "sum" of all the individual risks coming from different modules, that are aggregated through linear correlations to take into account the diversification and the mitigation effect

$$BSCR = \sqrt{\sum_{i,j} Corr_{i,j} \times SCR_i \times SCR_j} + SCR_{Intangible}$$

	Market	Default	Life	Health	Non Life
Market	1.00				
Default	0.25	1.00			
Life	0.25	0.25	1.00		
Health	0.25	0.25	0.25	1.00	
Non Life	0.25	0.50	0.00	0.00	1.00

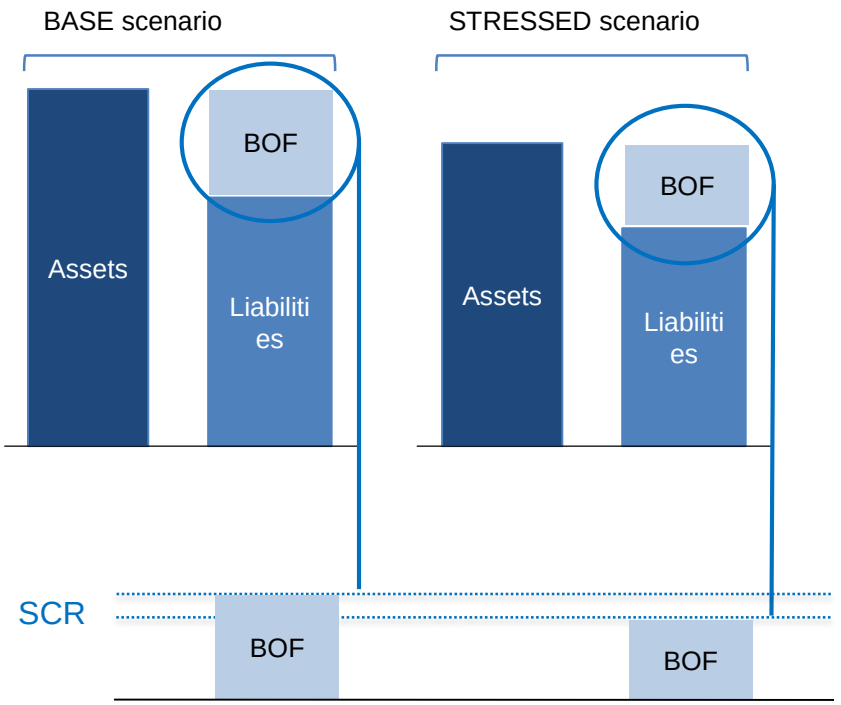
SCR - Basic SCR

Here is an overview of the modules and their components



SCR - Basic SCR

All the individual SCR that the BSCR is composed of are calculated following a scenario based approach



SCR - Basic SCR

In the scenarios based approach

- the capital requirement is determined as the impact of a specified stressed scenario (@99.50%) on the level of Basic Own Funds (BOF)
- the level of Basic Own Funds is defined as the difference between Assets and Liabilities
- the liabilities should not include subordinated liabilities and Risk Margin for the purpose of the calculation
- the change of BOF resulting from the scenario is referred to as ΔBOF
- ΔBOF is defined to be positive where the scenario results in a loss of BOF
- where the scenario results in an increase of BOF, and therefore does not reflect a risk for the undertaking, it is floored to 0 (it does not lead to a "negative capital requirement“)

BSCR - Future Benefits

The Future Benefits promised to the policyholders can be split into Guaranteed Benefits and Future Discretionary Benefits (FDB).
A more precise classification is:

• Guaranteed benefits:
they represent the value of future cash-flows that take into account only those liabilities to which policyholders or beneficiaries are entitled at the valuation date.

• Conditional discretionary benefits:
there are liabilities based on declaration of future benefits influenced by legal or contractual declarations and performance of the undertaking/fund, like

a) the performance of a specified pool of contracts or a specified type of contract or a single contract
b) realised and/or unrealised investment return on a specified pool of assets held by the issuer
c) the profit or loss of the company, fund or other entity that issues the contract.

BSCR - Future Benefits

• Pure discretionary benefit:
they represent the liabilities based on the declaration of future benefits whose amount or timing are contractually at the discretion of the management.

This distinction in 3 parts doesn't mean that the undertaking has to value each part separately. Only a distinction between guaranteed benefits and discretionary benefits should be required.

Both conditional and pure discretionary benefits could potentially be considered to be loss-absorbing and undertakings should consider the extent to which this is the case.

The Loss Absorbing Capacity (LAC) quantifies the capability of the Liabilities of absorbing the losses occurred in the Assed in a stressed situation. It is usually defined as

$$LAC = \Delta \text{Liabilities} / \Delta \text{Assets}$$

BSCR - LAC adjustment

The Basic Solvency Capital Requirement should be derived gross and net:

$BSCR_{sub\text{-}module}$	capital requirement assuming that the shock scenario does not change the value of the Future Discretionary Benefits (FDB)
$nBSCR_{sub\text{-}module}$	capital requirement calculated by allowing for the impact of the shocked scenarios on the value of the FDB

The adjustment for the Loss-Absorbing Capacity of technical provisions is:

$$Adj_{TP} = -max\big(0, min(FDB, BSCR - nBSCR)\big)$$

Where:

BSCR	is gross of LAC of TP calculated by aggregating the gross capital requirements with the relevant correlation matrices
nBSCR	is net of LAC of TP calculated by aggregating the net capital requirements with the relevant correlation matrices
FDB	denotes the technical provisions without risk margin related to future discretionary benefits

BSCR - LAC adjustment

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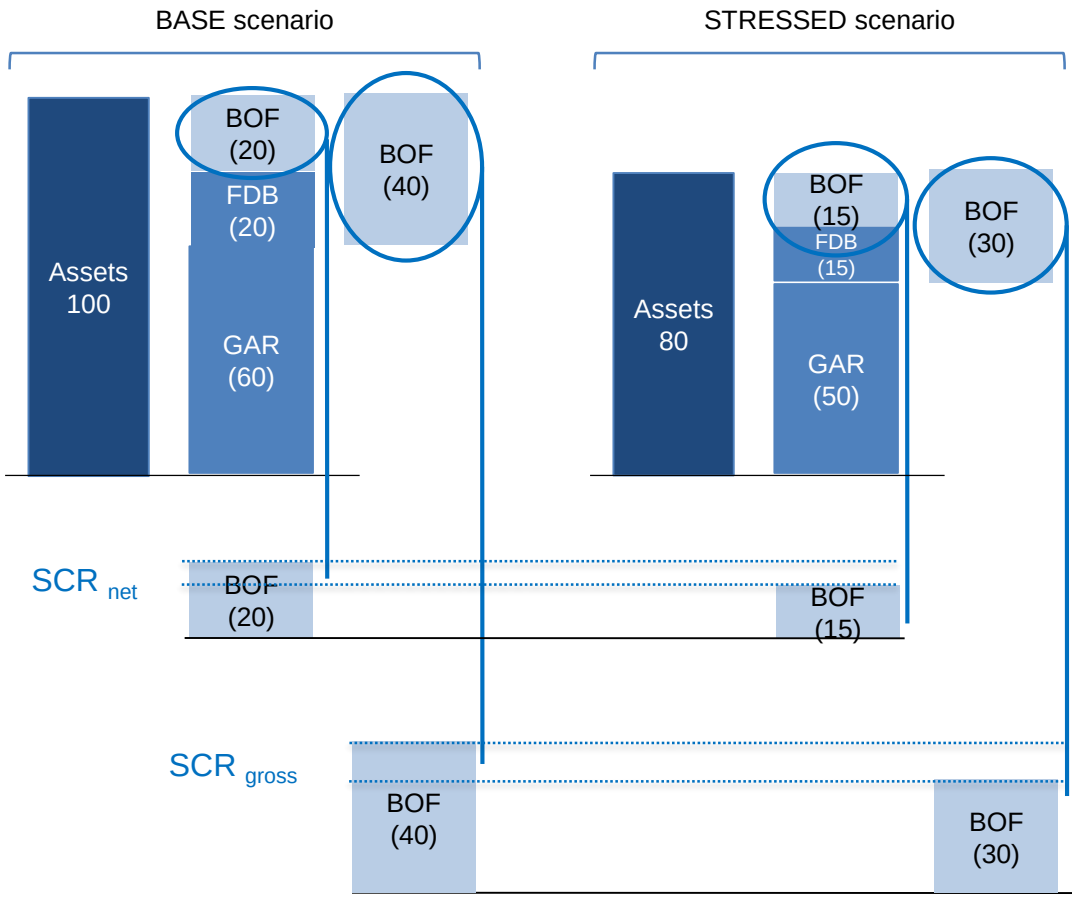

BSCR - Market Risk

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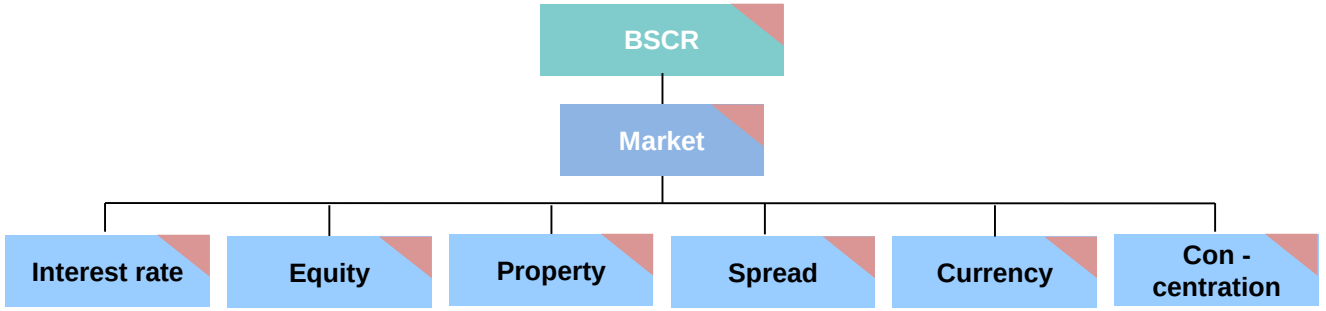
The **Market Risk** defines the risk due to the level and the volatility of the financial instruments the company has in its portfolios.

The exposition to the market risk is calculated measuring the impact of the changes in property and equity prices, interest rates, foreign exchanges rates and it requires a Look Through approach.

A **Look-Through** approach enables a refined level of asset monitoring and risk management based on the availability of more detailed information on investment assets and pooled funds' exposure to market risks. More information, however, can make the task of managing pooled vehicles more demanding, and may require modifying organizational and technological structures.

A successful look-through implementation should start with defining the implementation approach and roadmap. By reviewing their investment mandate, focusing on IT architecture and evolving the company's governance structure, insurers will be able to complete the implementation of a look-through approach quickly and efficiently

BSCR - Market Risk



$$SCR_{market} = \sqrt{\sum_{i,j} Corr_{i,j} \times SCR_i \times SCR_j}$$

	Interest	Equity	Property	Spread	Curren.	Conc.
Interest	1.00	A	A	A	0.25	0.00
Equity	A	1.00	0.75	0.75	0.25	0.00
Property	A	0.75	1.00	0.50	0.25	0.00
Spread	A	0.75	0.50	1.00	0.25	0.00
Currency	0.25	0.75	0.25	0.25	1.00	0.00
Concent.	0.00	0.00	0.00	0.00	0.00	1.00

A=0.00 if exposed to IR_{up}; A=0.50 if exposed to IR_{dw}

BSCR - Market Risk - Interest Rate

- The **Interest rate risk** exists for all assets and liabilities which are sensitive to changes in the term structure of interest rates or interest rate volatility, whether valued by mark-to-model or mark-to-market techniques
- Assets sensitive to interest rate movements will include fixed-income investments, financing instruments (for example loan capital), policy loans, interest rate derivatives
- the capital requirement for interest rate risk shall be equal to the **larger of the following**:
  - the sum, over all currencies, of the capital requirements for the risk of an **increase** in the term structure of interest rates
  - the sum, over all currencies, of the capital requirements for the risk of a **decrease** in the term structure of interest rates

$$Mkt_{int}^{up} = \Delta BOF \mid up \qquad Mkt_{int}^{down} = \Delta BOF \mid down$$

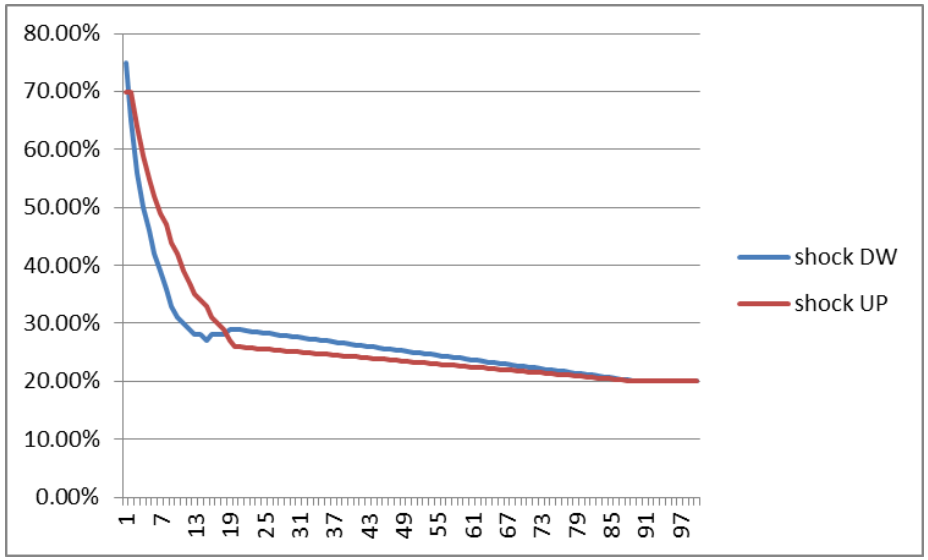
- scenario based approach, testing both with and without the possibility to change the future discretionary benefits:

BSCR - Market Risk - Interest Rate

- The Interest Rates have to be stresses applying the some relative changes
- The stressed IR are rounded up to the 5th relevant figure
- The DW stress is applied only if IR_base >0, otherwise IR_str = IR_base

$$IR^{dw} = IR^{base} - stress * IR^{base}$$

$$IR^{up} = IR^{base} + min\left(1\%, stress * |IR^{base}|\right)$$



BSCR - Market Risk - Equity

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- The **Equity risk** arises from the level or volatility of market prices for equities. Exposure to equity risk refers to all assets and liabilities whose value is sensitive to changes in equity prices
- The equity risk sub-module shall include a risk sub-module for type 1 equities and a risk sub-module for type 2 equities:
  - Type 1 equities shall comprise equities listed in regulated markets in the countries which are members of the European Economic Area (EEA) or the Organisation for Economic Cooperation and Development (OECD)
  - Type 2 equities shall comprise equities listed in stock exchanges in countries which are not members of the EEA or the OECD, equities which are not listed, commodities and other alternative investments
- The capital requirement for equity risk is derived by combining the capital requirements for the individual categories using a correlation matrix as follows

$$MKT_{eq} = \sqrt{\sum_{rxc} CorrIndex^{rxc} \bullet Mkt_r \bullet Mkt_c}$$

	Type 1	Type 2
Type 1	100%	
Type 2	75%	100%

BSCR - Market Risk - Equity

- The equity shock scenarios for the individual categories are the sum of the base shock and the symmetric adjustment (that vary per each valuation date)

	Type 1	Type 2
Equity shock_i	39%	49%

- The application of the stress is scenario based, testing both with and without the possibility to change the future discretionary benefits

BSCR - Market Risk - Property

- The **Property risk** arises as a result of sensitivity of assets, liabilities and financial investments to the level or volatility of market prices of property
- The following investments should be treated as property and their risks considered accordingly in the property risk sub-module:
  - land, buildings and immovable-property rights;
  - property investment for the own use of the insurance undertaking
- The calculation of the capital charge is linked to an instantaneous decrease in the market value of assets by **25%**

$$\mathrm{Mkt}_{\mathrm{prop}} = \max\left(\Delta \mathrm{BOF} \middle| \mathrm{property\,shock} ; 0 \right)$$

- The result of the scenario should be determined also under the condition that the value of future discretionary benefits can change and that undertaking is able to vary its assumptions in future bonus rates in response to the shock being tested

BSCR - Market Risk - Currency

- The Currency risk arises from changes in the level or volatility of currency exchange rates. Undertakings may be exposed to currency risk arising from various sources, including their investment portfolios, as well as assets, liabilities and investments in related undertakings. The design of the currency risk sub-module is intended to take into account currency risk for an undertaking arising from all possible sources
- The local currency is the currency in which the undertaking prepares its financial statements. All other currencies are referred to as foreign currencies
- The capital requirement for currency risk is determined as the result of two pre-defined scenarios
  - The scenario fx_{upward} shock is an instantaneous rise in the value of **25%** of the currency C against the local currency
  - The scenario $fx_{downward}$ shock is an instantaneous fall of **25%** in the value of the currency C against the local currency

$$Mkt_{fx}^{up} = \max\left(\Delta BOF\big|_{up}; 0\right) \qquad Mkt_{fx}^{dw} = \max\left(\Delta BOF\big|_{dw}; 0\right)$$

BSCR - Market Risk - Currency

- For each currency the capital charge is the maximum between the shock up and down
- The total capital charge is the sum of the capital charge for each currency
- The result of the scenarios should be determined under the condition that the value of future discretionary benefits can change and that undertaking is able to vary its assumptions in future bonus rates in response to the shock being tested

BSCR - Market Risk - Spread

- The Spread risk results from the sensitivity of the value of assets, liabilities and financial instruments to changes in the level or in the volatility of credit spreads over the risk-free interest rate term structure
- The spread risk module applies in particular to the following classes of bonds:
  - Corporate bonds
  - Subordinated debt investments, depending on the contractual terms
  - Investment instruments with equity and bond features
  - Covered bonds
  - Loans other than retail loans secured by a residential mortgage
  - Securitisation positions
  - Credit derivatives other than for hedging purposes
- A risk factor of 0% should apply for the purposes of this sub-module to exposures to EU Member States' central government and central banks denominated and funded in any domestic currency of a EU Member State, or instruments issued by a multilateral development bank as listed in the CRD

BSCR - Market Risk - Spread

- The capital requirement for spread risk is calculated as:

$$Mkt_{sp} = Mkt_{sp}^{bonds} + Mkt_{sp}^{sec} + Mkt_{sp}^{cd}$$

where

  - Mkt_{sp}^{bonds} denotes the capital requirement for spread risk on bonds and loans
  - Mkt_{sp}^{sec} denotes the capital requirement for spread risk on securitisation positions
  - Mkt_{sp}^{cd} denotes the capital requirement for spread risk on credit derivatives

- The capital requirement for spread risk of bonds is determined as the result of a pre-defined scenario $Mkt_{sp}^{bonds} = \max\left(\Delta BOF|_{shockonBon\ ds}; 0\right)$

- The spread risk shock on bonds is the immediate effect on the net value of asset and liabilities expected in the event of an instantaneous decrease of values in bonds and loans other than non-residential mortgage loans due to the widening of their credit spreads $\sum_i MV_i * F^{Up}(rating_i; duration_i)$

BSCR - Market Risk - Spread

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Spread risk factors for bonds

credit quality step / *duration (years)*	0	1	2	3	4	5	6
up to 5	0.9 %. *duration*$_i$	1.1 %. *duration*$_i$	1.4 %. *duration*$_i$	2.5 %. *duration*$_i$	4.5 %. *duration*$_i$	7.5 %. *duration*$_i$	7.5 %. *duration*$_i$
More than 5 and up to 10	4.5% + 0.5 %.(*duration*$_i$ - 5)	5.5% + 0.6%.(*duration*$_i$ - 5)	7.0% + 0.7%.(*duration*$_i$ - 5)	12.5% + 1.5%.(*duration*$_i$ -5)	22.5% + 2.5%.(*duration*$_i$ -5)	37.5% + 4.2%.(*duration*$_i$ -5)	37.5% + 4.2%.(*duration*$_i$ -5)
More than 10 and up to 15	7.2% + 0.5 %.(*duration*$_i$ - 10)	8.4% + 0.5 %.(*duration*$_i$ - 10)	10.5% + 0.5 %.(*duration*$_i$ - 10)	20.0% + 1.0 %.(*duration*$_i$ -10)	35.% + 1.8 %.(*duration*$_i$ -10)	58.5% + 0.5 %.(*duration*$_i$ -10)	58.5% + 0.5 %.(*duration*$_i$ -10)
More than 15 and up to 20	9.7% + 0.5 %.(*duration*$_i$ - 15)	10.9% + 0.5 %.(*duration*$_i$ - 15)	13.0% + 0.5 %.(*duration*$_i$ - 15)	25.0% + 1.0 %.(*duration*$_i$ -15)	44.0% + 0.5 %.(*duration*$_i$ -15)	61.0% + 0.5 %.(*duration*$_i$ -15)	61.0% + 0.5 %.(*duration*$_i$ -15)
More than 20	12.2% + 0.5 %.(*duration*$_i$ - 20)	13.4% + 0.5 %.(*duration*$_i$ - 20)	15.5% + 0.5 %.(*duration*$_i$ - 20)	30.0% + 0.5 %.(*duration*$_i$ -20)	46.6% + 0.5 %.(*duration*$_i$ -20)	63.5% + 0.5 %.(*duration*$_i$ -20)	63.5% + 0.5 %.(*duration*$_i$ -20)

BSCR - Market Risk - Counterparty Default

- The counterparty default risk module should reflect possible losses due to unexpected default of the counterparties and debtors of undertakings over the forthcoming twelve months. The scope of the counterparty default risk module includes risk-mitigating contracts, such as reinsurance arrangements, securitizations and derivatives, and receivables from intermediaries, as well as any other credit exposures which are not covered in the spread risk sub-module
- A differentiation of two kinds of exposures, in the following denoted by type 1 and type 2 exposures, and a different treatment according to their characteristics has to be applied
  - The class of type 1 exposures covers the exposures where the counterparty is likely to be rated, mainly risk-mitigation contracts and cash at bank
  - The class of type 2 exposures covers the exposures where the counterparty is likely to be unrated, mainly receivables from intermediaries, policy holder debtors and residential mortgage loans

BSCR - Market Risk - Counterparty Default

- The capital requirements for type 1 and type 2 exposures should be calculated separately

$$SCR_{def} = \sqrt{SCR_{def,1}^2 + 1.5 * SCR_{def,1} * SCR_{def,2} + SCR_{def,2}^2}$$

- The calculation of Type 1depends on the estimated Loss Given Default (LGD) of an exposure and the probability of default (PD) of the counterparty

$$SCR_{def,1} = \begin{cases} 3 \cdot \sqrt{V}, & if \quad \sqrt{V} \le 7\% \cdot \sum_i LGD_i \\ 5 \cdot \sqrt{V}, & if \ 7\% \cdot \sum_i LGD_i < \sqrt{V} \le 20\% \sum_i LGD_i \\ \sum_i LGD_i, & if \quad 20\% \sum_i LGD_i \le \sqrt{V} \end{cases}$$

- The capital requirement for counterparty default risk on type 2 exposures shall be equal to the loss in the basic own funds that would result from an instantaneous decrease in value of type 2 exposures

$$SCR_{def,1} = 0.9 * LGD_{rec>3months} + 0.15 * \sum_i LGD_i$$

BSCR - Market Risk - Concentration

- The scope of the concentration risk sub-module extends to assets considered in the equity, spread risk and property risk sub-modules, and excludes assets covered by the counterparty default risk module in order to avoid any overlap between both elements of the standard calculation of the SCR

- For the sake of simplicity and consistency, the definition of market risk concentrations regarding financial investments is restricted to the risk regarding the accumulation of exposures with the same counterparty. It does not include other types of concentrations (e.g. geographical area, industry sector, etc.)

- The capital requirement for market risk concentration shall be calculated on the basis of single name exposures

- The calculus is based on three steps

BSCR - Market Risk - Concentration

1. Excess exposure per single name

$$XS_i = \max\left(0, \frac{E_i}{Assets_{xl}} - CT\right)$$

E is the single name exposure

$Assets_{xl}$ is the total amount of assets considered

CT I is predefined relative excess exposure threshold

2. The capital requirement for market risk concentration on a single name exposure i *Conci* shall be equal to the loss in the basic own funds that would result from an instantaneous relative decrease in the value of the assets corresponding to the single name exposure i equal to

$$Conc_i = XS_i * g_i$$

3. The capital requirement for concentration risk is determined assuming no correlation among the requirements for each counterparty I, and it should be equal to the following

$$Mkt_{conc} = \sqrt{\sum_i Conc_i^2}$$

BSCR - Life Underwriting Risk

- The Life Underwriting Risk module should be applied for the calculation of the life underwriting risk capital requirements
- this module should be applied on life insurance and reinsurance obligations other than health insurance and reinsurance obligations

- In order to correctly identify obligations that should be considered under Life Underwriting Risk module EIOPA introduced detailed segmentation into Lines of Business (LoBs)
  - life insurance with profit participation
  - unit-Linked and Index-linked insurance
  - other life insurance
  - annuities stemming from non life insurance and not classified as health
  - accepted reinsurance for life insurance

BSCR - Life Underwriting Risk

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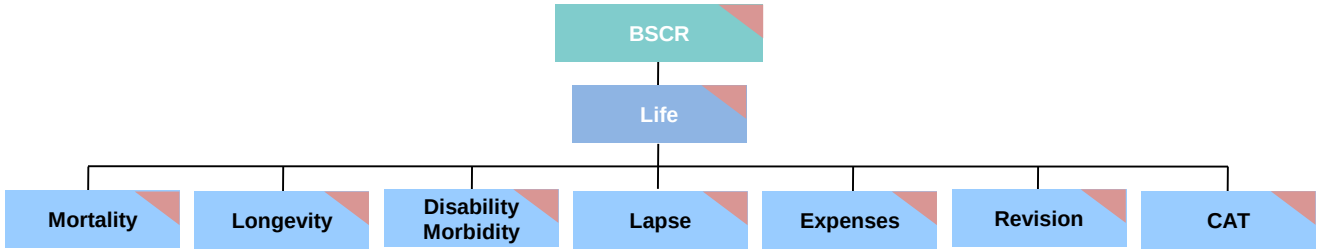

$$SCR_{life} = \sqrt{\sum_{i,j} Corr_{i,j} \times SCR_i \times SCR_j}$$

- modular approach
- seven sub-modules
- correlation matrix

	Mortality	Longevity	Disability	Lapse	Expenses	Revision	CAT
Mortality	1.00	-0.25	0.25	0.00	0.25	0.00	0.25
Longevity	-0.25	1.00	0.00	0.25	0.25	0.25	0.00
Disability	0.25	0.00	1.00	0.00	0.50	0.00	0.25
Lapse	0.00	0.25	0.00	1.00	0.50	0.00	0.25
Expenses	0.25	0.25	0.50	0.50	1.00	0.50	0.25
Revision	0.00	0.25	0.00	0.00	0.50	1.00	0.00
CAT	0.25	0.00	0.25	0.25	0.25	0.00	1.00

BSCR - LUR - Mortality

The mortality risk is the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of insurance liabilities

$$SCR_{mortality} = \Delta BOF \mid mortshock$$

the mortality shock is an immediate and permanent increase of 15% in the mortality rates adopted to calculate the TP

- The stress is applied only to policies where it results in an increase of TP. Those with potential decrease should not be stressed. Technically, for each policy (or model point or group of policies) the BEL value after mortality stress has to be compared with the corresponding BEL obtained in the central scenario.
- The stress exercise should be applied on a single policy basis, however, under certain conditions, policy (model point) grouping is allowed.
- In case of policy grouping the potential increase in TP may also be assessed based on groups of policies instead of single policies (assuming that it would give approximately the same result).

BSCR - LUR - Mortality

Subject to certain preconditions (i.e. simplification is proportionate to the nature, scale and complexity of the risks and standard calculation is an undue burden for the undertaking), a simplification may be used as follows

$$SCR_{mortality} = 0.15\,CAR\,q \sum_{k=1}^{n} \left(\frac{1-q}{1+ik} \right)^{k-0.5}$$

where

- CAR denotes the total positive Capital At Risk, meaning the sum, in relation to each contract, of the higher of zero and the difference between the following amounts: (i) the sum of the amount that the (re)insurer would currently pay in the event of the death of the persons insured under the contracts (net of reinsurance & SPV) and the expected PV of future amounts that the (re)insurer would pay under the same contracts (again net of reinsurance and/or SPV). (ii) the best estimate of the corresponding obligations after deduction of the amounts recoverable from reinsurance and/or SPV.
- q is an undertaking-specific expected average mortality rate for the next year weighted by sum assured.
- n denotes the modified duration in years of payments payable on death included in the best estimate.
- ik denotes the annualized spot rate for maturity k of the relevant risk-free term structure.

BSCR - LUR - Mortality

The stress factor for mortality risk reflects the uncertainty in mortality parameters as a result of mis-estimation and/or changes in the level, trend and volatility of mortality rates and captures the risk that more policyholders than anticipated die during the policy term.

The underlying assumptions for the mortality risk sub-module can be summarised as follows:

- the undertaking has established a system to restrict adverse selection.
- the probability distribution for mortality is skewed, with a current trend towards improving mortality
- for the simplified calculation of the capital requirement for mortality risk it is assumed that there is no material decrease in the respective sum of capital at risk in the next n years, where n is the modified duration (in years) of payments payable on death included in the best estimate projection. It is furthermore assumed, that the average mortality rate of the insured persons (weighted by sum insured) will not increase materially over the next n years.

BSCR - LUR - Longevity

Longevity risk is associated with the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of insurance liabilities.

$$SCR_{longevity} = \Delta BOF \mid longshock$$

the longevity shock is an immediate and permanent decrease of 20% in the mortality rates adopted to calculate the TP

- The stress is applied only to policies where it results in an increase of TP. Those with potential decrease should not be stressed. Technically, for each policy (or model point or group of policies) the BEL value after longevity stress has to be compared with the corresponding BEL obtained in the central scenario.
- The stress exercise should be applied on a single policy basis, however, under certain conditions, policy (model point) grouping is allowed.
- In case of policy grouping the potential increase in TP may also be assessed based on groups of policies instead of single policies (assuming that it would give approximately the same result).

BSCR - LUR - Mortality

Subject to certain preconditions (i.e. simplification is proportionate to the nature, scale and complexity of the risks and standard calculation is an undue burden for the undertaking), a simplification may be used as follows

$$SCR_{longevity} = 0.20\, q\, n\, 1.1^{(n-1)/2}\, BE_{long}$$

where

- BE_long is the BE for contracts subject to longevity risk
- q is an undertaking-specific expected average mortality rate for the next year weighted by sum assured.
- n denotes the modified duration in years of annuity payments to beneficiaries included in the Best Estimate

BSCR - LUR - Longevity

The longevity scenario should be calculated under the condition that the scenario does not change the value of future discretionary benefits in TP.

The stress factor for longevity risk is intended to reflect the uncertainty in mortality parameters as a result of mis-estimation and/or changes in the level, trend and volatility of mortality rates and captures the risk of policyholders living longer than anticipated. The underlying assumptions for the longevity risk sub-module can be summarised as follows:

- the annual mortality improvements follow a normal distribution
- for the simplified calculation of the capital requirement for longevity risk it is assumed that the average age of policyholders within the portfolio is 60 years or more.
- it is furthermore assumed that the average mortality rate of the respective insured persons does not increase by more than 10% each year.

BSCR - LUR - Disability / Morbidity

Disability-morbidity risk is the risk of loss, or of adverse changes in the value of insurance liabilities, resulting from changes in the level, trend or volatility of disability and morbidity rates.

$$SCR_{dis} = \Delta BOF \mid disshock$$

the shock are immediate and combined:

- increase of 35% in morbidity/disability inception rates for the first year
- permanent 25% increase (over best estimate) in morbidity/disability inception rates at each age in following years
- where applicable, a permanent decrease of 20% in morbidity/disability recovery rates across all years

Rates to be shocked

- any disability-morbidity rates used directly in the calculation of TP
- any transition rates between several health statuses of different severity. Transition from to status of higher severity should be considered as disability rate. Analogous transition to any status of lower severity should be considered as recovery rate.

BSCR - LUR - Disability / Morbidity

Subject to certain preconditions (i.e. simplification is proportionate to the nature, scale and complexity of the risks and standard calculation is an undue burden for the undertaking), a simplification may be used as follows

$$SCR_{dis} = CAR_1\, d_1\, 0.35 + CAR_2\, d_2\, 0.25(n-1)1.1^{(n-3)/2} + BE_{dis}\, t\, n\, 0.2\, 1.1^{(n-1)/2}$$

where

- CAR1 and CAR2 denote the capital at risk (calculated as per mortality) for disability-morbidity exposures during the following 12 months and the exposed period after the following 12 months
- d1 and d2 denote the expected average disability-morbidity rate during the following 12 months and the period thereafter respectively weighted by the sum insured
- BEdis is the best estimate for contracts subject to disability and morbidity risk
- t denotes the expected termination rates during the following 12 months.
- N denotes the modified duration in years of the disability/morbidity payments to beneficiaries included in the best estimate.

BSCR - LUR - Disability/Morbidity

The stress factors for disability/morbidity risk reflect the risk that more policyholders than anticipated become disabled or sick during the policy term (inception risk), and that disabled people recover less than expected (recovery risk). The underlying assumption for the disability/morbidity risk is that the insurance portfolio is well diversified in terms of likelihood of disability or sickness (inception rates) or change in the severity of disability or sickness (recovery rate).

Here are some assumptions for the simplification to be applied

- there are no material decrease in the respective sum of capital at risk in the next n-1 years after the following year, where n is the modified duration (in years) of payments payable on disability/morbidity included in the best estimate projection
- the expected average disability/morbidity rate of insured persons (weighted by the sum insured) will not increase materially during that period
- the expected average disability/morbidity rate and the expected termination rates do not increase by more than 10% each year

BSCR - LUR - Lapse

Lapse risk is the risk of loss or adverse change in liabilities due to a change in the expected exercise rates of policyholder options (contractual policyholder rights to fully or partly terminate, surrender, decrease, restrict or suspend insurance cover or permit the insurance policy to lapse).

$$SCR_{lapse} = max\left(SCR_{lapseup}, SCR_{lapsedw}, SCR_{lapsemass}\right)$$

$$SCR_{lapseup} = \Delta BOF \mid lapseup\ shock$$

$$R_{up}(R) = \min(150\%R, 100\%)$$

Instantaneous permanent increase of 50% in the assumed option exercise rates of the relevant options in all future years that do not exceed 100%

$$SCR_{lapsedw} = \Delta BOF \mid lapsedw\ shock$$

$$R_{dw}(R) = \max(50\%R, R - 20\%)$$

Instantaneous permanent decrease of 50% in the assumed option exercise rates of the relevant options in all future years, where the absolute variation do not exceed 20%.

BSCR - LUR - Lapse

$$SCR_{lapsemass} = \Delta BOF \mid lapsemass\ shock$$

Combination of the following instantaneous changes where 'discontinuance' means surrender, lapse without value, making a contract paid-up, automatic non-forfeiture provisions or exercising other discontinuity options or not exercising continuity options

- the discontinuance of 70% of the insurance policies relating to group pension business for which discontinuance would result in an increase of technical provisions without the risk margin and where the policy holder is either not a natural person and discontinuance is not subject to approval by beneficiaries or a natural person acting for the benefit of the beneficiaries.
- the discontinuance of 40% of the insurance policies other than group pensions above and for which discontinuance would result in an increase of technical provisions without the risk margin
- where reinsurance contracts cover insurance or reinsurance contracts that will be written in the future, the decrease of 40% of the number of those future insurance or reinsurance contracts used in the calculation of technical provisions

BSCR - LUR - Lapse

- The stress is applied only to policies where it results in an increase of TP. Those with potential decrease should not be stressed. Technically, for each policy (or model point or group of policies) the BEL value after mortality stress has to be compared with the corresponding BEL obtained in the central scenario.
- The stress exercise should be applied on a single policy basis, however, under certain conditions, policy (model point) grouping is allowed.
- In case of policy grouping the potential increase in TP may also be assessed based on groups of policies instead of single policies (assuming that it would give approximately the same result).
- Where the dynamic policyholder behaviour is implemented, this should be considered on top of the prescribed shocks. Hence, the order should be as follows: first shock is applied to the lapse rate and then dynamic policyholder decision is included

BSCR - LUR - Lapse

A simplification for the down and up shock may apply under certain circumstances at the level of homogeneous risk groups instead of a policy-by-policy basis, as follows:

$$SCR_{lapseup} = 150\%\ l_{up}\ n_{up}\ S_{up} \qquad SCR_{lapsedw} = 150\%\ l_{dw}\ n_{dw}\ S_{dw}$$

Where

- lup, ldw estimate of the average rate of lapsation of the policies with a negative/positive surrender strain, subject to a minimum rate of lapsation of 40% in case of negative (dw) surrender strain and a minimum of 67% in case of positive (up) surrender strain
- nup, ndw average run-off (in years), weighted by surrender strains
- Sup, Ddw sum of positive/negative surrender strains

BSCR - LUR - Expense

The Expense risk arises from the variation in the expenses incurred in servicing insurance and reinsurance contracts.

$$SCR_{expense} = \Delta NAV \mid expenseshock$$

the expense shock is an increase of 10% in future expenses compared to best estimate anticipations, and increase by 1% per annum of the expense inflation rate compared to anticipations

The underlying assumptions for the expense risk sub-module can be summarised as follows:

- undertakings are exposed to the risk of the change of expenses arising predominantly from: staff costs, cost of commissions to sales intermediaries (on the basis of the contractual terms of the arrangements), cost of IT infrastructure, cost of land and buildings occupied
- the undertaking operates in a macroeconomic environment where inflation, though subject to fluctuations, is broadly under control (i.e. inflation targeting).

BSCR - LUR - Expense

A simplification can be used where it is proportionate to the nature, scale and complexity of the risks that the undertaking faces and the expense risk sub-module is an undue burden for the undertaking as follows

$$SCR_{exp} = \left(\frac{n}{10} + \frac{(1+i+0.01)^n - 1}{i+0.01} - \frac{(i+1)^n - 1}{i} \right) EI$$

Where

- EI denotes the amount of expenses incurred in servicing life insurance or reinsurance obligations other than health insurance and reinsurance obligations during the last year
- n denotes the modified duration in years of the cash-flows included in the best estimate of those obligations
- i denotes the weighted average inflation rate included in the calculation of the best estimate of those obligations, weighted by the present value of expenses included in the calculation of the best estimate for servicing existing life obligations

It is assumed that there is no material increase due to other sources than inflation in the expenses incurred in servicing life insurance obligations, and where the projected cash flows follow a certain pattern

BSCR - LUR - Revision

The Revision risk is the risk of loss, or of adverse change in the value of insurance and reinsurance liabilities, resulting from fluctuations in the level, trend, or volatility of revision rates applied to annuities, due to changes in the legal environment or in the state of health of the person insured

$$SCR_{revision} = \Delta NAV \mid revshock$$

the revision shock is an increase of 3% in the annual amount payable for annuities exposed to revision risk over the run-off period of the annuities.

this risk module should be applied only to annuities where the benefits payable under the underlying insurance policies could increase as a result of changes in the legal environment or in the state of health of the person insured.

- this includes annuities arising from non-life claims (excluding annuities arising from health obligations which are treated in the health SLT module) where the amount of the annuity may be revised during the next year for the reasons mentioned above.
- the underlying assumptions for the revision risk sub-module can be summarised as follows: all annuities are independent and their annual amount is assumed to be constant; the average sized portfolio comprising annuities at different legal stages is in 'average' proportions

BSCR - LUR - CAT

The CAT risk stems from extreme or irregular events whose effects are not sufficiently captured in the other life underwriting risk sub-modules. Examples could be a pandemic event or a nuclear explosion.

$$SCR_{CAT} = \Delta NAV \mid CATshock$$

the revision shock is an absolute 1.5 per mille increase in the rate of policyholders dying over the following year. Also assess whether scenarios in health module apply and, if so, apply these scenarios in addition to the 1.5 per mille

Underlying assumptions:

- restricted to obligations that are contingent on mortality i.e. where an increase in mortality leads to an increase in technical provisions.
- not applicable to obligations, such as annuities, where the increase in mortality leads to a reduction in technical provisions.
- for the simplified calculation of the capital requirement for catastrophe risk it is assumed that the capital at risk is an appropriate proxy for the instantaneous loss caused by the death of the person insured by the respective contract.

BSCR - LUR - CAT

A simplification can be used where it is proportionate to the nature, scale and complexity of the risks that the undertaking faces and the expense risk sub-module is an undue burden for the undertaking as follows

$$SCR_{CAT} = \sum_i 0.0015 \; Capital\_at\_risk$$

Where

- the sum includes all policies with a positive capital at risk
- CARi denotes the capital at risk of the policy i, meaning the higher of zero and the difference between the following amounts:
  - the sum of (i) the amount that the insurance or reinsurance undertaking would currently pay in the event of the death of the persons insured under the contract after deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles, and (ii) the expected present value of amounts not covered in the previous indent that the undertaking would pay in the future in the event of the immediate death of the persons insured under the contract after deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles.
  - the best estimate of the corresponding obligations after deduction of the amounts recoverable form reinsurance contracts and special purpose vehicles.

BSCR - Life Underwriting Risk

Interactions between products and risks

	Pure Risk	Capitalization	Endowment	Annuity in accumulation	Annuity in payment	Non-Life annuity	Accident and disability	Health
Mortality	X		X	X			X	X
Longevity					X	X		
Disability							X	X
Lapse	X	X	X	X			X	X
Expenses	X	X	X	X	X	X	X	X
Revision					X	X		
CAT	X		X				X	X

BSCR - Health Underwriting Risk

- The SLT Health Underwriting Risk module should be applied for the calculation of the SLT Health underwriting risk capital requirements
- this module should be applied on health insurance and reinsurance obligations

- In order to correctly identify obligations that should be considered under Health Underwriting Risk module EIOPA introduced detailed segmentation into Lines of Business (LoBs)
  - Health insurance
  - Annuities stemming from non-life insurance and classified as health
  - Accepted reinsurance for health insurance

SII - SF or IM ?

- Each company can decide whether to stick to the Standard Formula calculation or to invest in a more sophisticate Internal Model
- The implementation of an Internal Model requires time and resources, but it allows to better capture the risk and (likely) to save capital

Here are some limitations of the Standard Formula

	Standard Formula	Issue	Internal Model
Risks	Elliptical distribution (eg normal)	Most risks are fat tailed distributed	The distributions can be chosen to suit the characteristics of the risk (empirical distributions are allowed as well)
Dependencies	Constant correlations (also in the tails)	Dependencies structure can vary in average and extreme situations - “markets crash together”	Ensures more accuracy in the SCR calculation and the ability to capture interdependencies among different risks

SII - SF or IM ?

	Standard Formula	Issue	Internal Model
Capital allocation	Not possible directly	Use test requires a capital allocation that is useful for decision making processes	It is possible to allocate the capital to each chosen risk
PDF	Percentile defined a priori	The 99.5th percentile of loss is only one point of the distribution	The full distribution is defined and allows to expand the Risk appetite Framework and setting limits not only on cat scenarios (i.e. a 3-year planning horizon); it also allows stress test, reverse stress test and scenarios analysis with more flexibility and readiness

SII - SF or IM ?

	Standard Formula	Issue	Internal Model
Aggregation	Available capital is a linear function of risk factors	Available capital is not linear – for example options and guarantees can vary not linearly on the market conditions	It's possible to define a non linear function
	Changes in more than one risk factors can be summed in term of capital	Capital requirements are not separable	The capital can be defined for each risk chosen
Risk Assessment	Requires strong simplifications for the projection of the SCR	The projection of the risk assessment in different time horizons allows greater accuracy in terms of Capital Management and Business Planning	Allows a more precise estimation of the capital projection and improves the effectiveness of the sensitivity analysis for the ALM processes or for any other ad-hoc what-if analysis required