Solvency II and Risk Management Solutions

Sections

1 Solvency II: a fresh challenge

Solvency II marks an authentic transformation of the risk management and decision-making models for insurance underwriters

Solvency ceases to be a static snapshot of an entity's situation, becoming a **dynamic** process that lies at the heart of the insurance management business:

"today's products, risk factors, investments and businesses will impact tomorrow's solvency"

The European Commission's latest proposal is for Solvency II to take effect on **1 January 2013**

The Solvency II implementation timeline for 2011 is:

- Publication of QIS5 results: end of March
- Definitive EC proposals for regulatory implementation (Level 2): June
- Publication of the binding technical standards by the EIOPA (former CEIOPS): by December

The process of adapting to the new standards and philosophy is going to require a huge effort on the part of the insurers. This process will be protracted and will imply significant **quantitative, organisational and data management challenges,** among which:

- Identification of an entity's most significant risk factors
- Estimation of technical provisions
- Asset valuations under a range of scenarios
- Selection, design and implementation of internal models
- Aggregation of compartmentalised calculation and data processing processes across an entity's various areas/departments/IT systems
- Traceability for all elements and processes involved in results calculation
- Generation of information that can be used to facilitate everyday decision-making

New approach to calculating minimum capital

Solvency II establishes a new approach to determining insurer solvency based on calculation of **net asset value (NAV)** and possible changes in value **(delta or ΔNAV)** over time

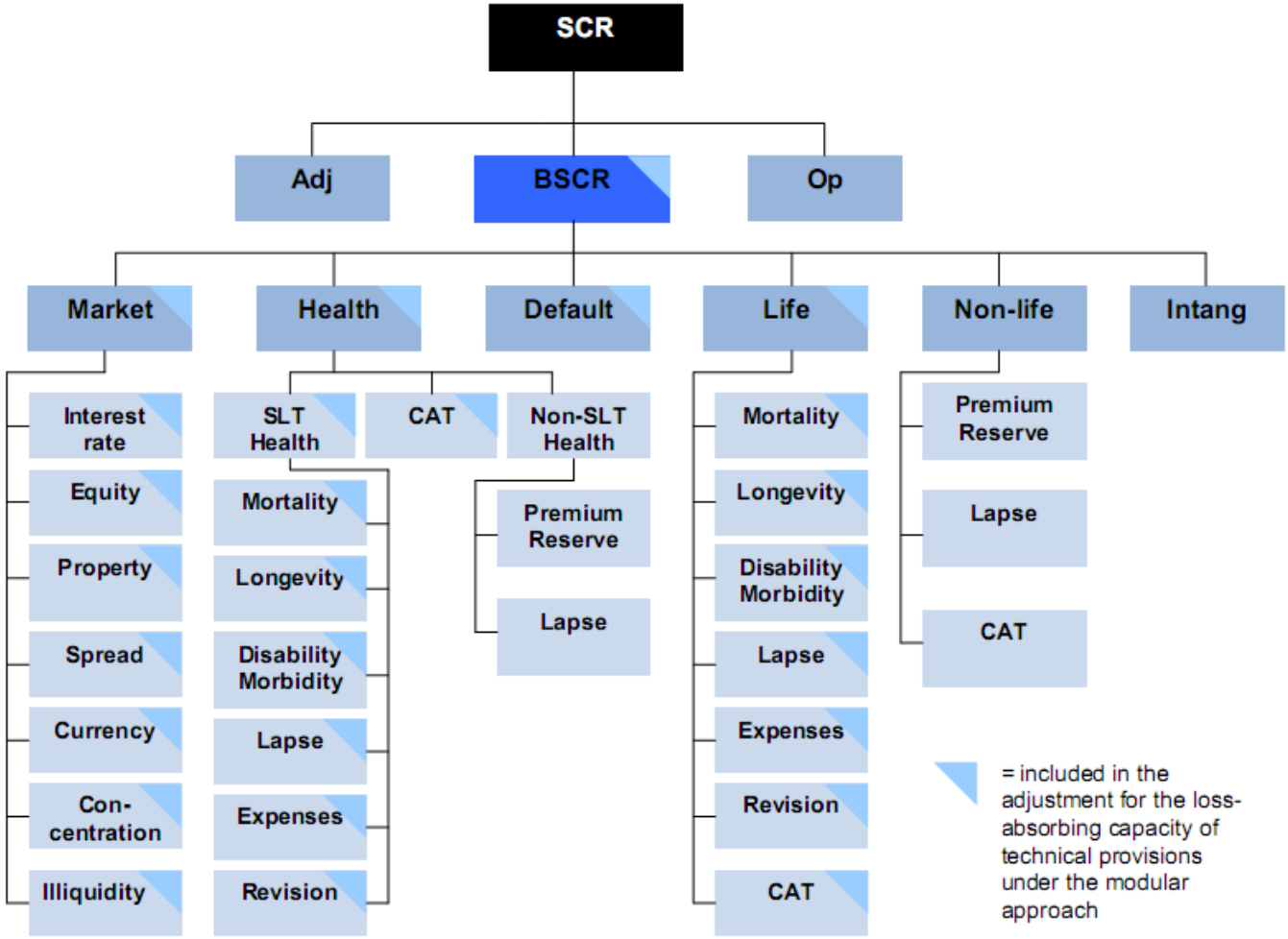
❑ Internal models

- ΔNAV for a one year time horizon
- VaR 99.5%
- Flexible framework with respect to model selection
- Scope for partial or full internal models, combined with the standard formula

❑ Standard formula

- Regulatory tables and formulas
- Stress testing of ΔNAV for market variables, mortality tables, etc.
- Scenarios 'corresponding' to 1-year VaR at a 99.5% interval
- Variance-covariance risk aggregation

Risk mapping under Solvency II



The Afi proposition is articulated around the major lines of initiative

Afi offers the following services designed to help entities to complete the process of adapting to the new risk measurement and capital management framework defined by Solvency II, particularly under the aegis of financial risk control:

1. Market value of financial assets (mark-to-market)
   - For NAV calculation
2. Financial risk measurement (VaR 99.5%)
   - Asset portfolio risk management and control
3. Scenario generation for the estimation of profit sharing (PS)
4. Tools for calculating capital for covering market and counterparty risk using the standard formula
5. Advice on the development and implementation of internal models
6. Control and management of capital calculation procedures: Risk Integrator

2 The Afi proposition

2.1. Asset valuation

AfiVal is the online financial asset valuation platform developed by Afi

This platform benefits from Afi's full expertise in the valuation of financial assets of all classes, configured to value plain vanilla assets or the most complex instruments (ABS, RMBS, structured products, etc.)

The platform enables:

- Access to historical intelligence for all valuations performed by Afi using the asset valuation service
- Ability to attend to discretionary requests to value or re-value instruments as of any date, even modifying the valuation inputs and/or market conditions
- Direct modelling and valuation of standard instruments by users
- Enhanced valuations of illiquid instruments (securitisations, covered bonds, preference shares, subordinated debt, etc.) through the use of credit spreads obtained following meticulous selection and cross-checking of market information sources

Resultados de la valoración

Volver Descargar datos en formato Excel

Página 1 de 2

IDENTIFICADORES			RAMA DE RECIBO					RAMA DE PAGO					VALOR GLOBAL				
ID TIF	ISIN BOLETA	FECHA VCTO	DIVISA	NOMINAL VIVO	VALOR TOTAL DIVISA	VALOR TOTAL %	VALOR TOTAL EURO	DIVISA	NOMINAL VIVO	VALOR TOTAL DIVISA	VALOR TOTAL %	VALOR TOTAL EURO	DIVISA	VALOR TOTAL DIVISA	VALOR TOTAL %	VALOR TOTAL EURO	DELTA EQUIVALENTE
1	BE0364162249	05/04/2022	EUR	1,091	2,036	187	2,036	EUR	0	0	0	0	EUR	0	187	2,036	0
2	BE0364779596	28/05/2021	EUR	1,653	3,023	183	3,023	EUR	0	0	0	0	EUR	0	183	3,023	0
3	BE0931376793	23/03/2021	EUR	2,000	1,878	94	1,878	EUR	0	0	0	0	EUR	0	94	1,878	0
6	DE000A0E8294	23/02/2016	EUR	1,500	1,515	101	1,515	EUR	0	0	0	0	EUR	0	101	1,515	0
7	DE000A0NZPE8	23/06/2015	EUR	2,000	1,703	85	1,703	EUR	0	0	0	0	EUR	0	85	1,703	0
9	ES0001353137	14/05/2013	EUR	400	417	104	417	EUR	0	0	0	0	EUR	0	104	417	0
10	ES0213211016	22/12/2016	EUR	1,202	1,243	103	1,243	EUR	0	0	0	0	EUR	0	103	1,243	0
11	ES0213679030	18/12/2028	EUR	902	898	100	898	EUR	0	0	0	0	EUR	0	100	898	0
13	ES0213980032	15/06/2015	EUR	5,000	4,527	91	4,527	EUR	0	0	0	0	EUR	0	91	4,527	0
14	ES0213980040	23/03/2017	EUR	5,000	4,135	83	4,135	EUR	0	0	0	0	EUR	0	83	4,135	0
16	ES0257763005	29/05/2018	EUR	1,202	1,379	115	1,379	EUR	0	0	0	0	EUR	0	115	1,379	0
17	ES0278430956	21/07/2029	EUR	1,000	2,068	207	2,068	EUR	0	0	0	0	EUR	0	207	2,068	0
18	ES0313211213	22/06/2011	EUR	500	497	99	497	EUR	0	0	0	0	EUR	0	99	497	0
19	ES0313260053	27/05/2011	EUR	12,020	12,985	108	12,985	EUR	0	0	0	0	EUR	0	108	12,985	0
30	FR0000489098	29/04/2022	EUR	1,000	1,204	120	1,204	EUR	0	0	0	0	EUR	0	120	1,204	0
31	FR0010239400	21/01/2016	EUR	500	435	87	435	EUR	0	0	0	0	EUR	0	87	435	0
33	NL0000116127	31/12/2050	EUR	2,000	943	47	943	EUR	0	0	0	0	EUR	0	47	943	0
35	PTCMHHOM0006	16/03/2014	EUR	4,000	3,978	99	3,978	EUR	0	0	0	0	EUR	0	99	3,978	0
37	XS0094515953	11/02/2011	EUR	12,000	12,512	104	12,512	EUR	0	0	0	0	EUR	0	104	12,512	0
40	XS0098170003	01/06/2019	EUR	28,000	28,355	101	28,355	EUR	0	0	0	0	EUR	0	101	28,355	0

Importes en miles

2.2. Financial risk measurement

AfiRisk is the tool designed by Afi to measure risk exposure at financial institutions. In addition to providing this service to clients as an external service provider, our system has also been implemented at several of Spain's most important financial institutions

It enables ongoing **monitoring** and **active management** of **market risk exposure** on asset portfolios

Some of its salient features include:

- VaR calculation (parametric, historical, Monte Carlo)
- Calculation of incremental VaR, marginal VaR, component VaR, TailVaR (expected shortfall)
- Measurement of the sub-portfolio diversification effect
- Stress testing
- Back testing
- The risk vertices include:
  - Interest rates
  - Credit spreads
  - FX
  - Equities

Informe de riesgos AfiRisk
Resumen ejecutivo

Metodología de cálculo:	Modelo paramétrico	Factor de decaimiento:	1
Nivel de confianza:	95%	Cartera:	CARTERA EJEMPLO
Horizonte temporal:	1 día	Fecha:	01/12/2010
Serie histórica de datos:	182	Divisa de cálculo:	Euro

AfiRisk

Afi

	Patrimonio	VaR Total	VaR % Patrimonio
VaR Cartera	**461,911,346**	**1,073,096**	**0.23%**

VaR POR TIPO DE INSTRUMENTO

	Valor de mercado	VM % Patrimonio	VaR	VaR % Patrimonio
ACCIONES	68,735,639	14.88%	666,184	0.14%
INSTRUMENTOS CON PROXY	201,715	0.04%	3,485	0.00%
BONOS	392,973,993	85.08%	668,283	0.14%
FUTUROS SOBRE ÍNDICES RENTA VARIABLE	0	0.00%	7,646	0.00%
FUTUROS SOBRE TIPO DE CAMBIO	0	0.00%	1,565	0.00%
Suma de medidas de riesgo			1,347,163	0.29%
Efecto diversificación			274,067	0.06%
Medida de riesgo total de la cartera			1,073,096	0.23%

VaR POR FACTOR DE RIESGO

	VaR	VaR % Patrimonio
TIPO INTERES	467,250	0.10%
TIPO CAMBIO	64,415	0.01%
CREDITO	612,091	0.13%
EQUITY	674,271	0.15%
RIESGO POR PROXY	3,485	0.00%
Suma de medidas de riesgo	1,821,512	0.39%
Efecto diversificación	748,416	0.16%
Medida de riesgo total de la cartera	1,073,096	0.23%

2.3. Estimation of profit sharing (PS)

One of the most complex tasks in valuing liabilities is the valuation of the **options and guarantees** incorporated into insurance policies such as surrender options, profit sharing (PS) and future discretionary bonuses. These are usually valued using Monte Carlo stochastic simulation methods.

Against this backdrop, the PS arrangements (of a financial nature) incorporated into many savings insurance products can be seen as a call option on the actual return on a portfolio of assets. Valuation of this optionality requires the **simulation of stochastic financial scenarios** (interest rate, credit, etc.) on the basis of real market data.

Afi has extensive experience in the use of Monte Carlo methodology to value instruments and measure risk and is in a position to offer its clients stochastic simulations of scenarios for interest rates, credit spreads and other market variables using the most widely used models, including:

Interest rate scenario generation

- Libor Market Model
- Hull-White

Credit risk scenario generation

- Jarrow-Lando-Turnbull
- CreditMetrics

2.4. Market and counterparty risk

The calculation of capital requirements using the standard formula for the market risk module can be summed up as follows:

- Calculation of present-day NAV
- Stress testing (predefined scenarios under prevailing regulations) for a given market variable (interest rates, credit spreads, etc.) before recalculating NAV
- Subtraction of stressed NAV from initial NAV

In short, the exercise entails repeated asset and liability valuations under different pre-defined scenarios for certain market variables.

On the asset side, AfiVal enables rapid investment portfolio revaluation using its ‘what-if’ valuation capability.

On the liability side, when estimating stressed PS, Afi can provide the stochastic financial scenarios corresponding to the various stressed market scenarios.

Lastly, the Afi team remains at all times on hand to provide its clients with advice on all matters relating to the calculations involved in any standard formula risk model.

2.5. Internal models

Solvency II accommodates the use of internal models, allowing partial or full implementation, in any of the risk map modules, for assets and liabilities alike.

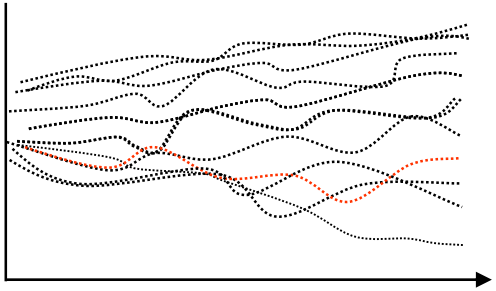
The **Afi** team supports and advises its clients on the design and implementation of these models, boasting a significant track record in modelling **market risk, credit risk** and **counterparty risk**.

The starting point in advanced internal models is the generation of risk scenarios, **real world scenarios** (financial markets, economic conditions) over a one year horizon.
To measure solvency, the following is required for each scenario:

- The value of an entity's assets in one year's time
- Information for valuing liabilities in one year's time
- Use of the most sophisticated calculation methodologies when liability cash flows depend on asset returns (PS arrangements)

2.5. Internal models: schematic

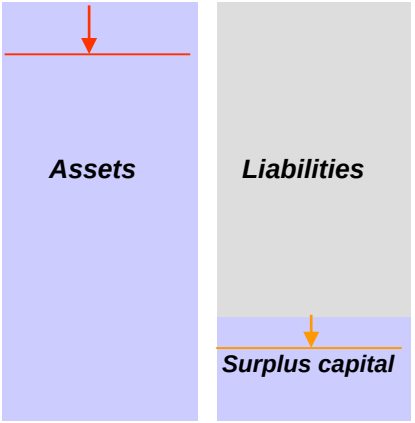
Real world scenarios



Risk factors

- Exogenous (interest rates, credit spreads, etc.)
- Idiosyncratic (claims in motor insurance, management, etc.)

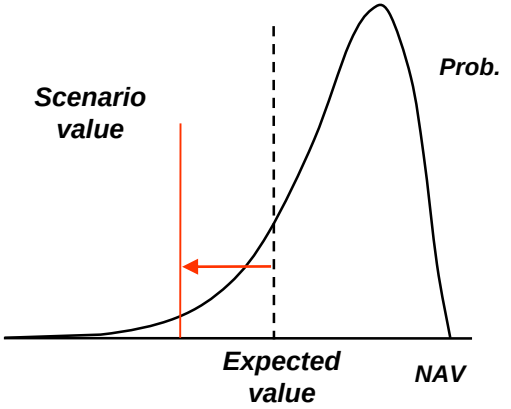
Asset and liability valuation



Valuation

- Cash flow projections for each scenario
- Possible Monte Carlo simulation

NAV distribution



NAV

- Risks are aggregated into intervals
- VaR 99.5%

2.6. Risk Integrator

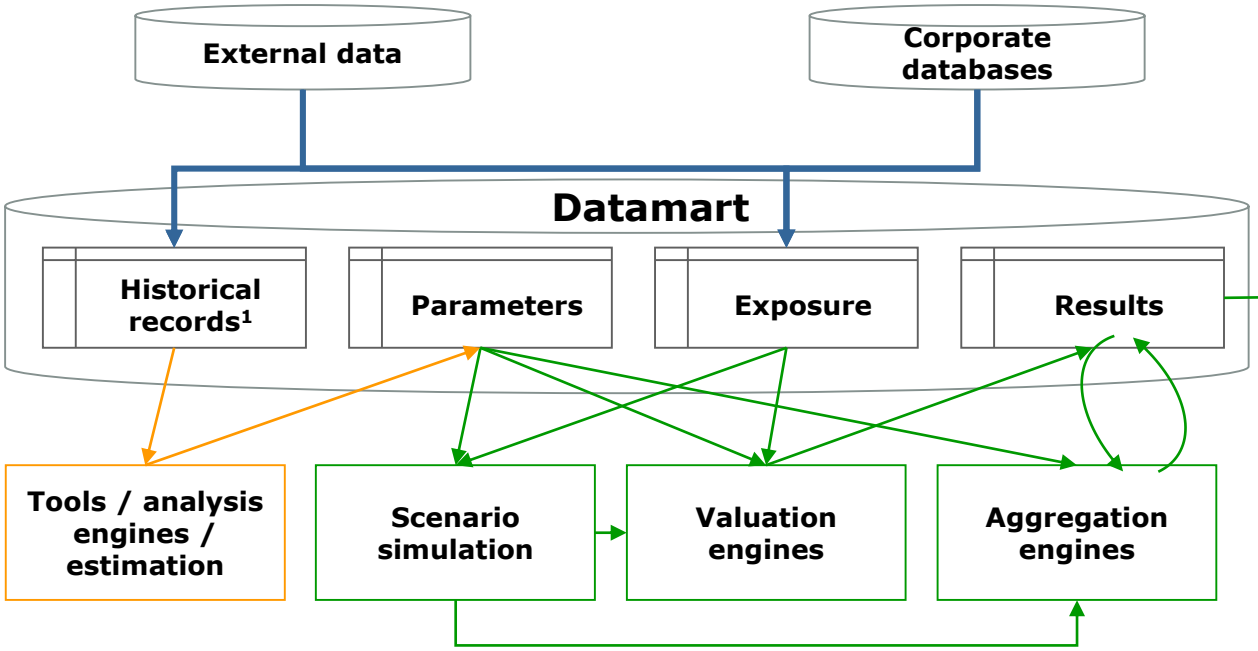
Beyond the purely quantitative issues and financial calculations, it is our understanding that adaptation to and implementation of Solvency II brings significant **IT and organisational challenges**, including but not limited to:

- The aggregation of compartmentalised risk exposures and calculation processes across an entity's various areas/departments/IT systems
- The management of the technical and operational risks intrinsic to the calculation process
- The generation of information that can be used to facilitate everyday decision-making

With a view to helping its clients in this arena, Afi, in collaboration with Ritova Solutions, has developed a tool which helps resolve these issues: Risk Integrator. The tool enables:

- Centralised workflow control
- Results traceability / reproduction
- The ability to incorporate / control the results generated by multiple platforms / tools
- Injection of calculation transparency and scalability for new models and tools
- Minimisation of implementation time and costs
- Minimisation of additional development costs

2.6. Risk Integrator: risk measurement architecture



Reporting

Executive reports

ETL: extraction, transformation, loading

Risk analysis / factor parametrisation: analysis circuit

Results output:
- **valuation circuit**
- **aggregation / assignation circuit**

Key functions

- **Data management**
- **Statistical analysis**
- **Interval simulations / aggregations**
- **Non-life / Health valuations**
- **Life valuations**
- **Asset valuations**
- **Economic scenario simulation**
- **Technical scenario simulation**

Risk Integrator

2.6. Risk Integrator: prerequisites for optimal risk measurement

	Requirements …	*… for creating practical solutions*
Control	• Centralised workflow control (no files changing hands) • Results traceability / reproduction • Model continually updated	"Who has the latest motor insurance results?" "When do they date from?" "But the life insurance figures are from March"
Sophistication	• Ability to configure multiple risk map definitions (e.g. regulatory model vs. internal models by module) • Methodologies not conditioned by risk factor • Advanced aggregation and allocation approaches	"We are planning to migrate Life over to an internal model but need SCR standard formula calculations in parallel"
Flexibility	• The ability to incorporate / control the results generated by multiple platforms / tools • Injection of calculation transparency and scalability for new models and tools	"Reinsurance is trialing a new tool. How are we going to incorporate it into the capital framework?"
Distribution	• Results and aggregations need to be user-friendly for their assorted users • Ability to configure user access at various levels (configuration, execution, reporting, consultation)	"Can you send Mexico its latest capital charge results by business line?" "I am being asked what table we used, apparently there is a new one! What did they send me in October?!"
Costs	• Minimisation of implementation time and costs • Minimisation of additional development costs	"How are we going to leverage our existing tools? We can't possibly migrate all our methodologies over to a new platform!"

3 Contacts

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