Principles and models for the Embedded Value calculation

Trieste – February 2012

AGENDA

1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

2. CFO Principles: the MCEV framework

3. Stochastic scenarios: calibration and validation

4. Asset and Liabilities valuation: looking for a consistent approach through the risk free definition

5. The MCEV calculation: a simple and “practical” example

1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

Getting to grips with Embedded Value

- Why not just using the Balance Sheet?
- Basic definitions: Embedded Value

From Traditional to Market Consistent EV

- Value of in-force business (VIF)
- Traditional EV: technical aspects
- Limits of traditional Embedded Value
- CFO Forum and EEV Principles
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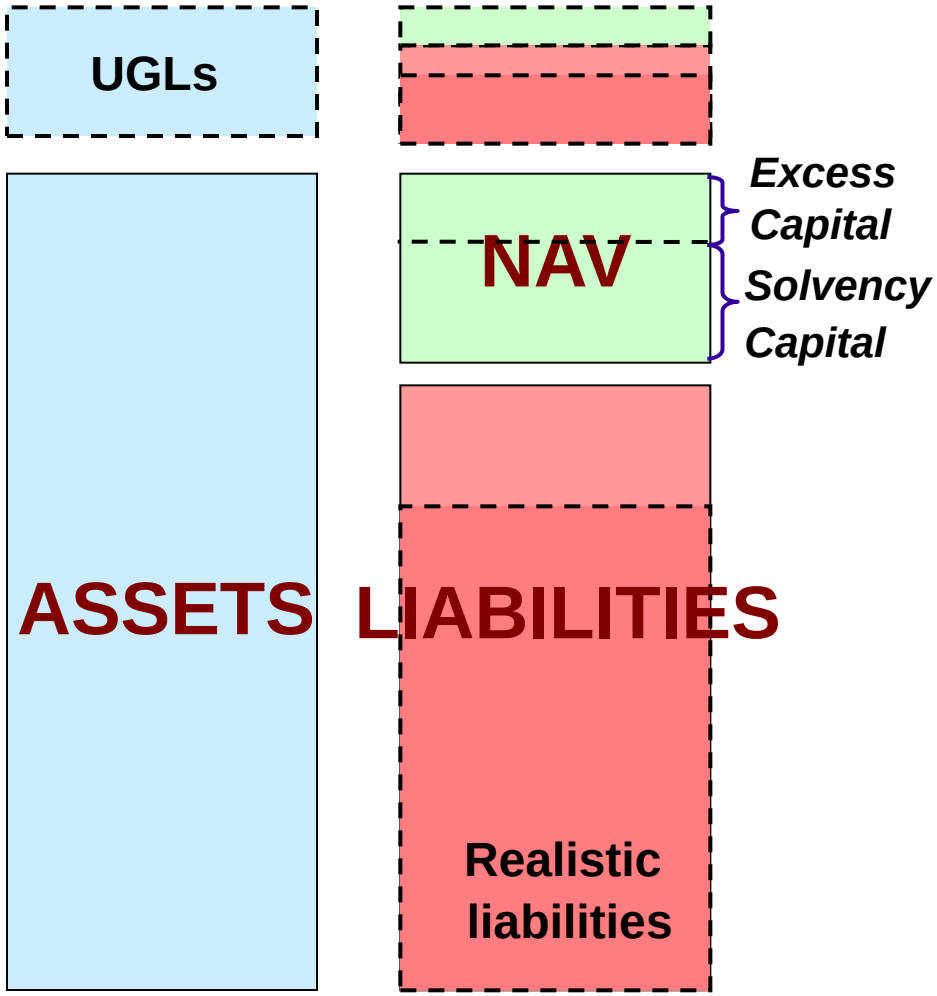
Life business: characteristics

Characteristics of life business:

- long duration of contracts
- uncertain payments to policyholders (“if”, “when” and “how much”)
- presence of guarantees for policyholders
  - minimum death benefits
  - minimum guaranteed rates
- dependence on economic variables (“financial”)
  - interest rates, equity returns
  - inflation
- dependence on operating variables (“non financial”)
  - mortality
  - lapses
  - expenses
- dependence on accounting practices
  - deferred acquisition costs
  - local / IFRS accounting

Measuring the value from a SH's perspective

What is the Balance Sheet missing to recognise?



The difference between MV and BV of assets:

- UGLs on Assets backing NAV
- UGLs on Assets backing Liabilities
- Split of UGLs between SHs and PHs

The prudent basis used in pricing and reserving:

- intrinsic value in the reserves

The use of SH's capital (and the fact taxes are to be paid on it), which must be remunerated:

- cost of holding a (regulatory or internally determined) solvency capital

Measuring the value from a SH's perspective

What is the P&L missing to recognise?

P&L result is not necessarily a valid indicator of value creation, e.g.:

1. P&L high profit but value destruction

- **High lapses** in one year bring **high profits** due to surrender penalties, **but…**
- **Loss of stream of future profits** expected from the contracts that lapsed is higher than the profit of the year;

2. P&L loss but value creation

- High **new business** volumes in one year bring **high acquisition expenses** with consequent losses, **but…**
- Stream of **future profits** expected from the new contracts is higher than the loss of the year

Measuring the value from a SH's perspective

What is the P&L missing to recognise?

Premiums are not necessarily a valid indicator of value creation:

- low volumes – high margins
- high volumes – low margins
- duration of contracts
  - ✓ low surrender penalties – high surrenders
  - ✓ high surrender penalties – low surrenders
- financial options and g'tees
- solvency requirement

It is the **VALUE of the PREMIUMS** that actually matters, taking into account the cost of the solvency margin

Embedded Value: the strengths

Embedded value:

- is a value-based measure
- highlights the value created, its drivers and timing of emergence
- analyses the differences between assumptions and reality
- allows international comparisons, not depending on statutory accounting
- provides a value for new business (i.e. business sold during the year)

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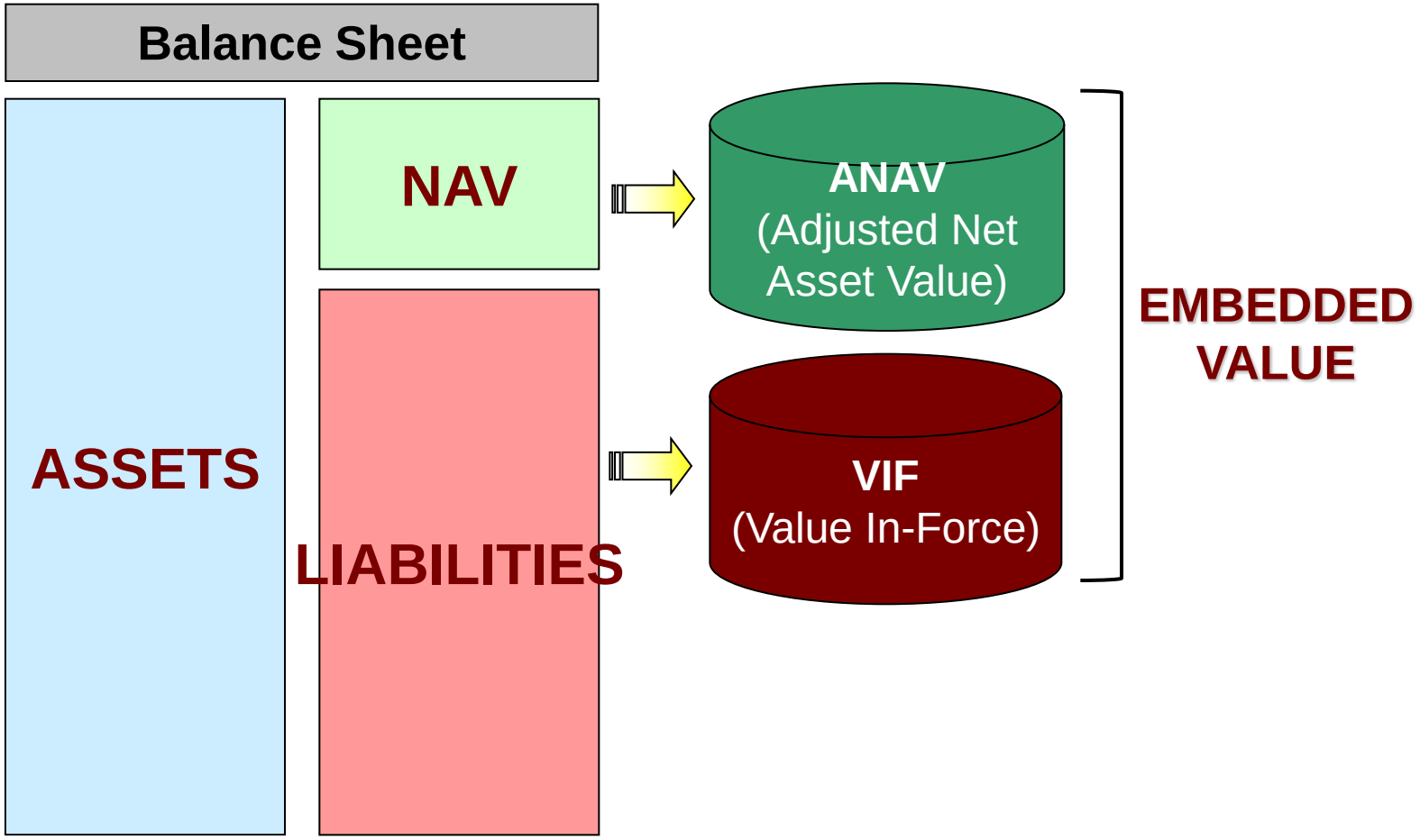
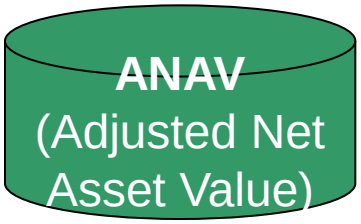
Value of a life insurance company



Adjusted net asset value



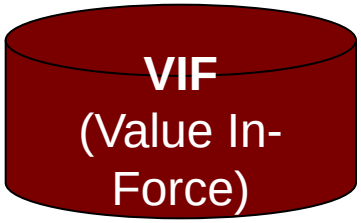
DEFINITION:

Company's published net assets adjusted to reflect the market value of the related backing assets

ANAV is equal to the sum of:

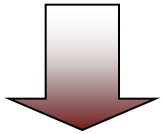
- Net Asset Value (shareholders' equity)
- adjustments to Net Asset Value (after taxes and PH participation)
  - unrealised gains and losses (+/-)
  - intangibles (start up costs, Deferred Acquisition Costs, …) (-)
  - revaluation of participated companies (+)
  - cross participations (-)

Value of in-force (VIF)



DEFINITION:

Present value at valuation date of future industrial profits (after taxes and reinsurance) expected to emerge from all contracts existing at valuation date, after allowance for the cost of financial guarantees and options, the cost of non financial risks and the cost of holding the required capital



value “implicit” in the contracts already in-force

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Traditional VIF

GENERAL VIF DEFINITION:

Present value at valuation date of future industrial profits (after taxes and reinsurance) expected to emerge from all contracts existing at valuation date, after allowance for the cost of financial guarantees and options, the cost of non financial risks and the cost of holding the required capital

To be noted:

under TEV approach, the cost of financial guarantees and options and the cost of non financial risks are not taken into account explicitly (but only implicitly within the discount rate)

Traditional VIF definition

TRADITIONAL VIF DEFINITION:

Present value, at valuation date, **of future industrial profits** (after taxes and reinsurance) expected to emerge from all contracts existing at valuation date, taking into account the **cost of holding the capital**

VIF = PVFP - CoC

$$PVFP = \sum_t \frac{U_t}{(1+r)^t}$$

where

U_t = industrial profit (after tax and reinsurance)

r = discount rate

$$CoC = \sum_t \frac{C_{t-1} * [r - i * (1 - tax)]}{(1+r)^t}$$

where

C_{t-1} = capital

i = return on assets backing the capital

r = discount rate

PVFP calculation: main aspects

➢ **PVFP:** Present value of future **industrial profits**, after taxes and reinsurance

✓ **INDUSTRIAL PROFITS: technical profits + financial profits**

- **technical profits:** mortality profits + surrender profits + loading profits
- **financial profits:** investment income - technical interests (i.e. minimum guaranteed + revaluations)

➢ **How to calculate the PVFP**

✓ Database

- Info regarding all the policies in the portfolio at valuation date

✓ Other Issues

- Impact of DAC
- Reinsurance
- Contingency Reserves

✓ Future Assumptions

- Economic assumptions:
  - Investment returns
  - taxation rate
- Operating assumptions:
  - Lapses
  - Mortality
  - Maintenance Expenses
- Discount Rate

Projection of future profits: demographic analysis

Demographic Analysis

Year	Policies fully in force	First Elimination	Surrender	Maturity	Paid-Up New	Paid-Up in force	Paid-Up Elimination	Paid-Up Surrender	Paid-Up Maturity
2010	786,319	1,484	24,560	34,750	7,082	-	5	46	36
2011	718,444	1,407	20,392	29,309	7,305	6,995	15	183	170
2012	660,030	1,337	17,268	30,859	7,038	13,932	26	317	320
2013	603,528	1,247	15,203	30,647	6,348	20,307	36	431	512
2014	550,084	1,152	13,309	34,709	5,278	25,675	45	508	794
2015	495,636	1,076	11,577	28,305	4,067	29,606	51	545	1,101
2016	450,611	1,025	10,088	28,195	3,151	31,976	56	545	1,313
2017	408,151	966	8,731	31,497	2,405	33,213	59	520	1,608
2018	364,553	903	7,434	27,472	1,861	33,431	61	481	1,586
2019	326,882	859	6,250	28,302	1,437	33,165	62	422	2,004
2020	290,033	817	5,128	27,443	1,098	32,114	61	354	2,360
2021	255,548	779	4,354	27,115	830	30,437	60	278	2,743
2022	222,470	734	3,805	27,788	612	28,185	57	208	3,296
…	…	…	…	…	…	…	…	…	…
2041	2,409	72	9	-	-	-	-	-	-
2042	2,329	76	8	-	-	-	-	-	-
2043	2,244	46	5	1,488	-	-	-	-	-
2044	706	10	1	695	-	-	-	-	-
	-	-	-	-	-	-	-	-	-

Projection of future profits: P&L account

Gross Profit and Loss Account

Year	Premiums	Reserves Incoming	Investment Income	Reserves Outgoing	Payments	Commissions	Expenses	**Gross Result**
								1,384
2010	709	6,109	266	6,327	556	1	28	172
2011	660	6,327	280	6,510	557	1	27	172
2012	612	6,510	292	6,610	610	1	25	167
2013	566	6,610	301	6,655	634	1	24	163
2014	520	6,655	299	6,569	728	1	22	153
2015	474	6,569	333	6,487	693	1	21	175
2016	431	6,487	327	6,351	716	1	19	159
2017	389	6,351	318	6,115	777	1	18	148
2018	350	6,115	305	5,862	754	1	16	136
2019	312	5,862	291	5,539	786	1	15	125
2020	275	5,539	272	5,168	791	1	14	113
2021	239	5,168	253	4,760	787	1	12	101
2022	205	4,760	231	4,299	796	1	11	89
…	…	…	…	…	…	…	…	…
2041	3	189	11	193	7	-	0	3
2042	3	193	11	196	7	-	0	4
2043	1	196	6	36	164	-	0	2
2044	-	36	1	-	37	-	0	0
	-	-	-	-	-	-	-	-

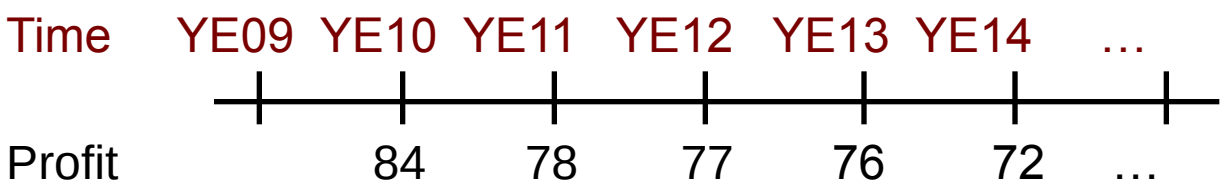
Projection of future profits: from gross to industrial results

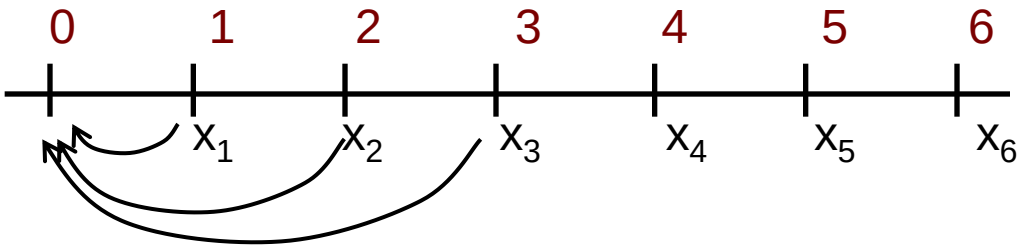
PVFP				U'_t
Gross Result	Reinsurance Result	**Before Tax Industrial Profit**	Taxation	**Industrial Profit**
1,384	**- 343**	**1,042**	**398**	**643**
172	- 36	136	- 52	84
172	- 46	126	- 48	78
167	- 43	125	- 48	77
163	- 40	123	- 47	76
153	- 37	116	- 44	72
175	- 48	127	- 49	78
159	- 43	116	- 44	72
148	- 39	108	- 41	67
136	- 36	100	- 38	62
125	- 33	92	- 35	57
113	- 29	84	- 32	52
101	- 25	76	- 29	47
89	- 22	68	- 26	42
…	…	…	…	…
3	-	3	- 1	2
4	-	4	- 1	2
2	-	2	- 1	1
0	-	0	- 0	0
-	-	-	-	-

Present value of future profits (PVFP)

U^{I}_{t}

Year	Industrial Profit
	643
2010	84
2011	78
2012	77
2013	76
2014	72
2015	78
2016	72
2017	67
2018	62
2019	57
2020	52
2021	47
2022	42
…	…
2041	2
2042	2
2043	1
2044	0
	-





r: discount rate →

$$PV = \sum_{i=1}^{n} x_i (1+r)^{-i}$$

r=7.25%

$$PVFP = \frac{84}{(1+7.25\%)} + \frac{78}{(1+7.25\%)^2} + \frac{77}{(1+7.25\%)^3} + \frac{76}{(1+7.25\%)^4} + \ldots = 78 + 68 + 62 + 58 + \ldots = 643$$

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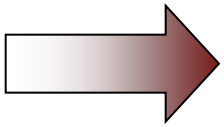
Future projections: assumptions

Financial

Demographic

Expenses

Taxation



"Best Estimate" assumptions

- determined by each Company at the valuation date, having regard to past, current and expected future experience and to any other relevant data
- set within the context of a going concern (i.e. new business will continue to be written)

Future projections: financial assumptions

➢ **Asset Mix backing mathematical reserves**
(*equities, properties, corporate bonds, government bonds…*)

➢**RISK FREE** *(10-y AAA Government bond)*
➢**GOVERNMENT BONDS** *(risk free*)*
➢**CORPORATE BONDS**
(risk free + spread(1) for liquidity premium)
➢**EQUITIES** *(risk free + spread(2))*
➢**PROPERTIES** *(risk free + spread(3))*

Long term Future Investment Return

➢**UGLs on equities**
(assumed realisation: 5 years)
➢**UGLs on properties**
(assumed realisation: whole projections)
➢**UGLs on bonds**
(assumed realisation: duration)

Future Investment Return (UGLs included)

➢ **Risk Discount Rate (RDR)**
risk free + Spread(4)

Future projections: financial assumptions

Example: Generali

Return on Equities= spread 2.90% on AAA but 2.32% on local govt

Return on Property= spread 1.15% on AAA but 0.57% on local govt

Return on Equities= spread 2.90%

Return on Properties = spread 1.15%

Best-estimate economic assumptions as at 31 December 2009

	Italy	Germany	France	CEE	RoE	RoW
10 y Government Bond	4.02%	3.44%	3.57%	4.55%	3.46%	5.54%
Equity Total Return	6.34%	6.34%	6.34%	6.51%	6.11%	8.03%
Property Total Return	4.59%	4.59%	4.59%	5.41%	3.77%	6.13%

Source: Generali – Life Embedded Value 2009 – Supplementary Information

Future projections: financial assumptions

The **discount rate** is the **return offered** to a shareholder on his investment in the company

- if the future profits are certain → risk free
- insurance business → uncertain
- shareholders want to pay less for uncertain businesses

↓

A RISK PREMIUM IS REQUIRED BY THE SHAREHOLDER

Risk, apparently ignored in a deterministic traditional approach, is instead already taken into account via a discount rate higher than the risk free rate: *risk free + risk premium*.

But how was the risk premium calculated?

Future projections: financial assumptions

The **risk premium**:

- should depend on the company riskiness
- should depend on the line of business
- should be different between VIF, ANAV and Goodwill

but…

- in the traditional deterministic approach it is not determined on a scientific basis, but based on market practice (range between 2.5%-4.0%)
- it is typically set equal to the equity risk premium
- same risks could be valued differently depending on the prudentiality of the company

Demographic assumptions

- **Mortality**: Company experience, where available
- **Surrenders**: Company experience, where available
- If not available? Market experience with possible prudential corrections

Further difficulties in setting demographic assumptions when:

- data on past experience is unavailable/insufficient for a specific product;
- rates experienced in the past years are not deemed to be valid as long term assumptions (especially for surrenders rates, which strongly depend on the economic environment)

Cost of capital

Cost of Capital:
Cost/Loss of interest due to holding the capital

Annual cost: $C_i * [r - i * (1 - tax)]$

i: return of assets backing the capital (gross of taxes)

r: shareholders' required rate of return

$i * (1 - tax)$

shareholder actual return from investing C_i in an insurance company

Within TEV valuation, the amount of capital (C) is typically set equal to the level of **minimum solvency margin**

Cost of capital

PVFP - CoC formula

CoC	$C_t * r$	$C_t * i * (1\text{-tax})$	PVFP - CoC
Cost of Solvency Margin	Required Return on Solvency Margin	After Tax Return on Solvency Margin	**Industrial Profit after Cost of SM**
55	**148**	**93**	**588**
6	16	10	78
6	17	10	72
6	17	11	71
6	17	11	70
6	17	11	65
6	17	10	72
6	16	10	65
6	16	10	61
6	15	9	56
5	14	9	52
5	13	8	47
5	12	8	42
4	11	7	37
…	…	…	…
0	0	0	2
0	0	0	2
0	0	0	1
0	0	0	0
-	-	-	-

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TEV methodology: technical limits

➢ Technical limits

1. Subjective choice of Risk Discount Rate (RDR)
2. Subjective choice of financial assumptions
3. Indirect allowance for financial guarantees
4. Capitalisation of asset risk premium

TEV methodology: 1) subjective choice of RDR

➢ RDR should reflect

- shareholder's expected return
- level of risk in the business at each valuation date

➢ Risk Margin in RDR is NOT actively linked to risk

- it usually reflects market practice
- use of similar risk margins between companies rather than active differentiation on the basis of the risks being run ("**herding**" tendency)

TEV methodology: 2) subjective choice of financial assumptions

Example n°1: Capitalisation product with profit sharing = 80% of financial result
Company A and B: same asset mix but **different financial assumptions**

	COMPANY A BOND return: 5% EQUITY return: 7.5% Risk Discount Rate: 7.5%	COMPANY B BOND return: 5% EQUITY return: 9% Risk Discount Rate: 9%
Asset Mix:	35% Equities, 65% Bonds	35% Equities, 65% Bonds
Expected Return:	**5.87%**	**6.40%**
Reserves:	2,000 €	2,000 €
PH Interest:	94.00 €	102.40 €
SH Interest:	23.50 €	25.60 €
PVFP:	**21.86 €**	**23.49 €**

→ **the higher the financial assumptions, the higher the value**

TEV methodology: 3) indirect allowance for financial guarantees

➢ Traditional VIF calculation

- explicitly captures the value of “in the money” guarantees to the extent that they have impact on projected profits (**Intrinsic Value**)
- implicitly allows, in the RDR, for the possibility that guarantees move (further) into the money (**Implicit allowance for Time Value of FG**)

TEV methodology: 3) indirect allowance for financial guarantees

Example n°2: Capitalisation product with profit sharing = 80% of financial result
Company A and B: same asset mix and financial assumptions but **different guarantee for PH**

BOND Return: **5%**, EQUITY Return: **7.5%**, Risk Discount Rate: **7.5%**

	COMPANY A Guarantee: none	COMPANY B Guarantee: 3%
Asset Mix:	35% Equities, 65% Bonds	35% Equities, 65% Bonds
Expected Return:	**5.87%**	**5.87%**
Reserves:	2,000 €	2,000 €
PH Interest:	94.00 €	94.00 €
SH Interest:	23.50 €	23.50 €
PVFP:	**21.86 €**	**21.86 €**

➔ **Same value for companies running different risks**

When best estimate assumptions are higher than guarantees, the cost of financial guarantees is not explicitly captured

TEV methodology: 4) capitalisation of asset risk premium

Example n°3: Capitalisation product with profit sharing = 80% of financial result
Company A and B: same financial assumptions, same guarantees but **different asset mix**

BOND Return: **5%**, EQUITY Return: **7.5%**, Risk Discount Rate: **7.5%**

	COMPANY A	COMPANY B
Asset Mix:	35% Equities, 65% Bonds	65% Equities, 35% Bonds
Expected Return:	**5.87%**	**6.62%**
Reserves:	2,000 €	2,000 €
PH Interest:	94.00 €	106.00 €
SH Interest:	23.50 €	26.50 €
PVFP:	**21.86 €**	**24.65 €**

→ **The riskier the assets, the higher the value**

In Traditional EV, the RDR is an input and is not adjusted to reflect the the actual risk profile of the company

TEV methodology: 4) capitalisation of asset risk premium

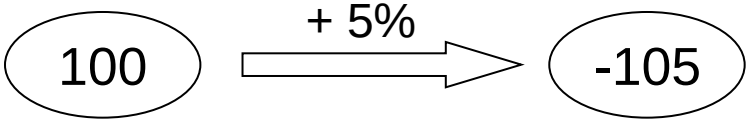
Traditional EV capitalises asset risk premiums:

- immediate recognition, at valuation date, of future margins expected to compensate for the assumed investment risk

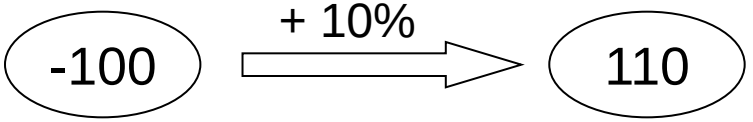
➔ 100 € of equities is worth **more** than 100 € of bonds

In a traditional environment, an investor can:

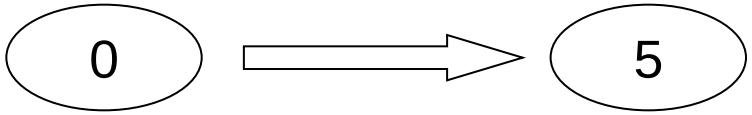
- borrow 100 € at 5% to be repaid in a year's time



- invest the proceeds in an equity with average return of 10% in a year's time



FREE ARBITRAGE:



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The CFO Forum is…

- a high level discussion group
- founded in 2002
- focused on:
  - new regulations for insurers
  - increase in transparency for investors
  - improving consistency of information reported
- with wide representation from major European-centred insurance groups

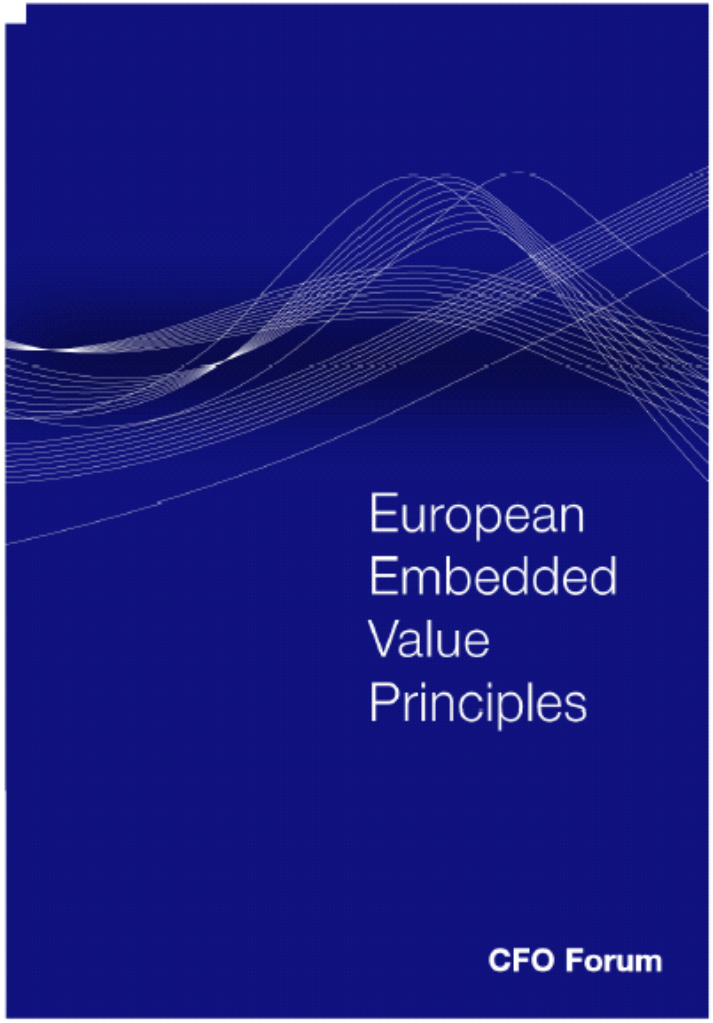
The CFO Forum is…

Aegon	CNP	ING	Prudential
Allianz	Fortis	Legal & General	Scottish Widows
Aviva	Generali	Mapfre	Standard Life
AXA	Hannover Re	Munich Re	Swiss Re
BNP Paribas	IF P&C	Old Mutual	Zurich FS

Source: CFO Forum

CFO Forum and EEV Principles

- In May 2004, the CFO Forum published the **European Embedded Value Principles** and member companies agreed to adopt EEVP **from 2006** (with reference to 2005 financial year)
- EEV Principles consisted of 12 **Principles and** 65 related areas of **Guidance**
- Other 127 comments, collected in the **"Basis for Conclusions",** summarised the considerations in producing the Principles and Guidance
- In October 2005, **additional guidance on EEV disclosures** was published to improve consistency of disclosures and sensitivities



CFO Forum and EEV Principles

European Embedded Value Principles

- **Principle 1** Introduction
- **Principle 2** Coverage
- **Principle 3** EV Definitions
- **Principle 4** Free Surplus
- **Principle 5** Required capital
- **Principle 6** Future shareholder cash flow from the in-force covered business
- **Principle 7** Financial options and guarantees
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- **Principle 10** Economic assumptions
- **Principle 11** Participating business
- **Principle 12** Disclosure

required use of stochastic simulations to determine impact of financial guarantees

The financial asymmetry of SH's result

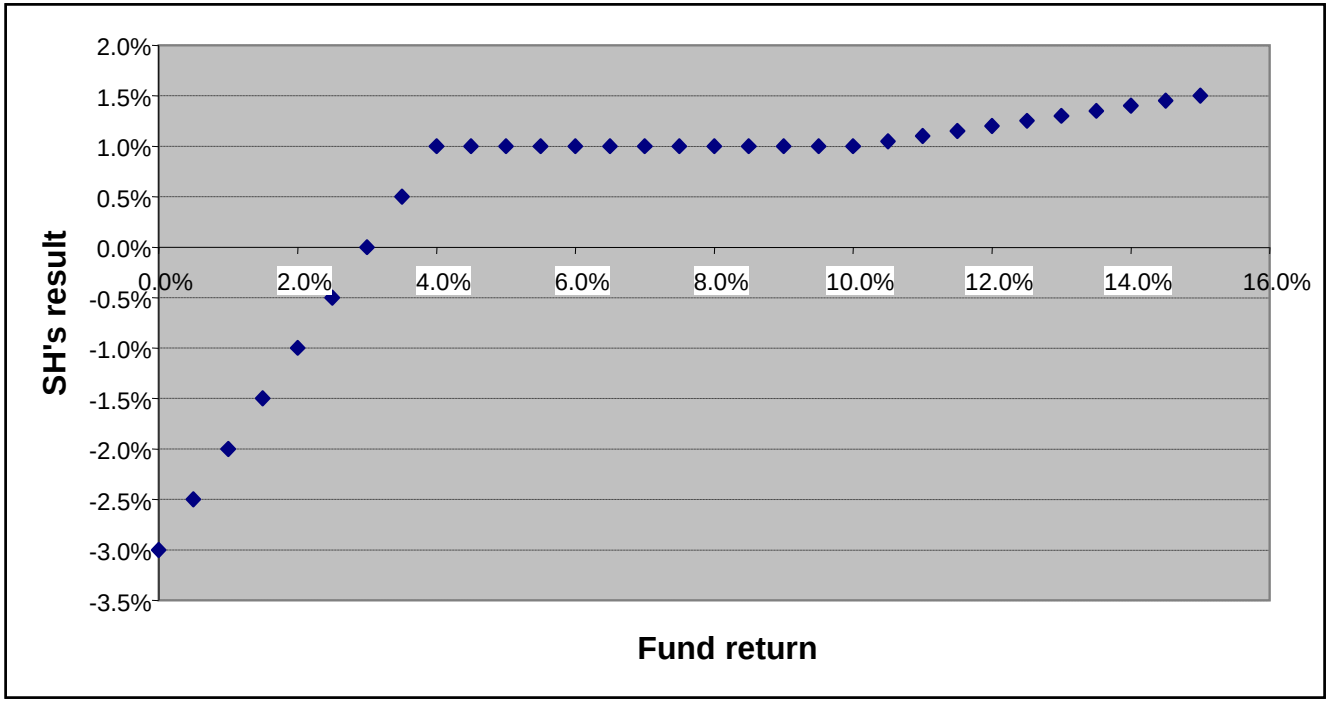
Return	SH's result
0.0%	-3.0%
0.5%	-2.5%
1.0%	-2.0%
1.5%	-1.5%
2.0%	-1.0%
2.5%	-0.5%
3.0%	0.0%
3.5%	0.5%
4.0%	1.0%
4.5%	1.0%
5.0%	1.0%
5.5%	1.0%
6.0%	1.0%
6.5%	1.0%
7.0%	1.0%
7.5%	1.0%
8.0%	1.0%
8.5%	1.0%
9.0%	1.0%
9.5%	1.0%
10.0%	1.0%
10.5%	1.1%
11.0%	1.1%
11.5%	1.2%
12.0%	1.2%
12.5%	1.3%
13.0%	1.3%
13.5%	1.4%
14.0%	1.4%
14.5%	1.5%
15.0%	1.5%

Guaranteed interest (gar)	3%
Participation percentage (a)	90%
Minimum retained (fee)	1%

PH's result = max (gar, min (return*a, return - fee)

SH's result = return - PH's result

Asymmetry of SH's results:
the mean SH's result is lower than the SH's result in the mean scenario



Valuation of the financial asymmetry

- Insurance business is asymmetric:
  - in “positive” scenarios, SHs earn only a share of the financial profit (due to the profit sharing with PHs)
  - in “negative” scenarios, SHs bear the full cost (due to the presence of guaranteed interests)

➡ the mean of PVFPs is lower than the PVFP of the mean scenario

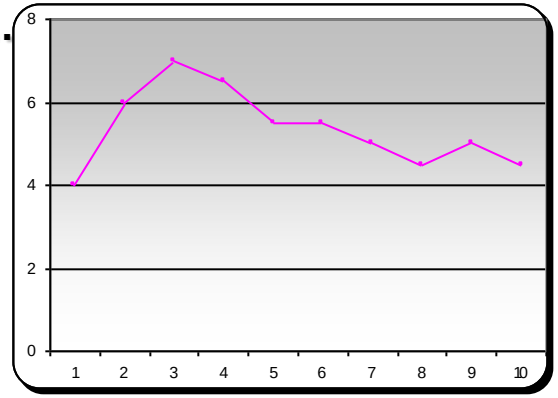
To capture the financial asymmetry (i.e. volatility of financial parameters):

- **TEV**
  - 1 single scenario (“Best Estimate”)
  - implicit allowance for risks within the discount rate (290bps over govt.bonds)
- **STOCHASTIC APPROACH**:
  - a number of stochastic scenarios is considered (1000 or 5000 or …)
  - in each scenario future profits and PVFP are calculated
  - the final PVFP is the mean of all the PVFPs in the stochastic scenarios

Valuation of the financial asymmetry

Not only one single scenario…

Scenario 1:



… but 1000 stoch scenarios

Scenario 2:

…

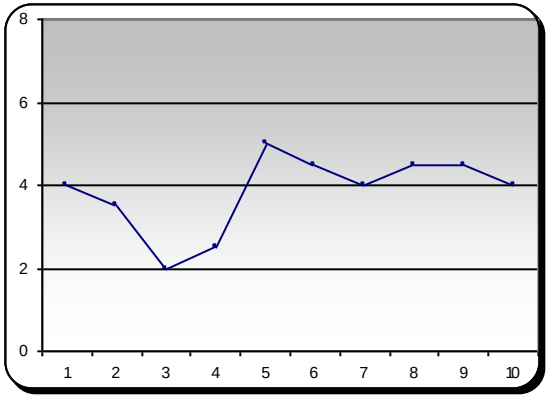
…

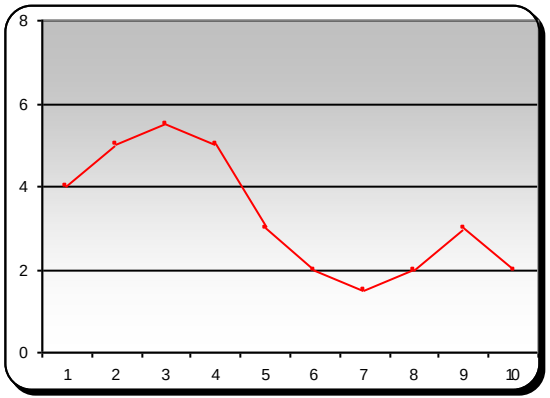
…

…

…

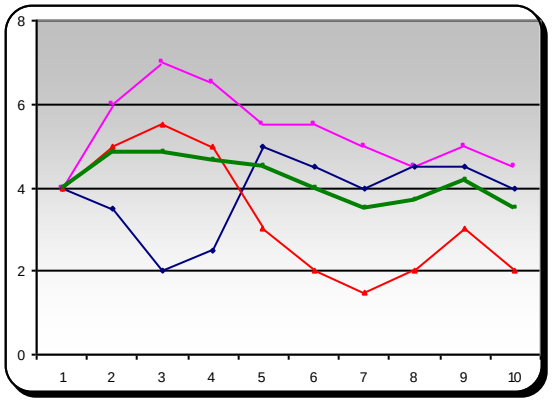
Scenario 1000:





PVFP

is the MEAN of PVFPs



MEAN profits

AGENDA

1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

Getting to grips with Embedded Value

- Why not just using the Balance Sheet?
- Basic definitions: Embedded Value

From Traditional to Market Consistent EV

- Value of in-force business (VIF)
- Traditional EV: technical aspects
- Limits of traditional Embedded Value
- CFO Forum and EEV Principles
- Market Consistent Embedded Value

Market Consistent Embedded Value

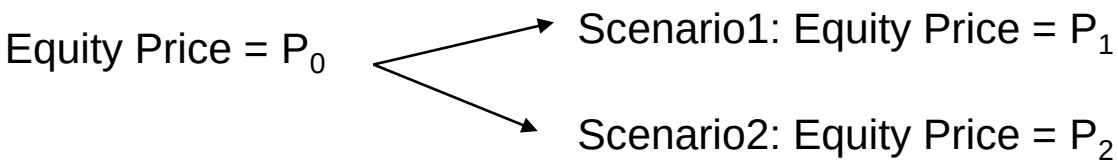
Market consistent valuation:

all projected cash flows are valued in line with the prices of similar cash flows that are traded in the financial market

- **Stochastic approach, consistent with modern financial theory**
  - **Avoid subjectivity in the choice of RDR and financial assumptions**
  - **Avoid capitalisation of asset risk premium *(no arbitrage)***
  - **Impact of financial guarantees is captured in all possible scenarios *(no implicit allowance)***

- **Two main possible approaches leading to same results**
  - **Deflator approach**
  - **Risk-neutral approach**

MCEV: two different approaches



$$P_0 = \frac{P_1 * probabilit\ \ y_1}{1 + discount\ _1} + \frac{P_2 * probabilit\ \ y_2}{1 + discount\ _2}$$

Two possible ways to reflect Risk Aversion:

- **using real-world probabilities of scenarios and calibrating to the market scenario dependent discount rates (Deflator approach)**
- **discounting at the risk-free rate and calibrating to the market probabilities of scenarios (Risk-neutral approach)**

MCEV: Risk Neutral approach

➢ **Assuming that Discount Rate is equal to Risk Free:**

$$P_0 = \frac{P_1 * probabilit\ \ y_1}{1 + discount\ _1} + \frac{P_2 * probabilit\ \ y_2}{1 + discount\ _2}$$

Equity/Bond Price		Discount Rate	pay-off in one year		probability
			bond	equity	
100	scenario 1	**5%**	105	113.5	43.33%
	scenario 2	**5%**	105	98.5	56.67%

➢ **Asset price is the mean of present values of corresponding pay-offs in all scenarios**

$$100 = \frac{113.5 * p_1 + 98.5 * (1 - p_1)}{1 + 5\%}$$

p_1 = 43.33%

p_2= 1 – p_1= 56.67%

Given the pay-offs and set the discount rate equal to risk free, the probabilities of the scenarios are calibrated to the market

Input

Bond return	5.0%
Equity Returns	7.5%

Output

Bond return	**5.0%**=5.0%*43.33%+5.0%*57.66%
Equity Returns	**5.0%**=13.5%*43.33%-1.5%*57.66%

"Certainty Equivalent": contract with 80% financial PS, no guarantee

	COMPANY A	COMPANY B	COMPANY C
Asset Mix:	35% Equities 65% Bonds	65% Equities 35% Bonds	Risk Free
Expected returns:			
Scenario 1	7.975%	10.525%	5%
Scenario 2	2.725%	0.775%	2,000 €
Reserves:	2,000 €	2,000 €	
PH Interest:			
Scenario 1	127.60 €	168.40 €	80 €
Scenario 2	43.60 €	12.40 €	
SH Interest:			
Scenario 1	31.90 €	42.10 €	20 €
Scenario 2	10.90 €	3.10 €	
PVFP:	**19.05 €**	**19.05 €**	**19.05 €**

For business where cash flows do not depend on, or move linearly with market movements (i.e. business not characterised by asymmetries in shareholder's results), **Certainty Equivalent approach** is the correct choice:

Unit Linked without guarantees

Zero coupon Terms

Non participating products

Certainty Equivalent: deterministic approach with Risk Free as investment return / Risk free as RDR

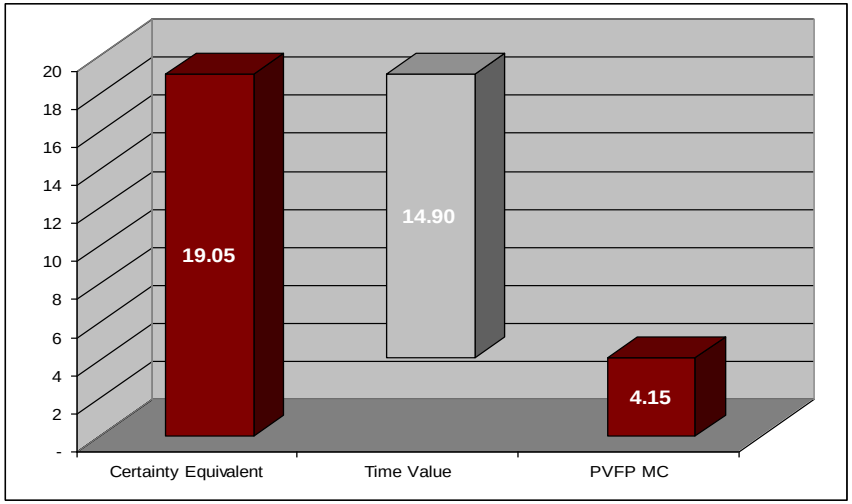
"Risk Neutral" applied to contract with 80% financial PS and 2% guarantee

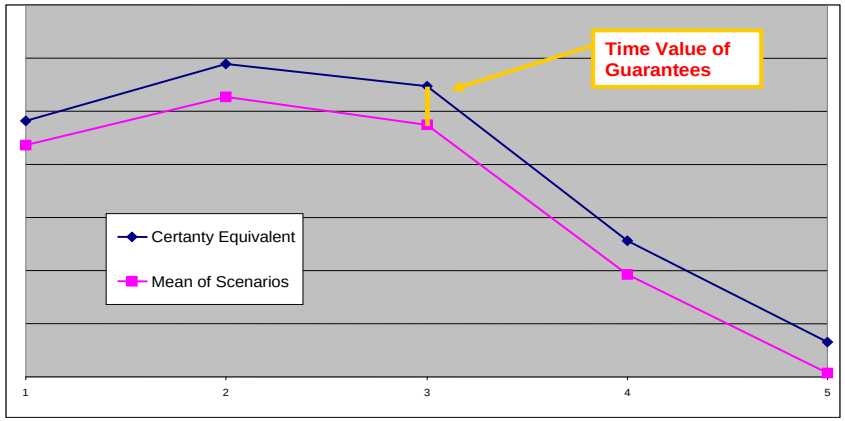
	COMPANY A	COMPANY B
Asset Mix:	35% Equities, 65% Bonds	65% Equities, 35% Bonds
Expected Return:		
Scenario 1	7.975%	10.525%
Scenario 2	2.725%	0.775%
Reserves:	2,000 €	2,000 €
PH Interest:		
Scenario 1	127.60 €	168.40 €
Scenario 2	43.60 €	40.00 €
SH Interest:		
Scenario 1	31.90 €	42.10 €
Scenario 2	10.90 €	-24.50 €
PVFP:	**19.05 €**	**4.15 €**

$= (31.90*43.33\%+10.90*56,67\%)*(1+5\%)^{-1}$ $(42.10*43.33\%-24.50*56,67\%)*(1+5\%)^{-1}$

"Risk Neutral" applied to contract with 80% financial PS and 2% guarantee

	Market Consistent	C.E.
Asset Mix:	65% Equities 35% Bonds	Risk Free
Expected returns:		
Scenario 1	10.525%	5%
Scenario 2	0.775%	
Reserves:	2,000 €	2,000 €
PH Interest:		
Scenario 1	168.40 €	80 €
Scenario 2	12.40 €	
SH Interest:		
Scenario 1	42.10 €	20 €
Scenario 2	-24.50 €	
PVFP:	**4.15 €**	**19.05 €**





Time Value= 19.05 - 4.15 = 14.90

Market Consistent PVFP can be seen as difference of:
Certainty Equivalent - Time Value of option & guarantees

AGENDA

1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

2. CFO Principles: the MCEV framework

3. Stochastic scenarios: calibration and validation

4. Asset and Liabilities valuation: looking for a consistent approach through the risk free definition

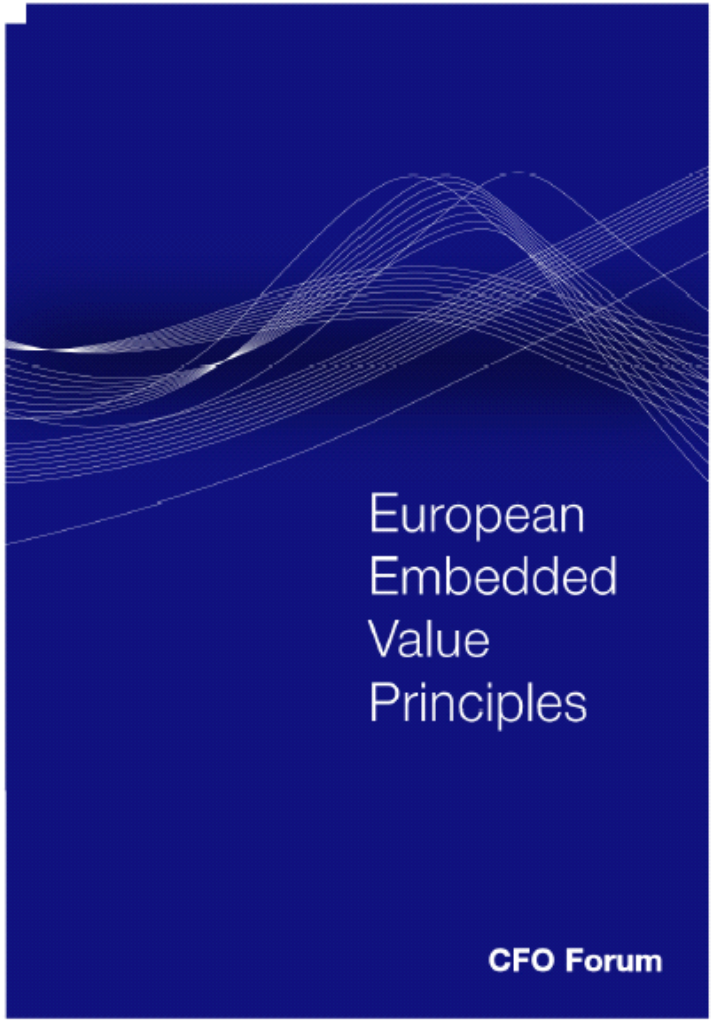
5. The MCEV calculation: a simple and “practical” example

The CFO Forum is…

- a high level discussion group
- founded in 2002
- focused on:
  - new regulations for insurers
  - increase in transparency for investors
  - improving consistency of information reported
- with wide representation from major European-centred insurance groups

CFO Forum and EEV Principles

- In May 2004, the CFO Forum published the **European Embedded Value Principles** and member companies agreed to adopt EEVP **from 2006** (with reference to 2005 financial year)
- EEV Principles consisted of 12 **Principles and** 65 related areas of **Guidance**
- Other 127 comments, collected in the **"Basis for Conclusions",** summarised the considerations in producing the Principles and Guidance
- In October 2005, **additional guidance on EEV disclosures** was published to improve consistency of disclosures and sensitivities



Away from TEV: EEV Principles

European Embedded Value Principles

- **Principle 1** Introduction
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- **Principle 3** EV Definitions
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- **Principle 12** Disclosure

Required use of appropriate approaches (*e.g. stochastic simulations*) to determine the impact of financial guarantees

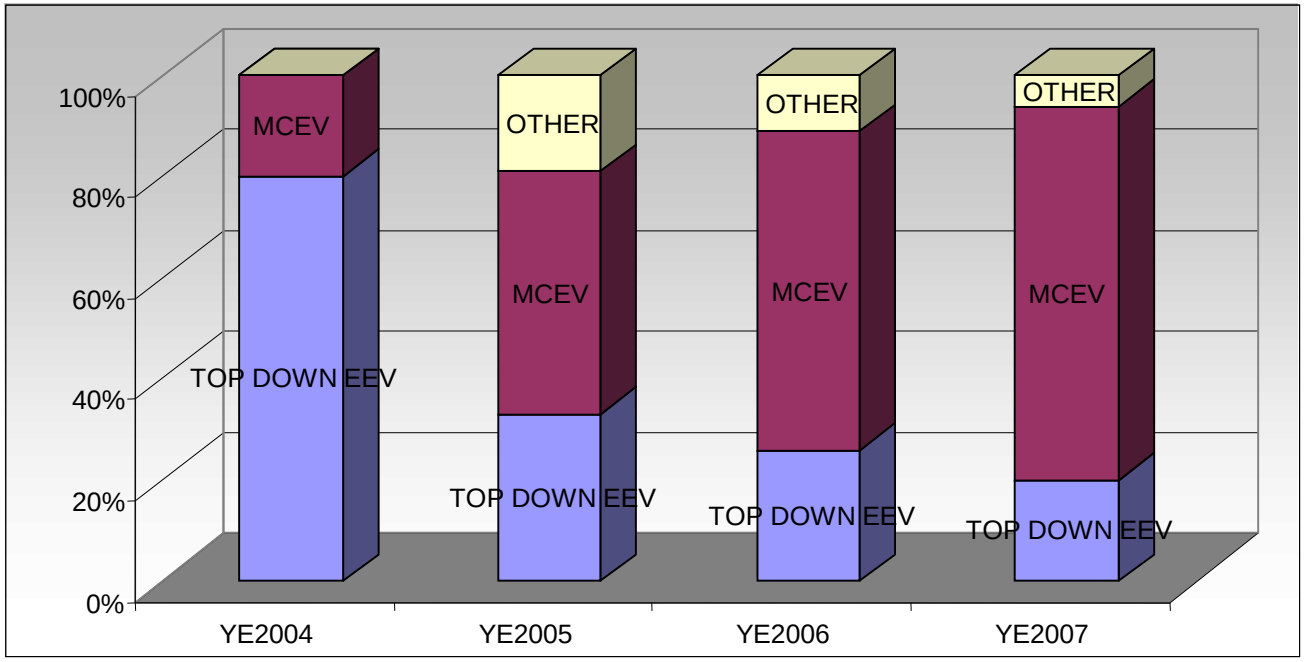
→ Generali's first EEV disclosure in May 2006, with YE2005 results

At the time, the EEV Principles represented a major step forward, introducing several major improvements:

- ✓ requirement for stochastic evaluation of financial guarantees and options
- ✓ disclosure of sensitivities and analysis of movement
- ✓ codification of several areas of current best practice, including disclosure on methodology and assumptions used

...but different approaches were still allowed!

EEV Principles



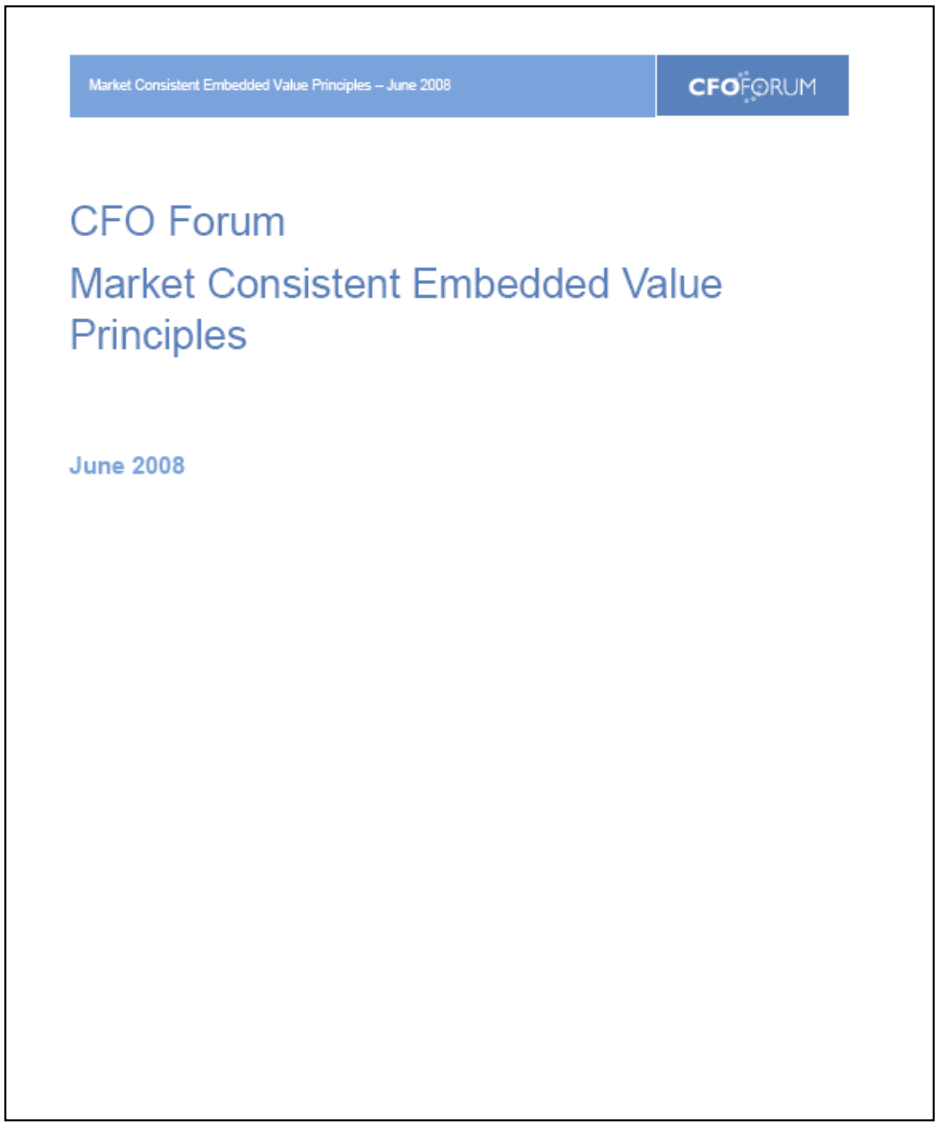
TOP DOWN EEV: risk discount rate based on company's WACC

MCEV: market consistent embedded value

In line with the emerging move towards a market consistent embedded value approach

Generali's first MCEV disclosure in March 2008, with YE2007 results

CFO Forum – June 2008: launch of MCEV Principles



On the 4th June 2008, the CFO published the **Market Consistent Embedded Value Principles**[1] and associated **Basis for Conclusions**

MCEV Principles:

- **replaced the EEV Principles** (i.e. standalone document, not supplement to EEV)
- **at beginning compulsory from year-end 2009** for CFO Forum members (early adoption was possible)
- mandated **independent external review** of results as well as methodology and assumptions

[1] Copyright© Stichting CFO Forum Foundation 2008

MCEV Principles (June 2008)

Market Consistent Embedded Value Principles

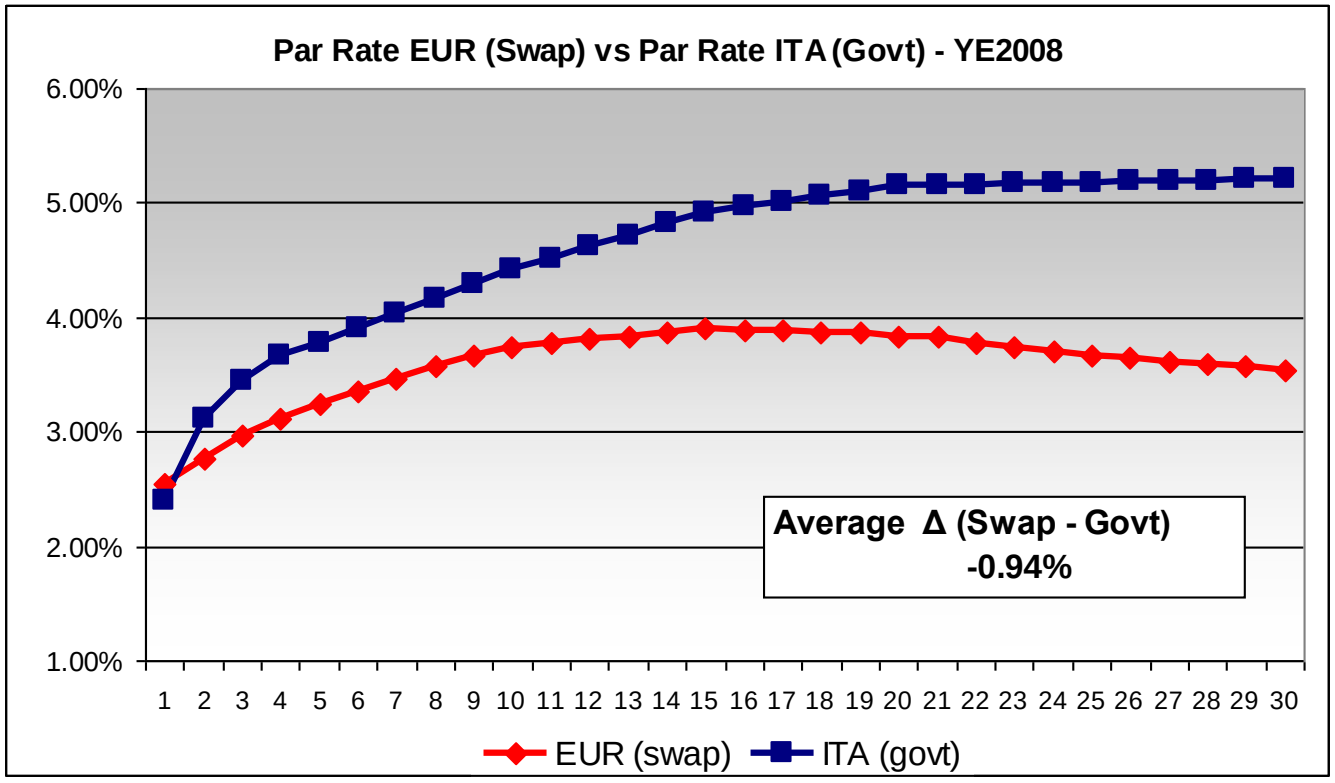
- **Principle 1** Introduction
- **Principle 2** Coverage
- **Principle 3** MCEV Definitions
- **Principle 4** Free Surplus
- **Principle 5** Required Capital
- **Principle 6** Value of in-force Covered Business
- **Principle 7** Financial Options and Guarantees
- **Principle 8** Frictional Costs of Required Capital
- **Principle 9** Cost of Residual Non Headgeable Risks
- **Principle 10** New Business and Renewals
- **Principle 11** Assessment of Appropriate Non Economic Projection Assumptions
- **Principle 12** Economic Assumptions
- **Principle 13** Investment Returns and Discount Rates
- **Principle 14** Reference Rates
- **Principle 15** Stochastic models
- **Principle 16** Participating business
- **Principle 17** Disclosure

Main implications of the MCEV Principles:

- all projected cash flows should be valued **in line with the price of similar cash flows** that are traded in the capital markets [*Principle 3 & 7*]
- **use of swap rates as reference rates** (i.e. proxy for risk-free rate) [*Principle 14*]
- **no adjustment for illiquidity premium** is allowed [*Principle 14*]
- volatility assumptions should be based on **implied volatilities** derived from the market **as at the valuation date** (rather than based on historic volatilities) [*Principle 15*]
- **required capital** should include amounts required **to meet internal objectives** (based on internal risk assessment or targeted credit rating) [*Principle 5*]
- explicit and separate **allowance for the cost of non hedgeable risks** [*Principle 9*]

The launch of **MCEV Principles** was initially welcomed by analysts and investor community and it was seen as a step in the right direction

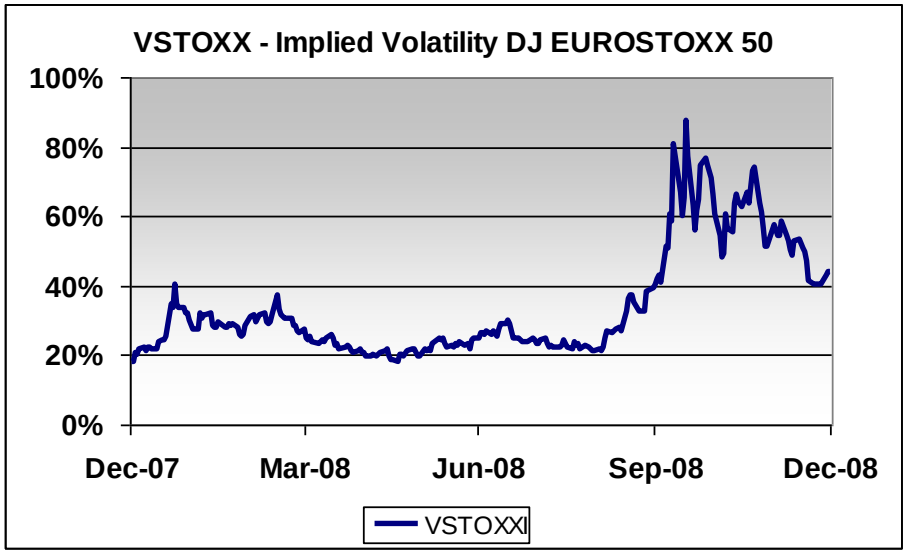
Financial market situation at YE2008: a “dislocated” market



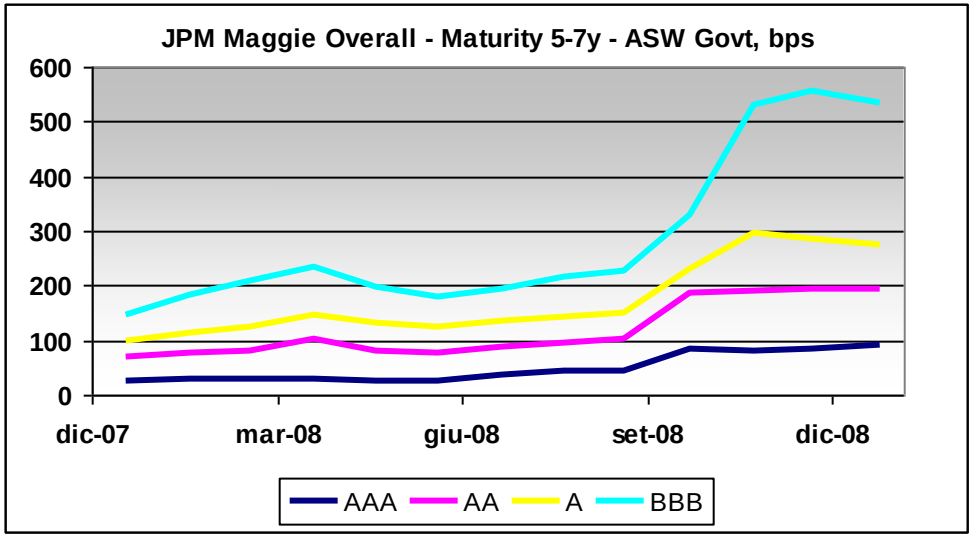
For Italy government bond rates higher than swap rates

Financial market situation at YE2008: a “dislocated” market

EQUITY VOLATILITY AT HISTORICAL PEAK



CORPORATE SPREADS AT RECORD LEVELS



CFO Forum - December 2008: tackling extreme financial conditions

CFO Forum - EEV Principles - Microsoft Internet Explorer

File Modifica Visualizza Preferiti Strumenti ?

Indietro Cerca Preferiti

Indirizzo http://www.cfoforum.nl/eev.html

CFOFORUM

HOME | MCEV/EEV PRINCIPLES | IFRS | CFO FORUM MEMBERSHIP | DISCLAIMER

Market Consistent Embedded Value (MCEV) Principles©

19 December 2008

In response to the current dislocated market conditions, the CFO Forum members are working collaboratively on the application of the Market Consistent Embedded Value (MCEV) Principles© to address the notion of market consistency in the current turmoil.

The CFO Forum remains committed to MCEV and the Principles published in June 2008. However, the MCEV Principles were designed during a period of relatively stable market conditions and their application could, in turbulent markets, lead to misleading results. The CFO Forum has therefore agreed to conduct a review of the impact of turbulent market conditions on the MCEV Principles, the result of which may lead to changes to the published MCEV Principles or the issuance of guidance.

The particular areas under review include implied volatilities, the cost of non-hedgeable risks, the use of swap rates as a proxy for risk-free rates and the effect of liquidity premia.

CFO Forum - May 2009: deferral of mandatory date

CFOFORUM

Amsterdam, 22 May 2009

PRESS RELEASE

The European Insurance CFO Forum (the CFO Forum) provides an update on progress made in developing the Market Consistent Embedded Value (MCEV) Principles©

In December 2008, the CFO Forum announced that its member companies would be working to address the notion of market consistency within the MCEV Principles across the economic cycle and in particular its application in current dislocated markets.

The current financial crisis has revealed significant challenges for MCEV, such as adjustments for liquidity premia, which have ultimately harmed comparability. The CFO Forum has agreed to do further work to seek to improve the consistency in the adjustments made for liquidity premium and volatilities. This should also allow due consideration to be given to Solvency II developments where liquidity premium is an equally important issue. A further update on the work of the CFO Forum will be provided later this year.

In light of these developments, which may result in significant amendments to MCEV, we believe it is sensible to defer the mandatory MCEV reporting for all member firms until 2011.

CFO Forum statement

- further work needed
- mandatory date of MCEV Principles reporting deferred from 2009 to 2011

CFO Forum - October 2009: amendment of MCEV principles

In October 2009, the CFO Forum announced a change to its MCEV Principles to reflect the **inclusion of an illiquidity premium**

Market Consistent Embedded Value Principles – June 2008

REFERENCE RATES

***Principle* 14: The reference rates used should, wherever possible, be the swap yield curve appropriate to the currency of the cash flows.**

G14.4 No adjustments should be made to the swap yield curve to allow for liquidity premiums or credit risk premiums.

Market Consistent Embedded Value Principles – October 2009

REFERENCE RATES

***Principle* 14: The *reference rate* is a proxy for a risk free rate appropriate to the currency, term and liquidity of the liability cash flows.**

• Where the liabilities are *liquid* the *reference rate* should, wherever possible, be the swap yield curve appropriate to the currency of the cash flows.

• Where the liabilities are not *liquid* the reference rate should be the swap yield curve with the inclusion of a liquidity premium, where appropriate.

G14.1 In evaluating the appropriateness of the inclusion of a liquidity premium (where liabilities are not liquid) consideration may be given to regulatory restrictions, internal constraints or investment policies which may limit the ability of a company to access the liquidity premium.

CFO Forum - October 2009: amendment of MCEV principles

The **CFO Forum** recognised that:

- the existence of an illiquidity premium is clear
  - ✓ as evidenced by a wide range of academic papers and institutions
- MCEV valuations should reflect the inclusion of an illiquidity premium
  - ✓ where liabilities are not liquid
- further work is needed to develop more detailed application guidance to increase consistency going forward
  - ✓ on the methods to estimate the illiquidity premium
  - ✓ on the application of the illiquidity premium in the valuation of insurance liabilities
    - e.g. different categories of products from fully liquid to fully illiquid, having a different percentage of the illiquidity premium ("*bucket approach*")?

MCEV Principles - latest developments: deferral of mandatory date

In April 2011,
on account of the concurrent developments of insurance reporting under SII and IFRS, the **CFO Forum announced the withdrawal of the mandatory date** for compliance with the **MCEV Principles**, previously set at YE2011

… but CFO Forum still remain committed to the value in supplementary information, including embedded value

MCEV Principles - latest developments: tackling the sovereign debt crisis

CFOFORUM

Munich, 9 December 2011

PRESS RELEASE

The European Insurance CFO Forum (the 'CFO Forum') responds to current market conditions

In response to current sovereign debt market conditions and complementary to the transition guidance published in September 2011, waiting for the finalisation of Solvency II, the CFO Forum members are working collaboratively on the application of the Market Consistent Embedded Value (MCEV) Principles© to ensure that companies have access to the best possible guidance on the subject and that the application is appropriate to the current market conditions and to the needs of the users of financial statements.

Including an allowance for the current sovereign debt market conditions as a component of the reference rate in embedded value reporting or disclosing a sensitivity as supplementary information of reported embedded value to such parameters where it is deemed appropriate would represent an initial step towards the expected convergence of MCEV with the developing European regulatory regime (Solvency II) on the matter.

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1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

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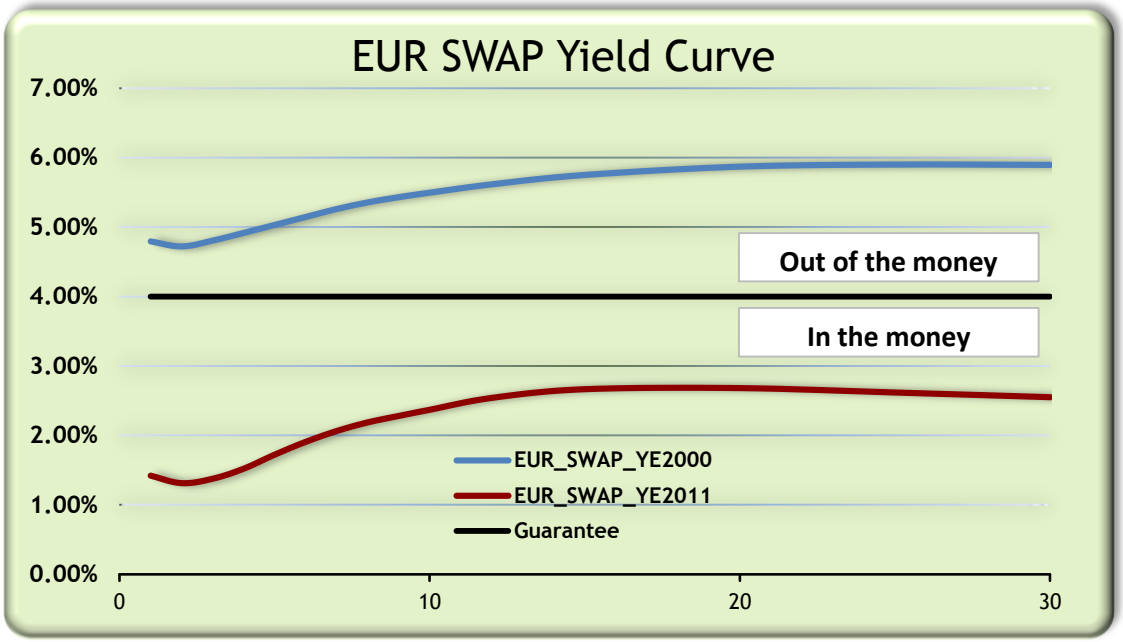
5. The MCEV calculation: a simple and “practical” example

Why Economic Scenario Generators?

The financial products sold by insurance companies often contain guarantees and options of numerous varieties, (i.e. maturity guarantee, multi-period guarantees)

At the time of policy initiation, the options embedded in insurance contracts were so far out-of-the-money, that the companies disregarded their value as it was considered negligible compared with the costs associated with the valuation.

In light of current economic events and new legislations, insurance companies have realised the importance of properly managing their options and guarantees and it is one of the most challenging problems faced by insurance companies today.



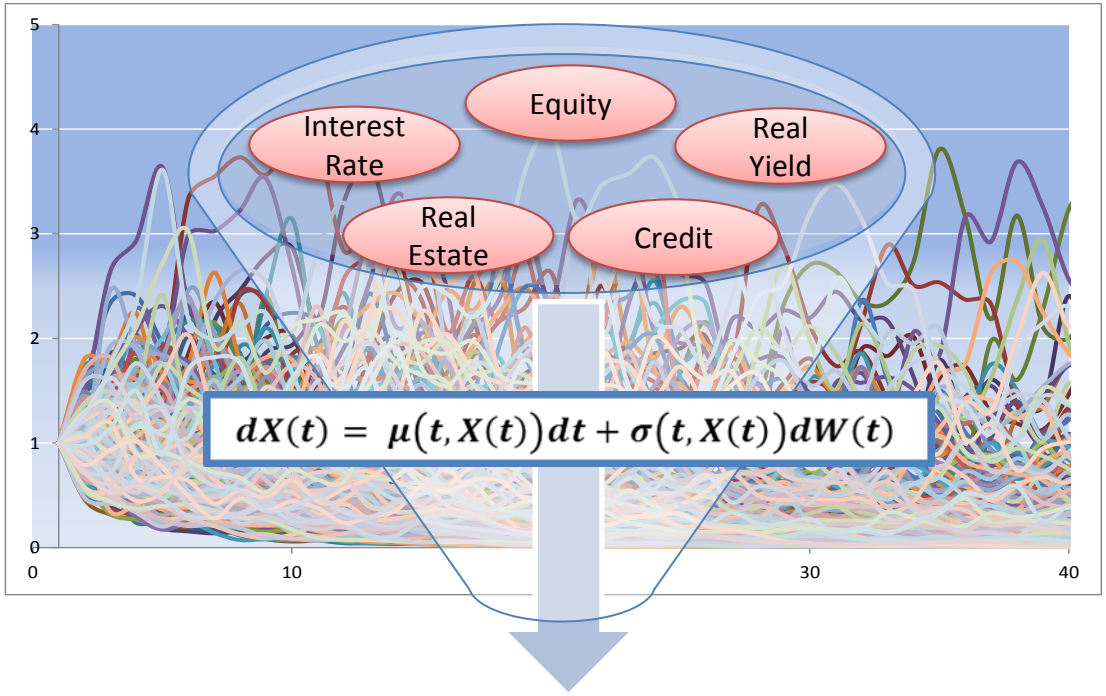
Economic Scenario Generators

Real world

- reflect the expected future evolution of the economy by the insurance company (reflect the real world, hence the name)
- include risk premium
- calibration of volatilities is usually based on analysis of historical data

Market consistent

- reproduce market prices
- risk neutral, i.e. they do not include risk premium
- calibration of volatilities is usually based on implied market data
- arbitrage free



Economic Scenario

Interest rate models

The interest rate model is a central part of the ESG, as the price of most of the financial instruments are related to interest rates.
A large number of models have been developed in the few decades:

Short rate: based on instantaneous short rate

- **Equilibrium** or endogenous term structure
  term structure of interest rate in an output
  Vasicek (1977), *Dothan* (1978), *Cox-Ingersoll-Ross* (1985)

- **No-arbitrage**
  match the term structure of interest rate
  Hull-White (1990) $$dr(t) = [\theta(t) - a(t)r(t)]dt + \sigma(t)dW(t)$$
  Black-Karasinski (1991) $$dln(r(t)) = [\theta(t) - a(t)ln(r(t))]dt + \sigma(t)dW(t)$$

- **Forward rate**: based on instantaneous forward rate
  instantaneous forward Heath-Jarrow-Morton (1992)

- **LIBOR and swap market**: describe the evolution of rates directly observable in the market

Instantaneous rate not observable in the market

Good pricing only for atm asset

Arbitrage free, are perfect for market consistent valuation

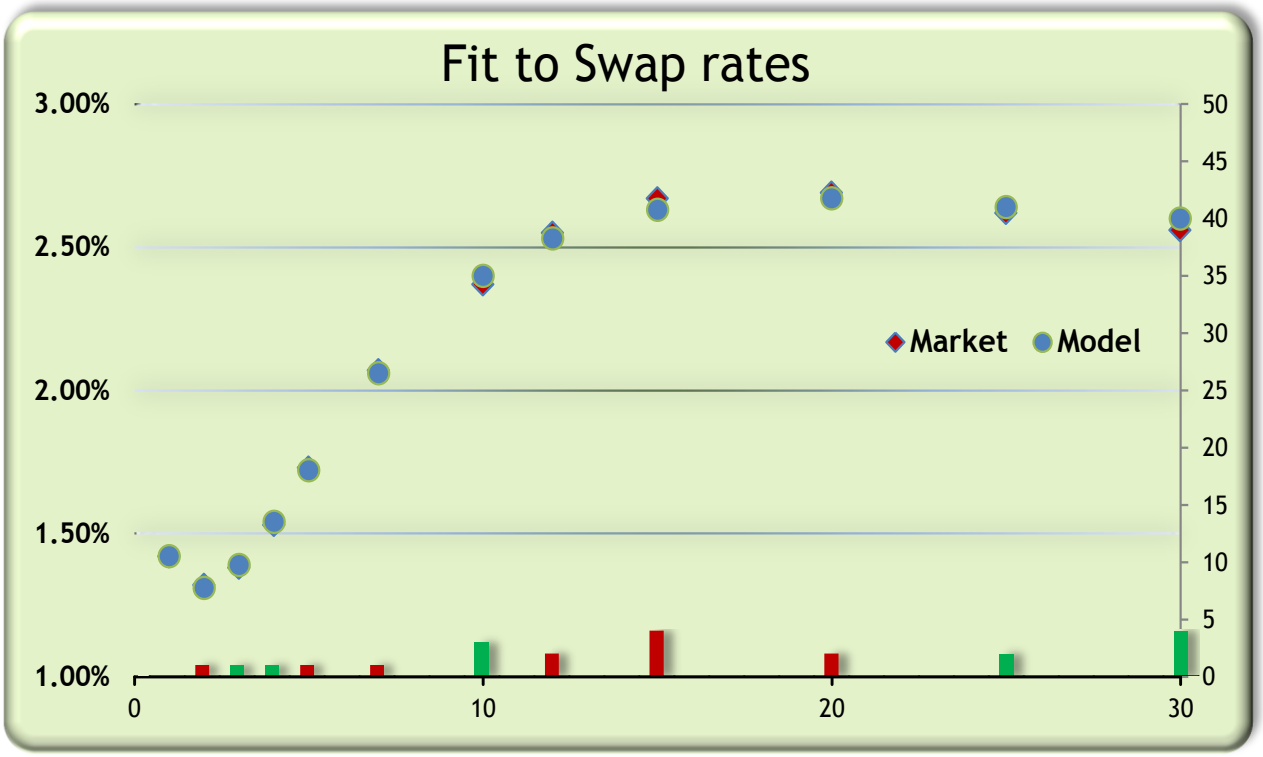
Easy to calibrate

Hard to calibrate

Good pricing only for all assets

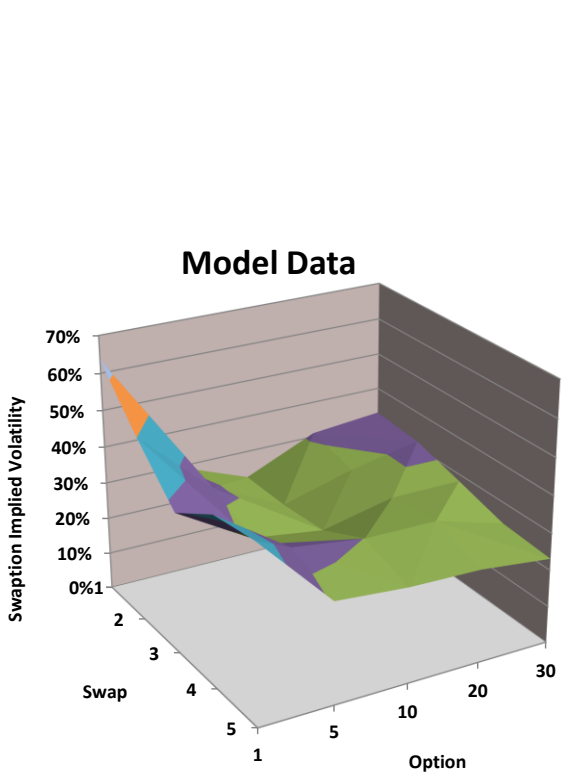
Interest rate calibration

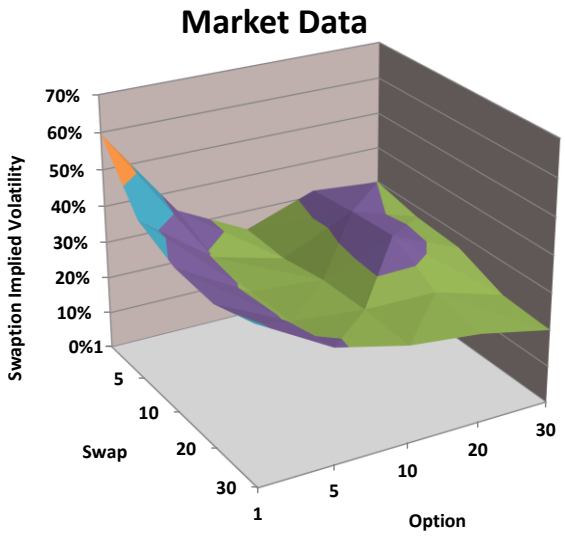
Considering interest rate models where the **market** yield curve is a direct input, it is possible to derive an excellent-fitting **model** yield curve (the **delta** are really unimportant).

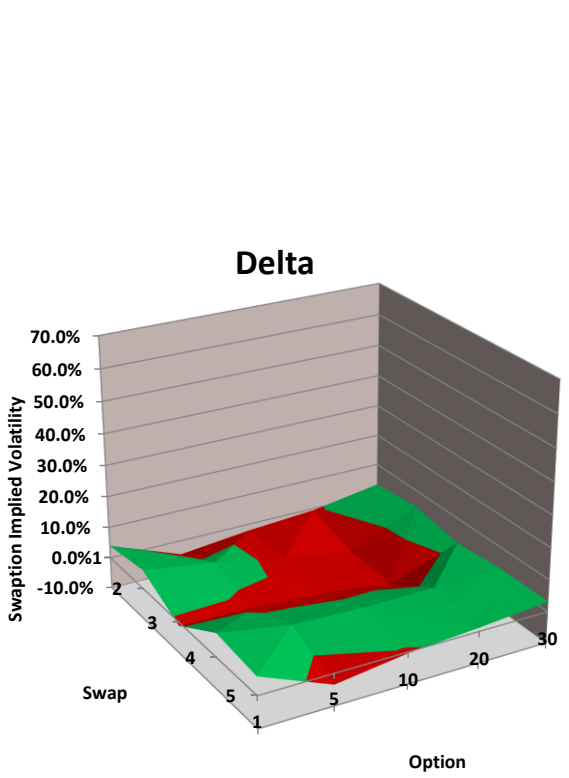


Interest rate calibration

The calibration of the volatility of the term structure is based on swaption prices, since these instruments gives the holder the right, but not the obligation, to enter an interest rate swap at a given future date, the maturity date of the swaption



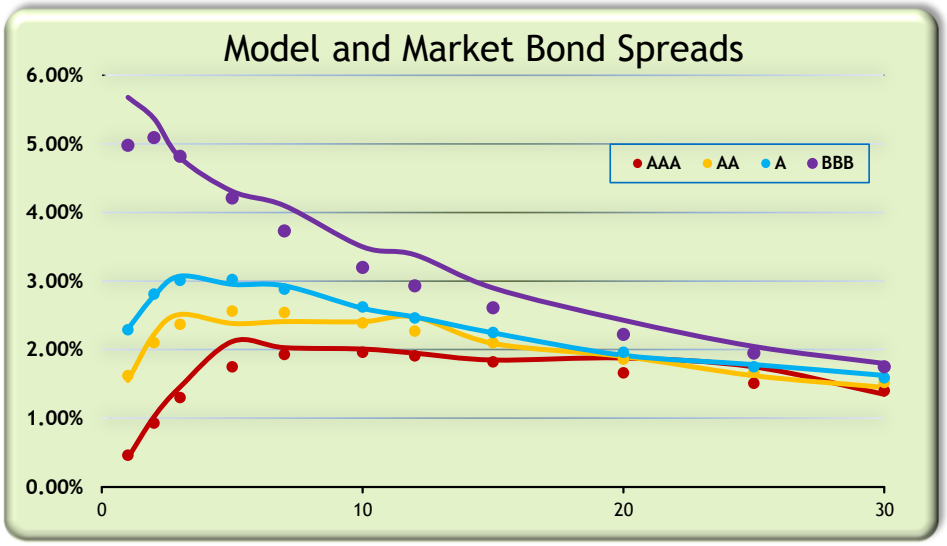




Credit model calibration

The most used Credit model is the Jarrow, Lando and Turnbull (1997) that is able to

- fit **market credit spread** for each rating class matching a single spread of a given rating and maturity
- provide a risk-neutral probability through **annual transition matrix** moving bonds to a different rating class (including default)



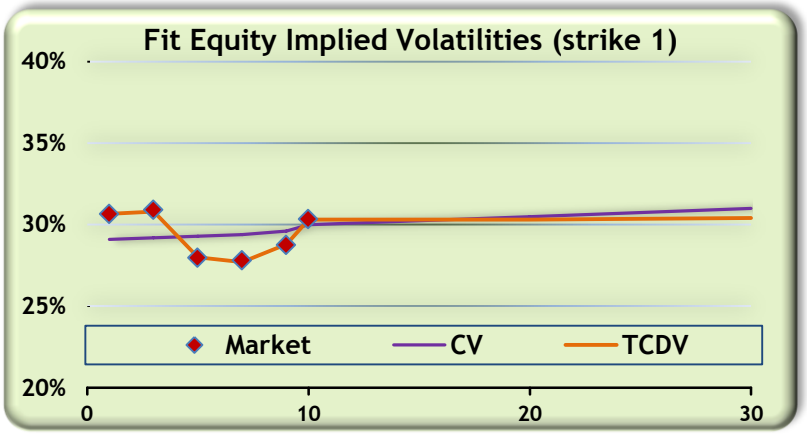
Rating at start of period	Rating at End of Period							
	AAA	AA	A	BBB	BB	B	CCC	D
AAA	90.0%	8.0%	1.0%	0.5%	0.3%	0.2%	0.0%	0.0%
AA	2.0%	86.0%	3.0%	2.5%	2.3%	2.2%	1.6%	0.4%
A	1.5%	2.0%	84.0%	5.0%	2.8%	2.4%	1.8%	0.5%
BBB	0.4%	1.8%	2.5%	81.0%	4.0%	3.2%	4.0%	3.1%
BB	0.3%	1.2%	1.3%	7.0%	78.0%	3.5%	4.5%	4.2%
B	0.2%	0.3%	0.5%	2.5%	4.0%	75.0%	5.0%	12.5%
CCC	0.1%	0.2%	0.4%	1.4%	2.0%	3.0%	71.0%	21.9%
D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Equity model calibration

Equity models are calibrated to equity implied volatilities, that are generally traded with terms up to two years; long terms are available over-the-counter (OTC) from investment bank. The choice depends on the users' appetite for sophistication and liability profile

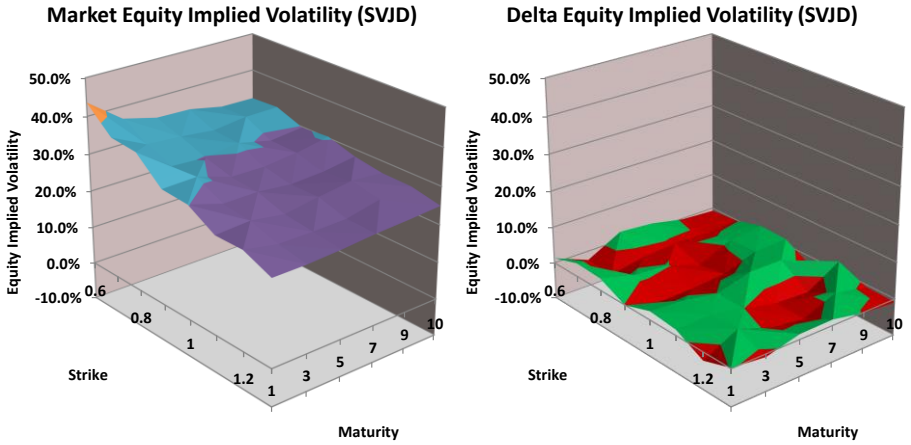
Constant volatility (CV)

is the Black-Scholes log-normal model implied volatilities of options will be quite invariant with respect to option term and strike.



Time varying deterministic volatility (TVDV)

volatility vary by time according monotonic deterministic function
It captures the term structure of implied volatilities but are still invariant by strike



Stochastic volatility jump diffusion (SVJD)

captures the term structure and the volatility skew

Reduce sampling error

The Monte Carlo technique is subject to statistical error ("sampling error"); to reduce the magnitude of sampling error it is possible to

- **Run more simulation**: the size of sampling error scales with the square root of the number of simulations. This mean that we would need to run 4 times the number of scenarios to halve the sampling error.
- **Variance reduction techniques**: "adjust" the simulations, or the cash flows produced by them, or the weights assigned to them in a way that ensures the resulting valuations are still "valid" but the sampling error is reduced.

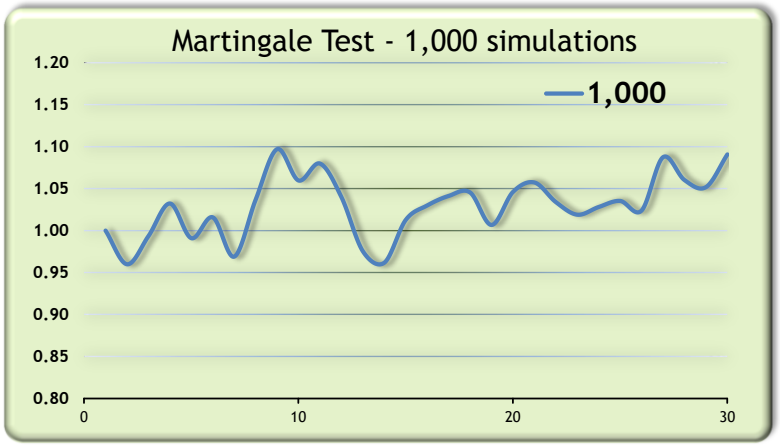
Martingale test is performed verifying that the discounted prices of the asset is the same as today's price

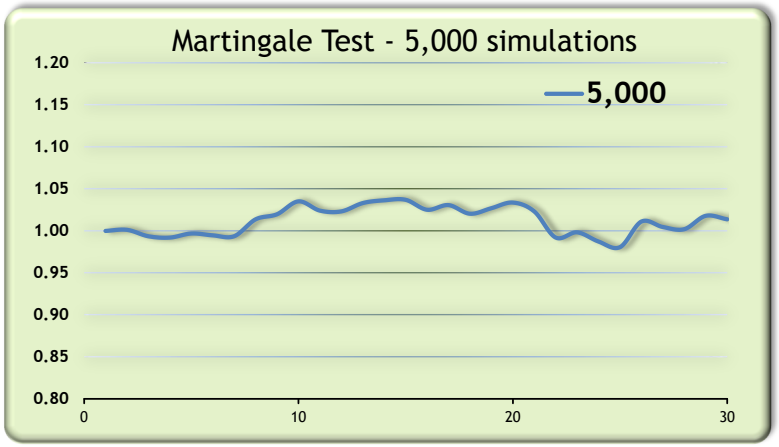
	Equity	Risk free	Deflator	PV Equity
0	1.00			
1	1.05	5%	95.24%	1.00
2	1.10	5%	90.70%	1.00
3	1.17	5%	86.38%	1.01
4	1.23	5%	82.27%	1.01
5	1.29	5%	78.35%	1.01
6	1.35	5%	74.62%	1.01
7	1.42	5%	71.07%	1.01
8	1.49	5%	67.68%	1.01
9	1.58	5%	64.46%	1.02
10	1.66	5%	61.39%	1.02

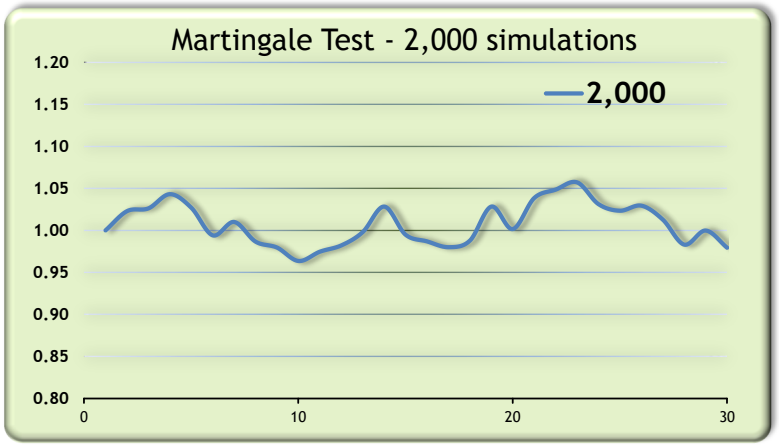
	Equity	Risk free	Deflator	PV Equity
0	1.00			
1	1.03	3%	97.09%	1.00
2	1.06	3%	94.26%	1.00
3	1.11	3%	91.51%	1.01
4	1.13	3%	88.85%	1.01
5	1.17	3%	86.26%	1.01
6	1.21	3%	83.75%	1.01
7	1.24	3%	81.31%	1.01
8	1.28	3%	78.94%	1.01
9	1.33	3%	76.64%	1.02
10	1.37	3%	74.41%	1.02

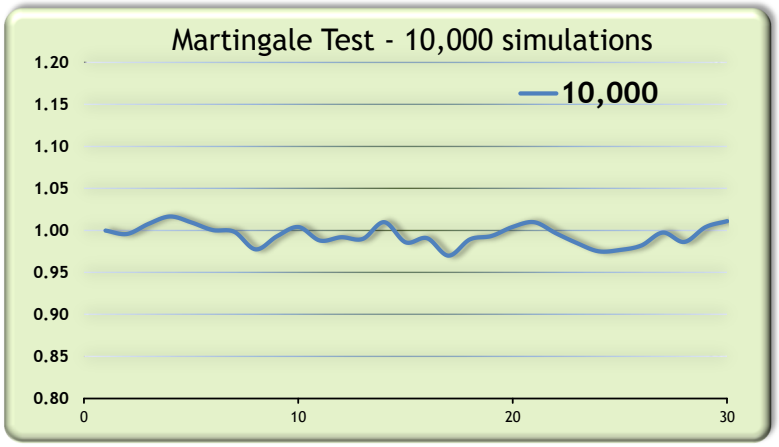
How many simulations?

Martingale test is so used to determine how many simulations are to be considered in the calibration of Economic Scenario.









AGENDA

1. Methodological Aspects: from the Traditional to the Market Consistent Embedded Value

2. CFO Principles: the MCEV framework

3. Stochastic scenarios: calibration and validation

4. Asset and Liabilities valuation: looking for a consistent approach through the risk free definition

5. The MCEV calculation: a simple and “practical” example

Level 2 Draft Implementing Measures

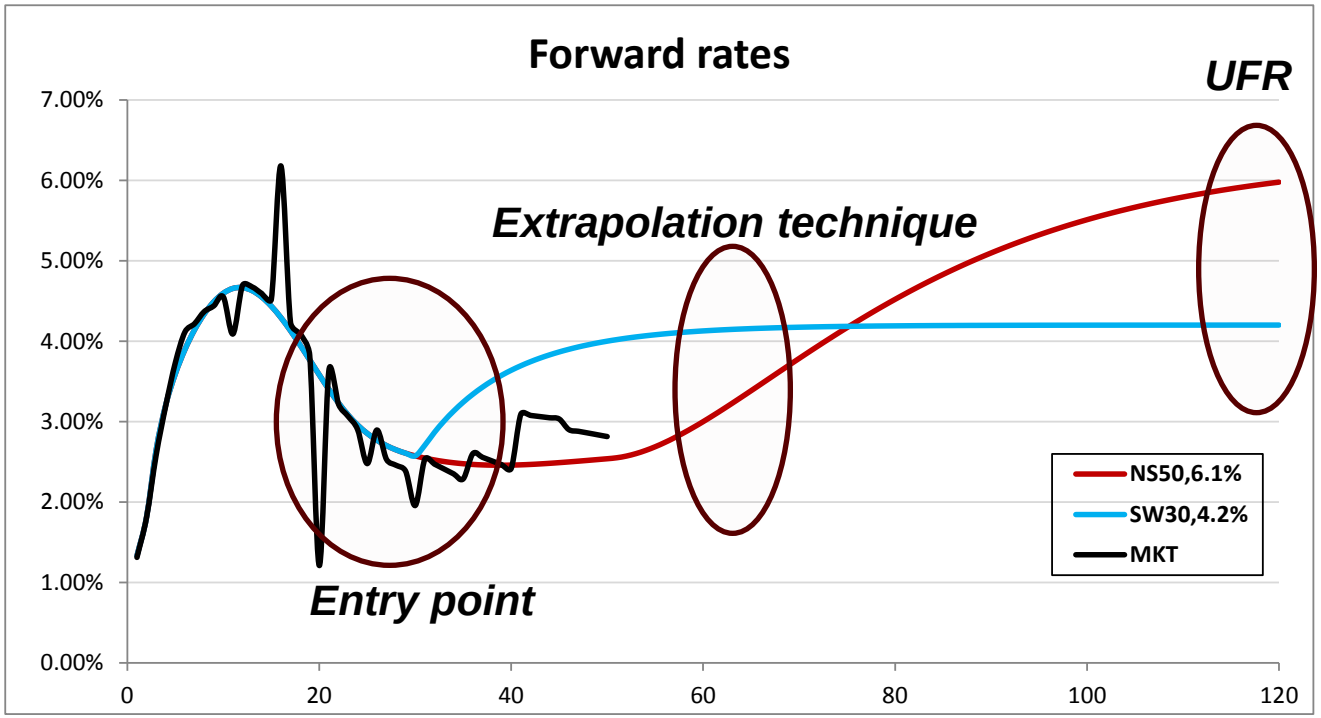
The rates of the relevant risk-free interest rate term structure to calculate the best estimate with respect to insurance or reinsurance obligations, as referred to in Article 77(2) of Directive 2009/138/EC, shall be calculated **as the sum of**:

- the rates of a **basic risk-free interest rate term structure**;
- where applicable, a **counter-cyclical premium**
- where applicable, a **matching premium**

For each relevant currency, **EIOPA shall derive and publish**:

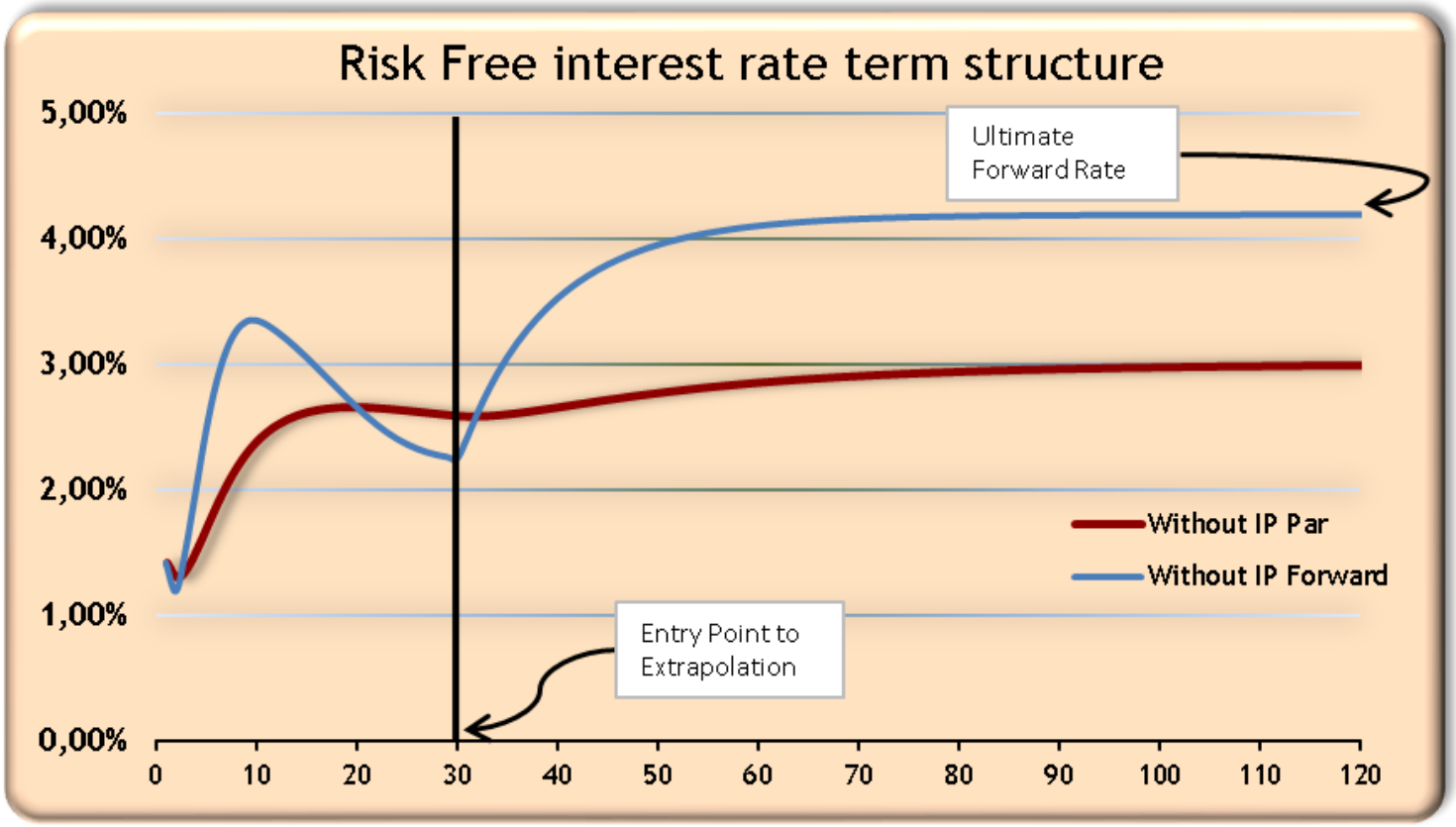
- the **basic risk-free interest rate term structure** referred to in point (a) of paragraph 1;
- the **counter-cyclical premium** referred to in paragraph 1 of Article IR6;
- the **ultimate forward rate** referred to in paragraph 2 of Article IR4.

Basic Risk Free interest rate term structure - extrapolation



The **extrapolation technique** *(Nelson Siegel or Smith Wilson)*, the extrapolation **entry point** and the **ultimate forward rate** (UFR) are **key drivers** of the valuation, especially in case of long term business with guarantees

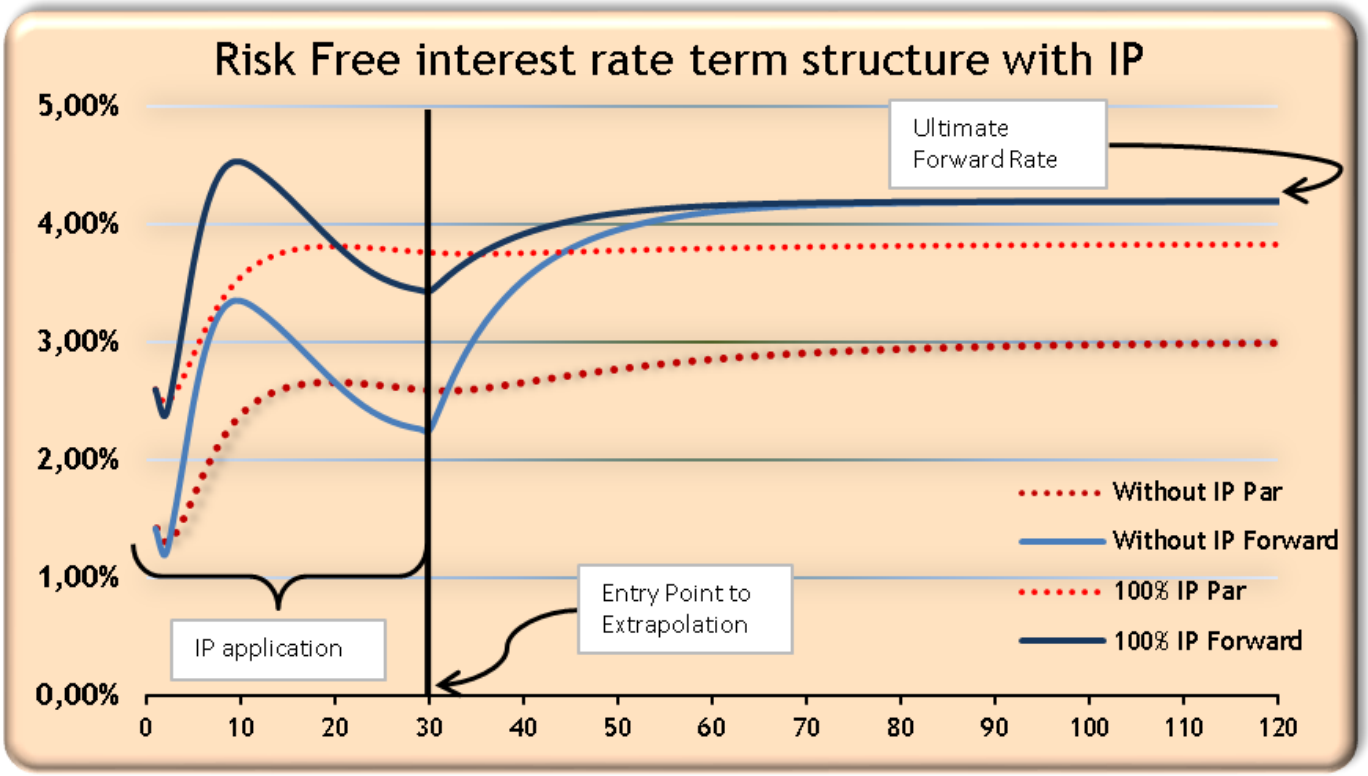
Basic Risk Free interest rate term structure



Generali is using, for EV/EBS exercise at YE2011 (EURO):

- Swap rates as basic risk-free interest rate term structure;
- 30y entry point for the extrapolation
- 4.2% as Ultimate Forward Rate
- Smith-Wilson as extrapolation technique

Counter – cyclical premium



Generali is supporting the Industrial proposal for CCP and, in line with last CFO Forum statement, will disclose to Financial Markets at YE2011:

- calculation using Illiquidity premium applied to forward rate
- impact assessment using a govies adjustment based on Industrial Proposal

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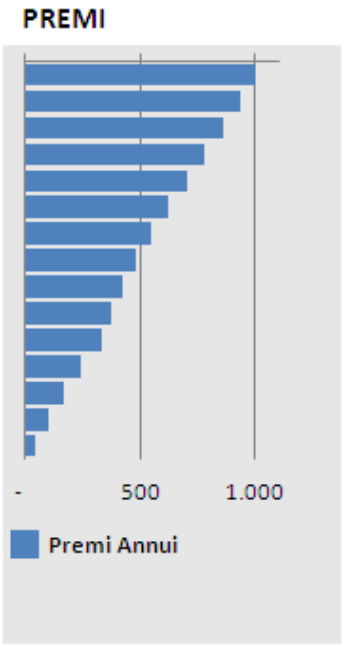
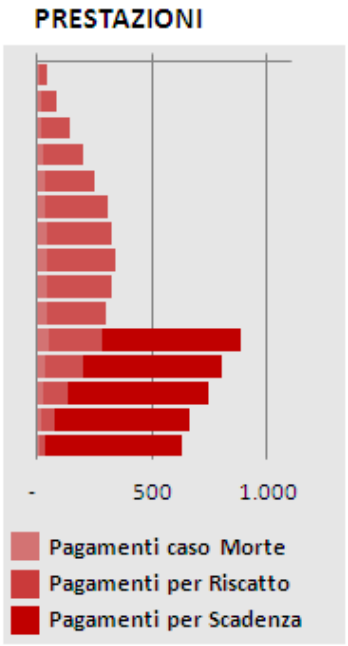
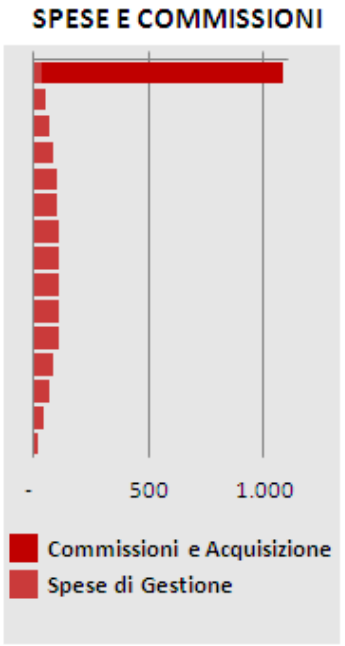
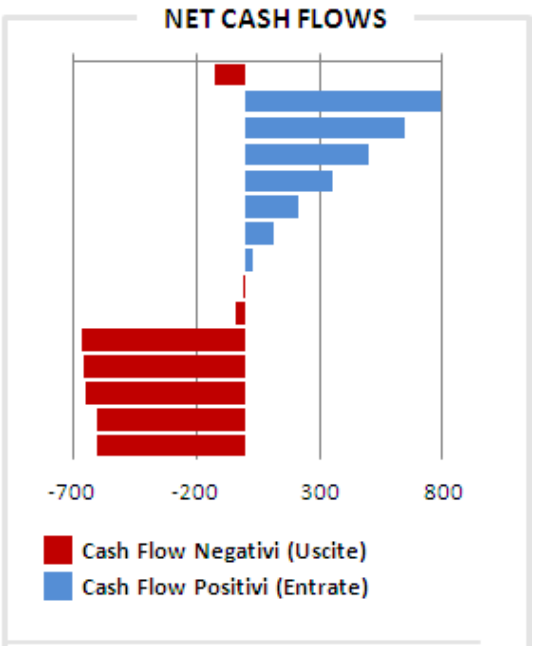
The MCEV calculation: a simple and “practical” example









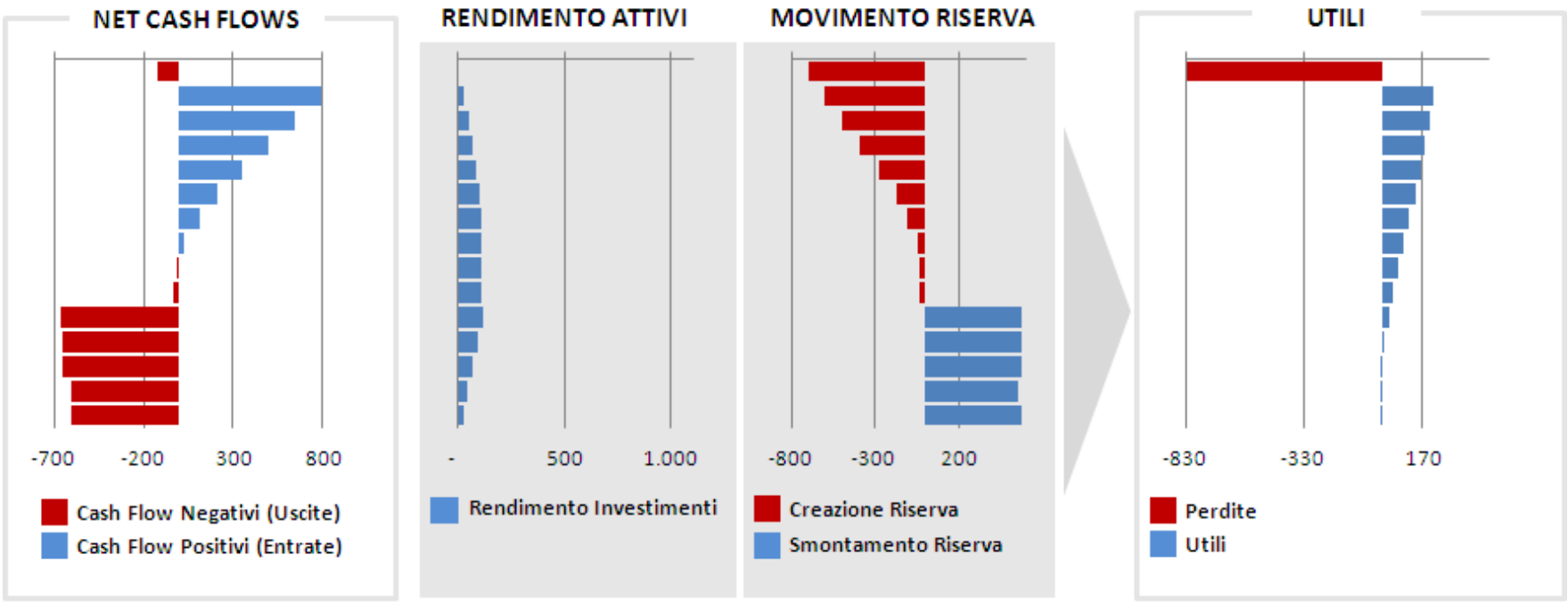
- Ipotesi contrattuali pagamento premi
- Ipotesi di persistenza degli assicurati nel contratto

- Ipotesi biometriche:
  - Mortalità
  - Morbidità
- Ipotesi «comportamento assicurati»per riscatti:
  - Razionali (vs mercato)
  - «irrazionali»
- Ipotesi di rivalutazione delle prestazioni:
  - Livello garanzie
  - Investimenti

- Contratti con Agenti / Canali Vendita
- Ipotesi costi gestione dei contratti
- Ipotesi di inflazione su come rivalutare i costi

- Ipotesi sull’assicurato:
  - «comportamentali» (riscatti);
  - Biometriche (mortalità)
- Ipotesi economiche/ finanziarie:
  - Rendimento futuro attivi;
  - Inflazione / Costi di gestione

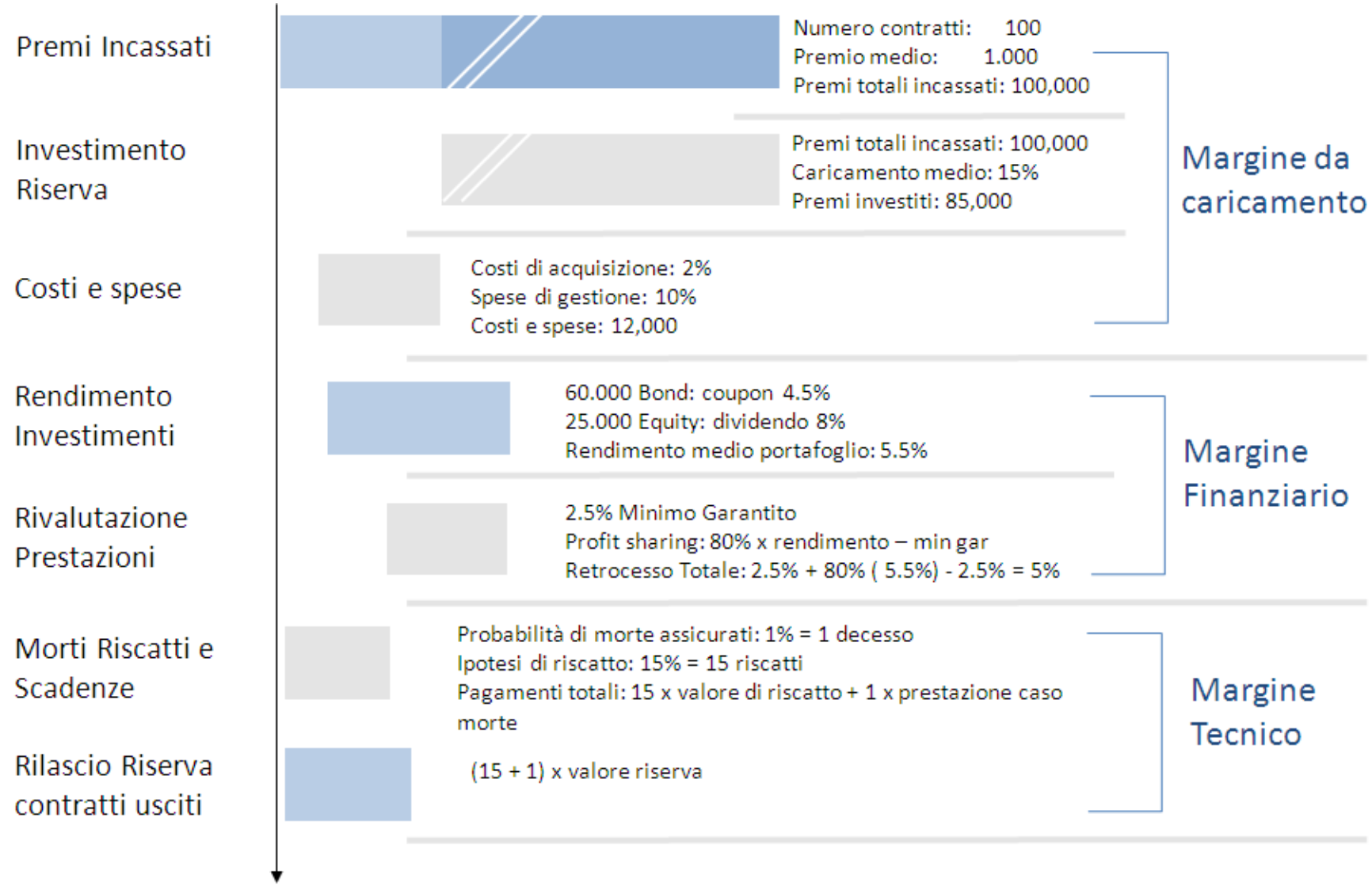
The MCEV calculation: a simple and “practical” example



Quali sono le principali caratteristiche del prodotto che impattano sulla valutazione del valore e della riserva?

- Livello, struttura delle garanzie finanziarie e regole di rivalutazione
- Corrispondenza tra costi associati al contratto e caricamenti
- Penalità di riscatto, in ammontare e anni di opzione
- Opzioni contrattuali aggiuntive, come l’opzione di conversione in rendita

The MCEV calculation: a simple and "practical" example



The MCEV calculation: a simple and "practical" example

Perché proiettare gli attivi?

Ottenere rendimenti per:

- Finanziare i minimi garantiti
- Finanziare la rivalutazione delle prestazioni
- Generare utile finanziario

Rendimenti provenienti da:

- Cedole fisse
- Dividendi, affitti, cedole variabili
- Trading (realizzo minus/plus)

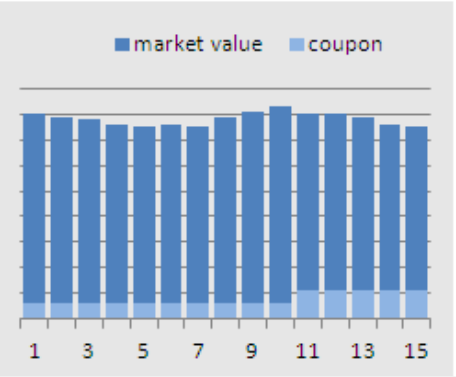
PUNTI DI ATTENZIONE

- Le valutazioni sono effettuate considerando il portafoglio chiuso, senza afflusso di premi di nuova produzione
- L'assenza di *matching* tra attivi e passivi può produrre costi di **disinvestimento** e/o di **reinvestimento**

Cosa fare nella proiezione?

Per ogni titolo è necessario proiettare cedole/dividendi e valore di mercato:

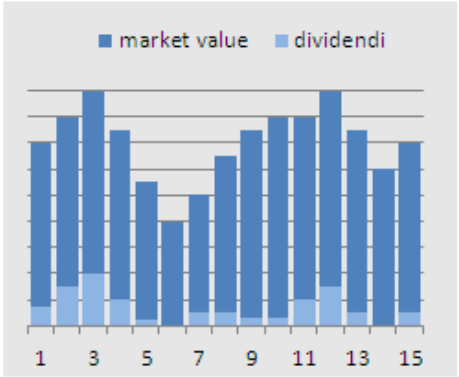
PROIEZIONE BTP 10ANNI



Fino al 10 anni il coupon è certo, dalla scadenza cambia il coupon.

Il valore di mkt cambia in funzione dei tassi di mercato.

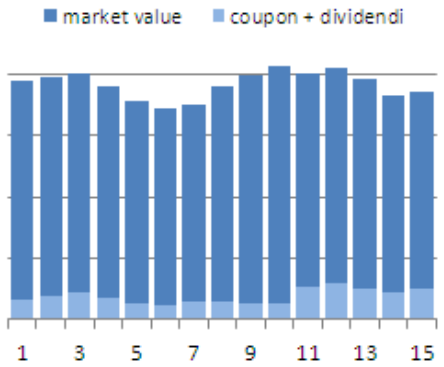
PROIEZIONE AZIONI



Il dividendo è incerto, sin dal primo anno di proiezione.

Il valore di mkt è – in media – molto più volatile di quello dei Bond

PORTAFOGLIO ATTIVI



Definita l' asset allocation (% Bond, % Equity,..) è possibile derivare i rendimenti attesi del portafoglio di attivi a copertura

The MCEV calculation: a simple and “practical” example

Va definito uno scenario

con la proiezione per 40 anni di:

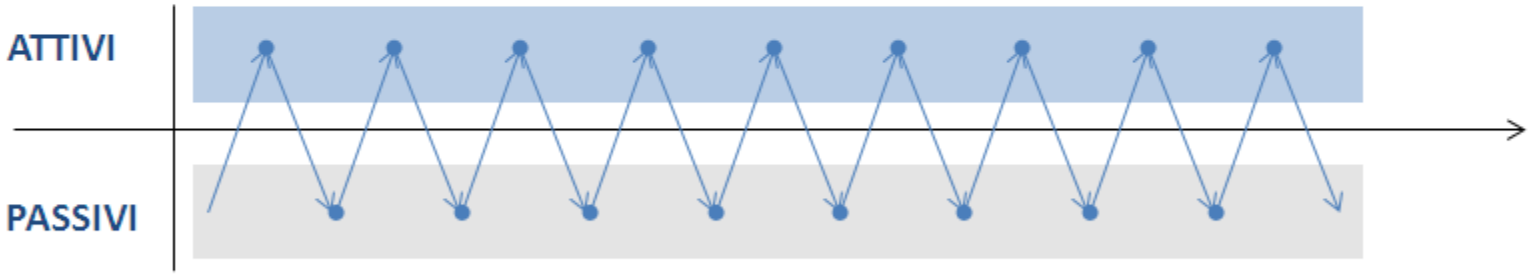
- Struttura a termine dei tassi risk-free
- Spread/migrazioni corporate bond
- Dividendi / indici azionari e real estate

Come va utilizzato?

Nella proiezione, in base ai net cash flow:

- Definisco asset allocation
- Determino i rendimenti e il valore di mercato dei titoli a copertura
- Trading (realizzo minus/plus)

Cosa succede nella proiezione?



I pagamenti nell’anno **T** dipendono dal rendimento degli attivi nel periodo precedente (**T-1**)

Il rendimento del fondo in **T-1** dipende dalle «**management action**» (per esempio quali titoli compro/vendo) definite e dall’andamento dei mercati nello scenario

The MCEV calculation: a simple and "practical" example

Perché uno scenario non basta?

Uno scenario non è in grado di catturare i **costi delle garanzie dei prodotti**.

Passo da 1 a 1.000 scenari:

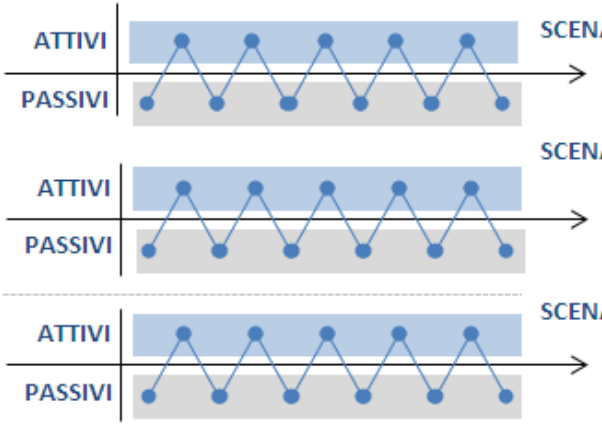
La valutazione va ripetuta per tutti gli scenari e il valore finale sarà pari alla media dei valori ottenuti nei 1.000 scenari.

RISERVA LOCAL GAAP: è calcolata in un unico scenario:

$$\sum_{i=1}^{n} Net\ Cash\ Flow_i^{1^\circ ordine} \times d_i$$

E' il valore atteso dei cash flow nello scenario di 1° ordine (*ipotesi prudenti*)

RISERVA A FAIR VALUE: la valutazione va ripetuta nei 1.000 scenari



SCENARIO 1

$$\sum_{i=1}^{n} Net\ Cash\ Flow_i^{2^\circ ordine} \times d_i$$

SCENARIO 2

$$\sum_{i=1}^{n} Net\ Cash\ Flow_i^{2^\circ ordine} \times d_i$$

SCENARIO 1,000

$$\sum_{i=1}^{n} Net\ Cash\ Flow_i^{2^\circ ordine} \times d_i$$

La riserva è la media dei valori ottenuti nei 1.000 scenari con ipotesi best estimate:

$$\frac{\sum_{j=1}^{1000}\left(\sum_{i=1}^{n} Net\ Cash\ Flow_i^{2^\circ ordine} \times d_i\right)}{1000}$$

PUNTI DI ATTENZIONE

Gli scenari stocastici devono catturare la diversa rischiosità degli attivi(bond governativi, corporate, azioni..)
Il rendimento medio nei 1.000 scenari è lo stesso per tutte gli attivi, ma più gli attivi sono rischiosi, maggiore è la volatilità del loro rendimento ***(SCENARI DI TIPO RISK NEUTRAL)***.