3rd June 2011

Sailing through regulatory turmoils- 2nd edition

SociétéGénérale,
Financial Institution Advisory

Dr. Carsten Zielke
Eric Viet
Ludovic Antony
Serge Moulin
Olivier Garnier
Clémentine Gallès

BUILDING TEAM SPIRIT TOGETHER

SOCIETE GENERALE
Corporate & Investment Banking

Eric Viet, Managing Director, Head Advisory, Société Générale and Ludovic Antony, Director, Advisor, Société Générale

Solvency II

An extremely challenging environment for insurers

European insurance companies are currently facing a challenging economic environment, and at the same time a change of regulatory and accounting rules.

Insurance companies have managed better than banks the first part of the credit crisis with limited losses in subprime and credit. But they now need to face the challenge of the sovereign debt crisis and the high uncertainty between a low rate environment and a high inflation scenario.

In this context, the upcoming adoption of Solvency II at the beginning of 2013, as well as the IFRS standards for assets and liabilities (IFRS 9 and IFRS 4, the Phase II standard for insurance contracts) will introduce a new and complex set of constraints for insurance company balance sheet management.

The new regulatory framework is likely to provide more incentives for companies to protect their balance sheet against market risks, provided the implementation of hedges does not result in adverse accounting mismatches.

At the same time, companies cannot afford to significantly cut yields, something which would put their market share at risk – deteriorate their ability to generate profits in the future, and increase their lapse rate – creating potential losses if combined with a raising interest environment.

As a result, companies will naturally seek to improve the use of Available Owned Funds ("AOF") in order to maximize the expected return on their AOF, i.e. the performance adjusted from the cost of capital.

The European Commission has recently announced that there would be transitional measures to smooth the implementation over up to 10 years. This is clearly helpful in many respects. However, best capitalised insurers will try to be Solvency II compliant as soon as possible to benefit from their strength in the consolidation of the European insurance landscape. Other companies may not have the luxury to delay the implementation, if they don't want to be penalized by equity and debt investors, and by large customers. The race is therefore on to anticipate potential implications of Solvency II in term of new business design, asset allocation and hedging strategy.

New Business in Life Insurance: Europe discovers Variable Annuities

European life insurers need to reconsider their business model. The traditional saving products have relied on taking market risk to pay high bonus rate, but the products have limited actuarial risks. As an illustration, the market risk on SCR represents on average 67.4% of the SCR of life undertakings[1].

BSCR structure
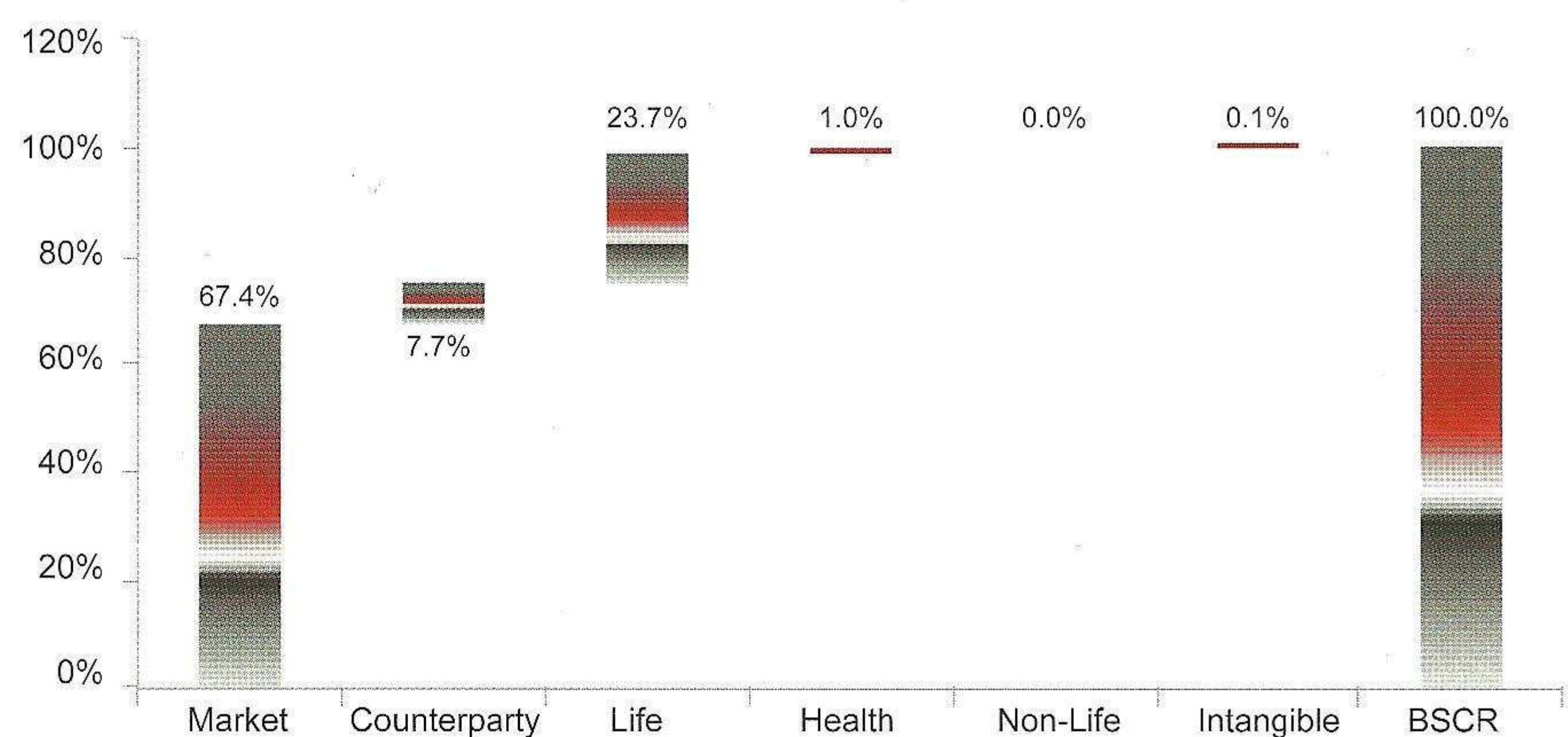
As long as capital is not charged for market risks that could be acceptable. But under Solvency II, the pressure will be on insurers to minimise the SCR and to optimise their return on capital. In addition, insurers are competing with banks and asset managers to gather assets from retail customers. With banks looking for funding, the fight is on to attract deposit with interest rates on saving accounts as high as 4% in some Euro countries. Asset managers (as well as hedge funds) also compete for the same pool of savings and offer more and more "capital protected" investments pools.

With high costs and capital requirements, insurers can only compete in the asset gathering if they offer products with true differentiating features, which will not be provided by others institutions. We believe that going forward life insurance products will embed more protection against actuarial factors: death, longevity, lapse and cost of life. But life insurers will seek to hedge as much as possible all market risks, effectively aiming for a better balance between Market and Life SCR.
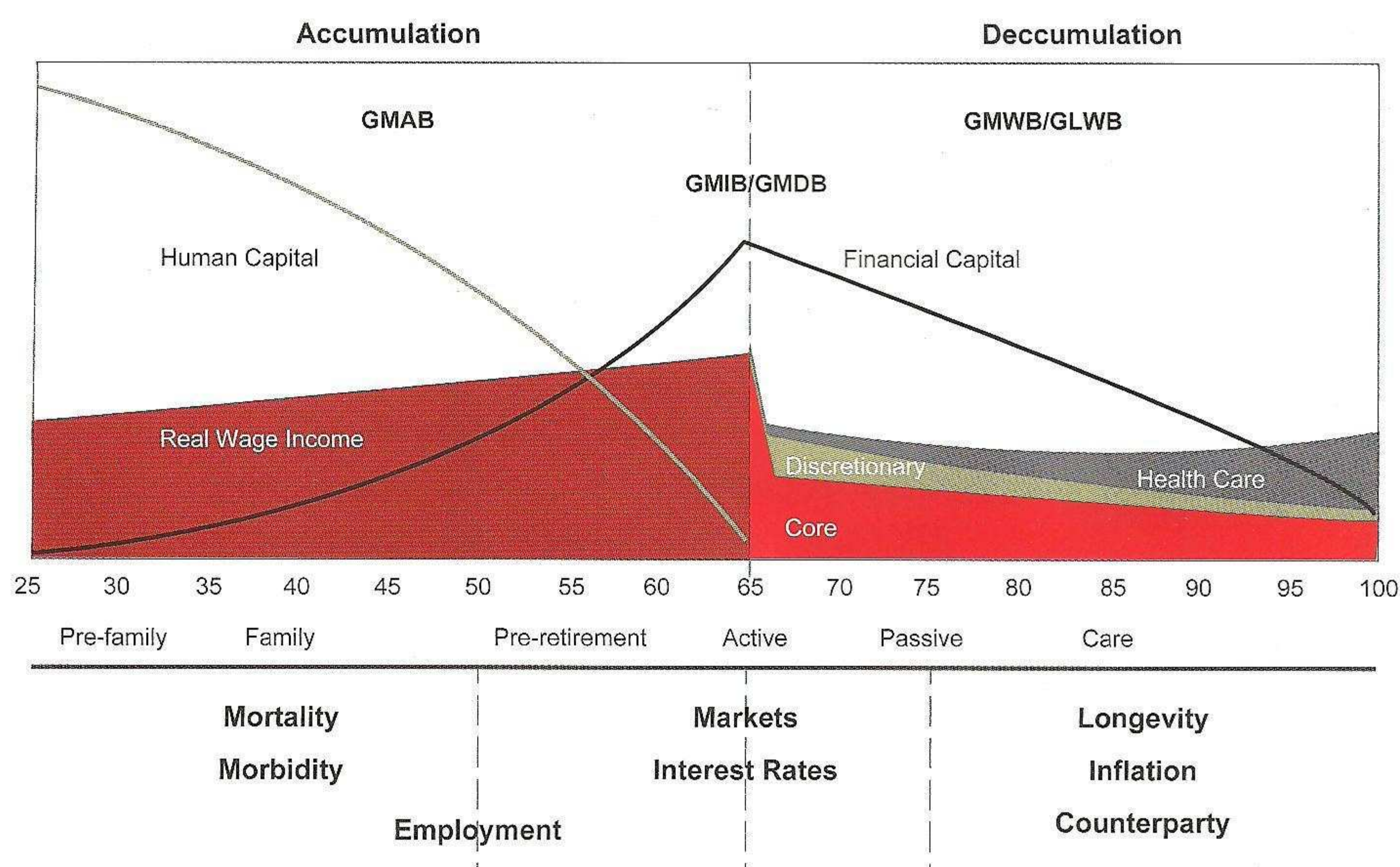
An answer would be the development of the Variable Annuity ("VA") market in Europe. VA are effectively the combination of a unit-linked investment with a guarantee which can take several forms.

[1]Source: EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II

Each type of guarantee is targeting a different stage of the saving cycle of individuals.

Prod	Features	
GMDB (Death)	Guaranteed investment return upon death	Basic feature
GMAB (Accumulation)	Guaranteed investment return at future point in time	For younger clients
GMIB (Income)	Guaranteed annuitisation factors or minimum income levels	For people in retirement age
GMWB (Withdrawal)	– Guaranteed regular withdrawal amounts – Specific term (e.g. 7% for 15 years)	
GLWB (Lifetime)	– Guaranteed lifetime withdrawal benefit – Specific term (e.g. 5% for life)	

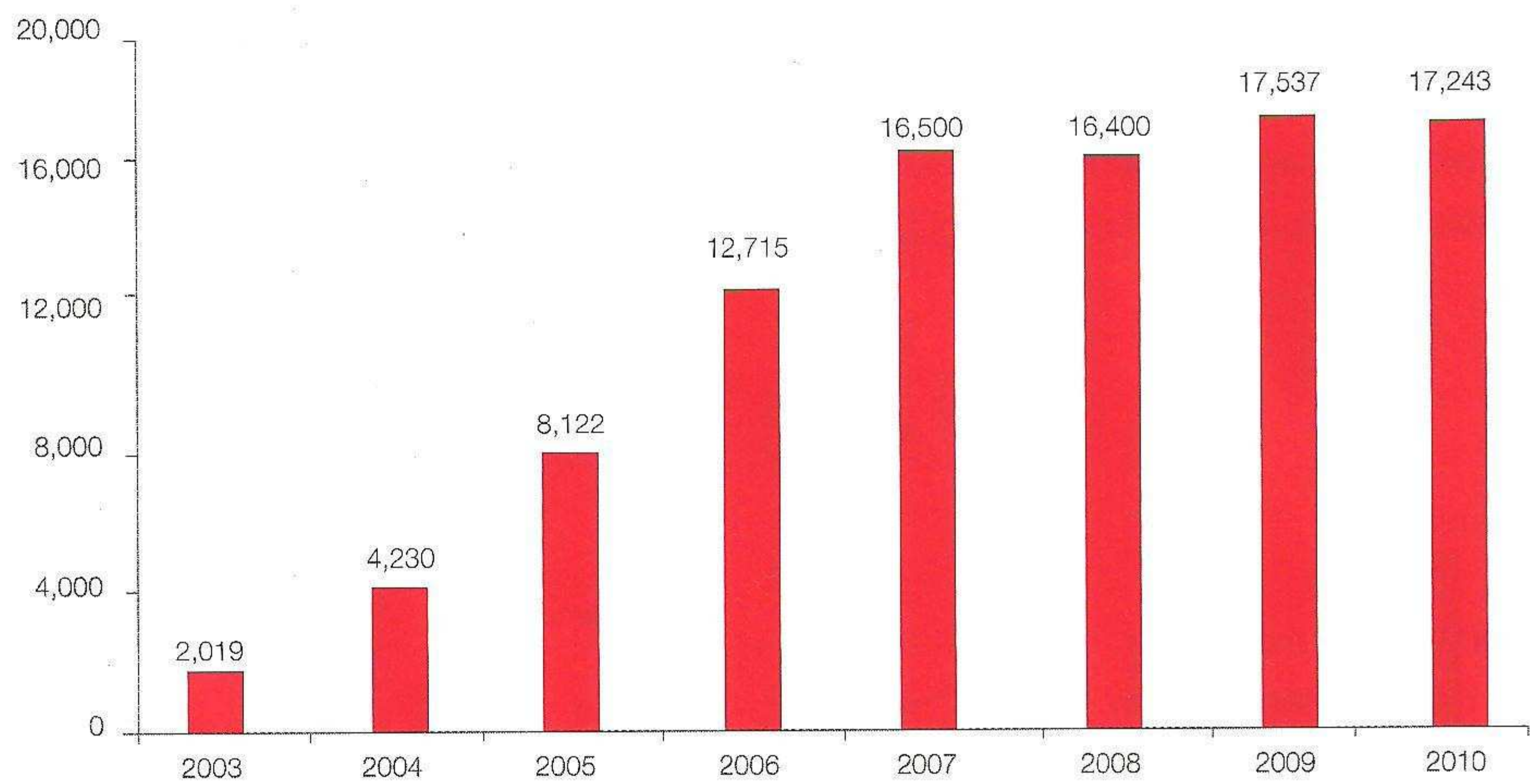**The largest VA market is today the US market with USD140 bn total sales at the end of 2010.**

US Fixed & Variable Annuity Sales (USD bn. Source: Limra, Morningstar)

Japan has over the recent years grown very quickly to be the second largest market in the world with USD 206bn of assets under management as of the end of September 2010.

23
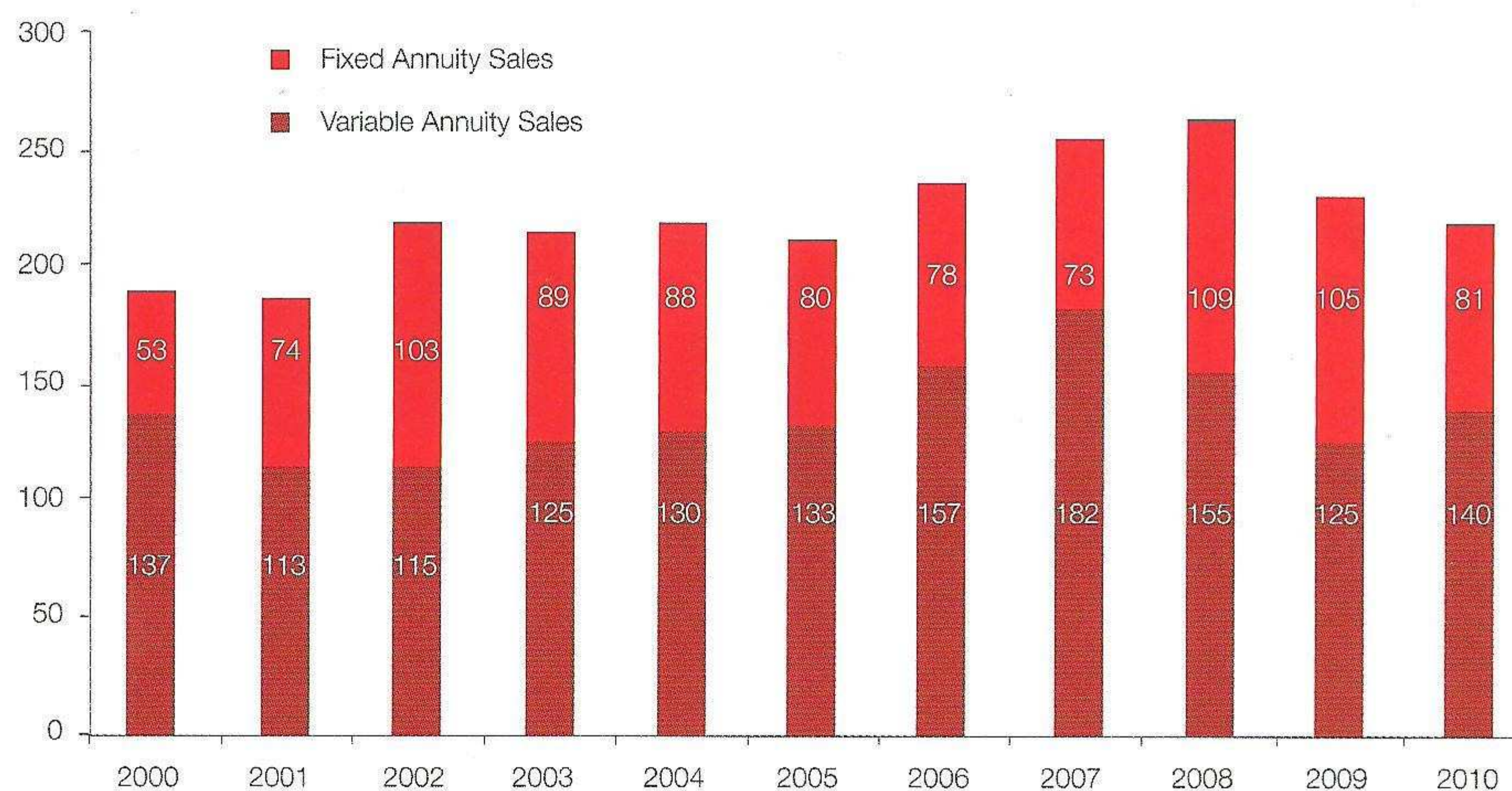
Japan VA assets (JPY bn. Source: Hoken Mainichi Shuimbun)

In Europe, the development of the VA market has so far been slow. Several products have been launched but very few have yet been successful and several early movers have since closed their VA business in Europe.

Number of Variable annuities products launched per country (SG estimation)

■ American variable annuities
■ Dynamic variable annuities

Source: Société Générale Financial Institution Advisory 2010

24

Number of Variable annuities products launched per country (SG estimation)

USA
USD 1.300+ bn
in 2010

UK & Ireland
EUR 75bn
EUR 160bn

France
EUR 95bn
EUR 200bn

Spain
EUR 10bn
EUR 30bn

Netherlands
EUR 10bn
EUR 30bn

Germany
EUR 50bn
EUR 100bn

Italy
EUR 45bn
EUR 115bn

JAPAN
USD 200+ bn
in 2010

Source: Watson Wyatt, Oliver Wyman

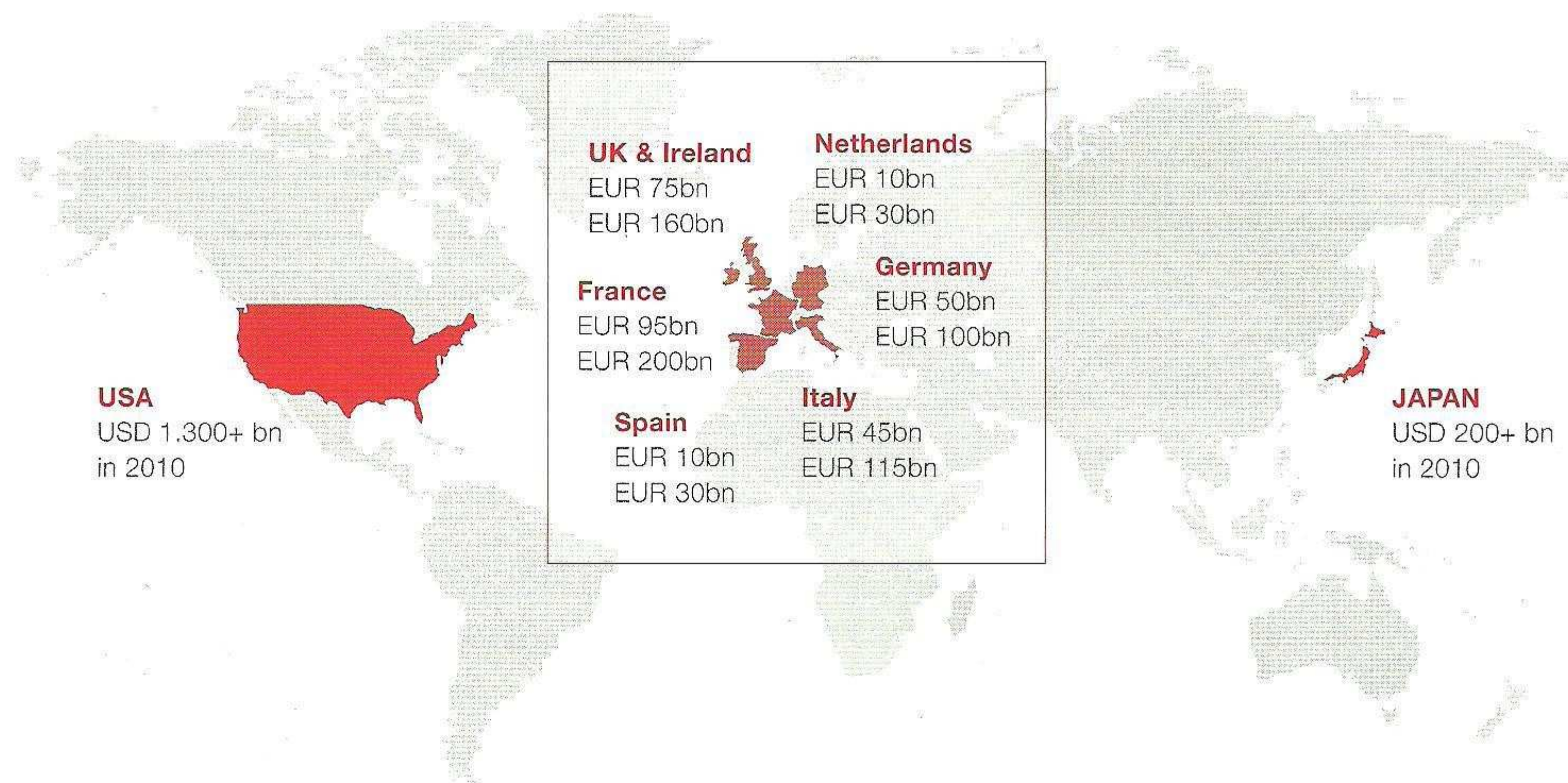But recent evidence is showing that the market is starting to pick-up with significant developments targeting the accumulation phase of the pension business. Several pension providers are looking at default options within Defined Contribution pension schemes that would be an alternative to life cycle funds and would provide capital guarantee features. Few predict that Europe may over-take Japan as the second market by 2020.

The design of a VA offer requires a detailed understanding of the customers' behavior and a strong derivative expertise. Few very large insurers will manage the risks in-house, effectively unbundle the risks, and hedge dynamically the market risks in the capital market. It requires a large business to justify the cost of a team of derivative experts and the development of a trading platform.

Most insurers will outsource the risk management of the guarantee effectively only retaining the actuarial risks. A bank will provide to them the back to back hedge of the individual policy. SG CIB has developed over the last 10 years a recognised expertise in VA and has today a dominant market share in the structuring and hedging of new VA business in Japan and in Europe.

Asset Allocation: Illiquidity Premium

Maximizing yield on assets in a capital constrained framework is very challenging, especially in a low yield environment. Will yield pickup come from the illiquidity premium? Indeed, the most debated topics between banks and insurances (and pension funds) is liquidity.

Basel III and its cohort of CRD-3 and CRD-4 are introducing the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). It will constrain banks to source long dated funding to better match the maturities of their assets (mortgage, corporate loans, project finance loans …) and to increase their funding through retail customers deposits.

On the other side, insurers are looking to match their long dated liabilities with long dated assets and to earn a premium for the illiquidity of the assets without incurring additional capital requirement for the market risk on these assets. Asset Exchanges is an efficient way to bridge the needs of the banks and the insurers in a Solvency II efficient way. Insurance companies and banks could therefore enter into transactions whereby the insurance company exchanges its government bonds against illiquid assets owned by the bank, which can use the government bonds to access liquidity in the repo market. The insurer retains the interest rate exposure of the government bond and earns a premium for taking the illiquidity risk. The insurer also takes counterparty risk on the bank, but secured by the collateral on which a haircut is applied. Overall the transaction requires a very low SCR for the insurer and offer a significant yield pick-up.

As an illustration we consider an exchange of government bonds against unrated floating rate loans with a 5-year maturity and a 4-year duration. The analysis is based on SG's understanding of current Solvency II proposals. In order to assess the SCR on the collateral exchange we have assumed that:

- The insurer has a long exposure to the assets and a short exposure to the government bonds, completely hedged by SG through a margin call process. Therefore, there should not be any market risk SCR for this long/short exposure.
- Under the margin call process, the insurer is exposed to SG default between two margin call dates.

The SCR for counterparty default risk is based on:

- The Loss Given Default to which the insurer would be exposed in case of SG default (i.e. the risk mitigating effect of the margin call on the long / short exposure), net of the risk-adjusted value of the haircut, multiplied by
- A Risk Factor, taking into account the rating of the bank and the diversification of the counterparty default risk, as per QIS 5 technical specifications.

For a haircut of 10% and no diversification of counterparty risk, the SCR is 0.39%.

Solvency Capital Requirement

Haircut	Solvency Capital Requirement		Return on Capital (assuming a spread of 70bps)
	Assuming maximum diversification of counterparty risk	Assuming no diversification of counterparty risk	
0%	0.007%	0.92%	76% to 10,000%
5%	0.005%	0.66%	106% to 14,000%
10%	**0.003%**	**0.39%**	**179% to 23,000%**
15%	0.001%	0.13%	538% to 70,000%

The table below provides detailed calculation of the case with 10% haircut and maximum counterparty diversification.

calculation of the case with 10% haircut and maximum counterparty diversification

Type of Credit Risk Exposure	Exposure	Module	Instrument Qualification	Amount Recognised for SCR or Risk Mitigation Purposes	Amount [2] & [3]
Primary exposure	Loan MTM – Government Bond MTM	Market Risk	n.a.	MtM After Credit Spread Stress Test + Interest Rate Stress Test	$= ((100\% \times Z\ 3.0\% * 4^{l2} + (100\% * 59\% * ZCRate * 4)^2)^{0.5} = 15.3\%$
Margin call, equivalent to weekly put on primary exposure	Government Bond MtM – Loan MtM	Market Risk	Financial Risk Mitigating Instrument	MtM after Credit Spread Stress Test	= -Primary Exposure SCR = -15.3%
Counterparty Default Risk on Collateralized Margin Call	Default on Government Bond MtM – Loan MtM – Risk Adjusted Value of Collateral	Counterparty Default Risk	n.a.	F(DP) x LGD, with LGD = 90% * Max(MtM of Risk Mitigating Instument + Risk Mitigating Effect of Instrument – Risk-Adjusted Value of Collateral, 0) Provided the collateral is held or deposited with a third party custodian and meets eligibility criteria Assuming the margin Call is treated like a derivative	- 6.70% * 90% * Max (0 + 15.3% – 8.8%,0) =6.70% * 90% * 6.5% =0.39% See below for Risk-Adjusted Value of Collateral
Haircut / Excess Collateral	Risk Adjusted Value of excess collateral invested in Loan	Market Risk	Collateral Financial Risk Mitigating Instrument	Risk-Adjusted Value = MtM – Market Risk SCR, i.e. IR and Spread Risk SCRs	= 10% – Spread Risk SCR = 10% – (10% * 3% * 4) = 10% - 1.2% = 8.8%

Source: Société Générale Financial Institution Advisory 2011

Taking into account the above SCR and the following indicative pricing, the return on capital for a collateral exchange is much higher than for credit risk through corporate bonds or covered bonds.

Return on Capital for a Collateral Exchange

	German Government Bonds	SG Covered Bonds[4]	SG Unsecured Debt[5]	BBB Corporate Bonds	Collateral Exchange
Spread for 5Y EUR	– 46bps	+ 35 bps	+ 91 bps	+ 109bps	+70bps
QIS5 Credit Spread Stress Test	0%	+ 0.6%	+ 1.4%	2.5%	3%
Capital Requirement (Duration 4 years)	0%	2.40%	5.60%	10%	0.39%[6]
Return on Capital[7]		14.6%	16.25%	10.9%	179%

Source: Société Générale Financial Institution Advisory 2011

2   3% credit spread risk charge for unrated Asset

3   6.70% DP for an Undiversified Counterparty Risk over 1 year (this is an approximation)

4   Based upon secondary market offer price, as of March16th, ASW of SG 4% 07/07/16 ,above 6 month Euribor

5   Based upon secondary market offer price, as of March16th, interpolated between ASW of SG 3% 2015 and SG 3%1/2 2017, above 6 month Euribor

6   Assuming 10% haircut and no diversification of Counterparty Default Risk

7   Calculated as the Spread for 5Y EUR, divided by Capital Requirement

The insurer needs however to take into account several parameters that are not reflected in the Solvency II standard approach:

- Upon default of the bank, the insurer is the owner of illiquid collateral. The SCR after default of the bank will be the SCR on the naked collateral, i.e. much higher.
- Being illiquid the collateral may require several days for the insurer to dispose the asset.
- In the tail risk of the joint default of the bank and of the collateral, the government bond lend by the insurer to the bank may perform on a MtM basis, this increasing the shortfall. Correlation between the collateral, the bank and the government bond will play an important part in the pricing and the appreciation of the risk.
- Even if insurers have a good view on their insurance liability cash flows, insurers need to closely assess their need for liquidity assets, especially considering the needs implied by active use of derivatives in hedging activity.

Asset Allocation: Investment in Equity

Solvency II will introduce a risk-adjusted approach to measure the profitability of investments. Focusing on equity, an asset class with very high capital charges under Solvency II, we have analyzed different investment strategies in equity. We found that capital guaranteed products are efficient tools, and have built upon that observation to design more refined structures.

Under this analysis, we compare the risk-adjusted performance of:

- A direct investment in the Eurostoxx 50 Total Return Index (strategy 1),
- A direct investment in the Eurostoxx 50 Total Return Index with the roll of an annual Put spread collar on the Eurostoxx 50 (strategy 2),
- A 12 years Zero Coupon AA bond combined with an ATM Call on the Eurostoxx 50 Price Return (strategy 3)

Comparison of Equity Return Strategies

Product	Protection	Coupons	Maturity Payoff on Top of Coupons	Investor Risks
Direct Investment + Collar Strategy	Through collars	- Collar payoff on Eurostoxx 50 Price Return: + Put 80% - Put 60% - Call 115%	Eurostoxx 50 Total Return performance + collars payoffs	- Under-performance of Eurostoxx 50 total return index and volatility (mitigated by collar) - Collars pricing conditions - Issuer credit risk on collar
Zero Coupon + 100% Participation Call	100% Initial investment at maturity	No coupon	100% of Eurostoxx 50 Price Return performance (if positive only)	- Under-performance of Eurostoxx 50 price return index mitigated by initial investment protection at maturity - MtM of investment between inception and maturity - Issuer credit risk

Source: Société Générale Financial

Institution Engineering and Advisory 2011

We have used QIS 5 calibrations for the SCR calculations, as detailed next.

Stress test methodology

Define Initial Solvency Ratio Monte Carlo Approach 10 Years 20 000 Simulations 50 000 Simulations for Eurostoxx 50	Calculate Mark-to-Market of investments for each path and at each date Determine IRR for each path, and at each date Determine SCR for each path and at each date and average since inception	Determine average (and Percentiles) SCR from inception across scenarios Determine average net liability covering ratio from inception across scenarios Determine average (and Percentiles) risk-adjusted IRR from inception and across scenario
Initial solvency ratio of company is arbitrarily fixed at 100% for a company investing all of its assets in Eurostoxx 50 investment in equity Since we are in an asset only framework, in order to define a solvency ratio, we define a theoretical liability equal to the initial investment in equity 100% - 39% = 61% (QIS 5 equity standard formula stress test) Liability is kept fixed throughout the projection (and treated like cash) at 61%	Mark-to-Market (MtM) of product repriced along each path at each period $IRR = \{MtM \text{ of product}(t)/MtM(0)\}^{1/t}$ Solvency Capital Requirement calculated assuming -39% shock on underlying in one year Shocks on the IR term structure which take duration into account Shocks on spreads SCR calculated at the end of each year, and along each path: Average $SCR(s,t) = 1/t \times Sum(i = 0 \text{ to } t) SCR(s,i)$ Average Net Liability Covering Ratio (t) = Average $(s,t) \{(MTM - SCR) / 61\%\}$	Average Risk Adjusted IRR (t) = Average IRR (t) – Average Cost of Capital (t) Average Cost of Capital (t) = 6% x Average SCR (t)

Monte Carlo Simulation parameters for simulation of Eurostoxx 50 based on the following simulation parameters
Implied market volatility (ATM volatility of approx. 25% volatility for Eurostoxx 50 Price Return)
Total return of Eurostoxx 50 equal to 7.5% (dividend rate at 2.5%)
Interest rate follow forward rate curve and reflects SG Credit quality
SG rating migration, or defaults, or spread variations are not simulated

We ran 20,000 simulations for each investment strategies. For each scenario we compute:
- The SCR and the coverage ratio on the investment,
- The return on the investment net of the cost of capital, assuming a 6% cost of capital constant for all scenarios.

The outcome of the analysis is a distribution of the returns on the investment strategies net of the cost of capital over a 12 year period that enable us to compare the different investment strategies.
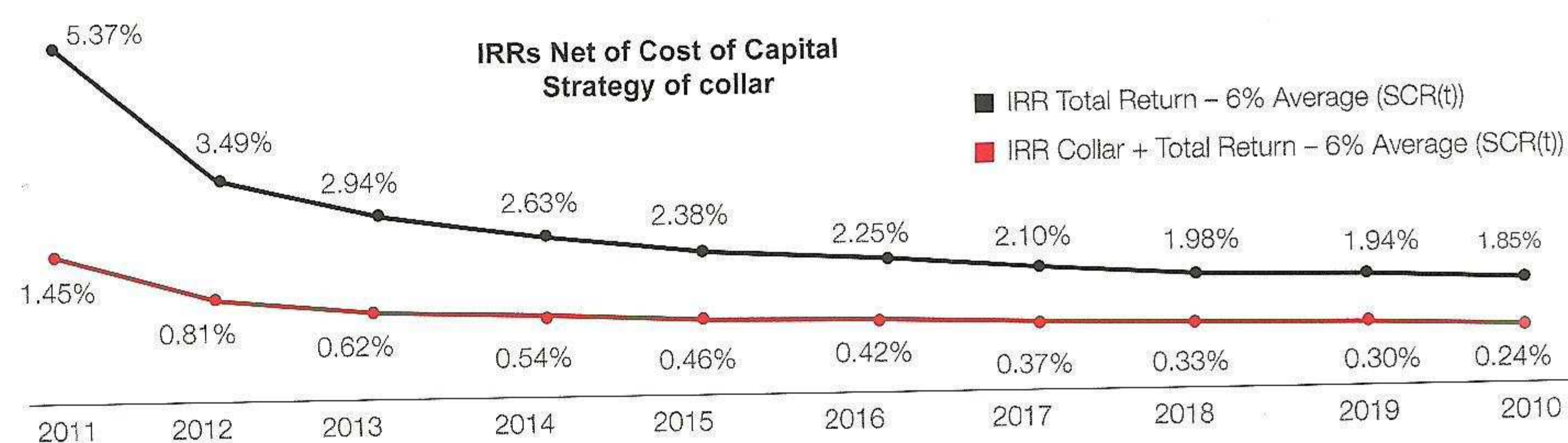
Detailed simulations methodology

QIS 5	Comments
Equity Feature SCR Equity -39% Stress Test Dampener	**SCR Equity equal to:** MtM of equity feature (t) – MtM of equity feature (t+1) under the stress test **Dampener Formula not used**
Zero Coupon SCR Interest Rate Stress Test Up Shock Up%: 1y 70%, 2y 70%, 3y 64%, 4y 59%, 5y 55%, 6y 52%, 7y 49%, 8y 47%	**SCR IR equal to:** MTM ZC(t) – MTM ZC Stressed (t+1) **MTM ZC Stressed (t+1) equal to ZC(t+1) – Stress Test(t)** Stress (t) equal to ZC(t) – ZC(t, stressed with QIS 5 shocks) **SCR IR for optional part as well**
Zero Coupon SCR Credit Stress Test Up Shock Up for maturities up to 8 years: 1.40% for an A rated company	**SCR Credit equal to:** MTM ZC(t) – {MTM ZC(t) – Stress Test Credit (t)} **Stress Test Credit (t) equal to (approximation):** ZC(t) x 1.40% x Residual Duration – RD (t)
Optional Part SCR Counterparty Default R.	**SCR Counterpart risk equal to:** 3% * MTM Option(t)
Total SCR	**Total SCR w/o Counterparty Risk equal to:** (SCR Equity 2 + SCR IR 2 + SCR Credit 2 + 2 x 0.75 SCR Credit Spread x SCR Equity) 0.5 **Total SCR with Counterparty Risk equal to:** (SCR without CD Default Risk 2 + SCR for CD Risk 2 + 2 x 0.25 SCR w/o CD Risk x SCR with CD Risk) 0.5
	QIS5 specifies 2 sets of correlations: one for which a rise in interest rates is the most important source of IR risk at company level, and one for which a decrease in interest rates is the most important source of IR risk at company level

Source: Société Générale Financial Institution Engineering and Advisory 2011

The first outcome of the analysis is that the collar strategy, used by many investors to reduce the cost of hedges is totally inefficient. Return net of cost of capital is minimal and even in the best 5% scenario produces low average return.

Average irr net of the cost of capital for direct investment & direct investment protection with collar
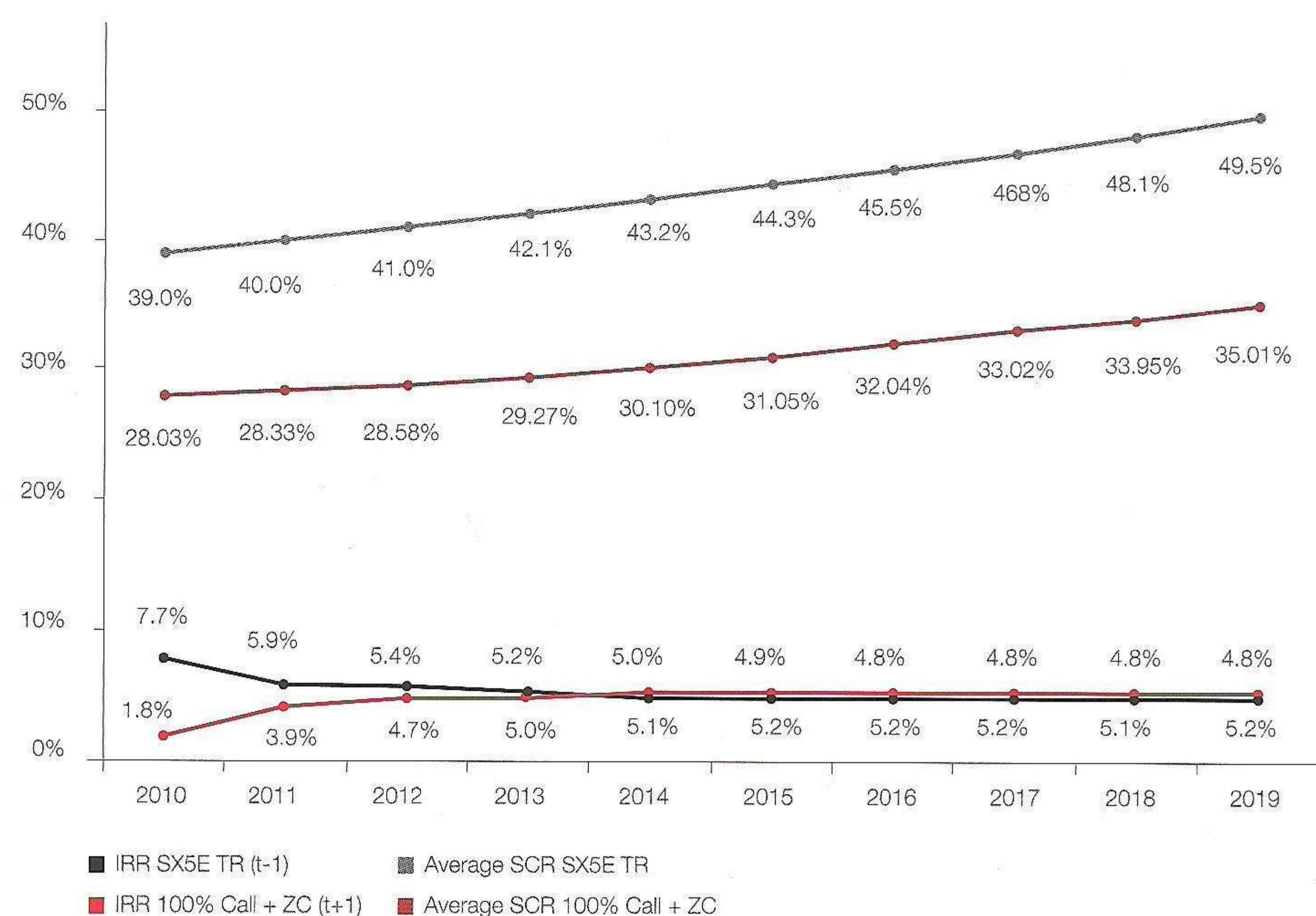

IRRs Net of Cost of Capital Strategy of collar

- IRR Total Return – 6% Average (SCR(t))
- IRR Collar + Total Return – 6% Average (SCR(t))

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010
IRR Total Return	5.37%	3.49%	2.94%	2.63%	2.38%	2.25%	2.10%	1.98%	1.94%	1.85%
IRR Collar	1.45%	0.81%	0.62%	0.54%	0.46%	0.42%	0.37%	0.33%	0.30%	0.24%

	IRR Net of Cost of Capital					(MtM – SCR) / 61%				
	2011	2013	2015	2017	2019	2010	2012	2014	2016	2018
Percentile 5% COLLAR	-19.5%	-13.0%	-10.3%	-8.8%	-8.0%	1.3	1.1	0,9	0.8	0.8
Average COLLAR	1.4%	0.6%	0.4%	0.3%	0.3%	1.3	1.4	1.5	1.5	1.6
Percentile 95% COLLAR	17.3%	15.2%	11%	9.6%	8.4%	1.3	1.6	2.1	2.4	2.6
Percentile 5% STOXX50ER	-34.0%	-21.2%	-17.1%	-14.4%	-12.4%	1.0	0.7	0.5	0.4	0.4
Average STOXX50ER	5.3%	3.0%	2.4%	2.1%	1.9%	1.0	1.1	1.2	1.4	1.5
Percentile 5% STOXX50ER	50.8%	33.1%	18.3%	14.8%	12.1%	1.0	1.5	2.2	2.8	3.1

Source: Société Générale Financial Institution Engineering and Advisory 2011

The third strategy (ZC + Call) provides a much better return profile:
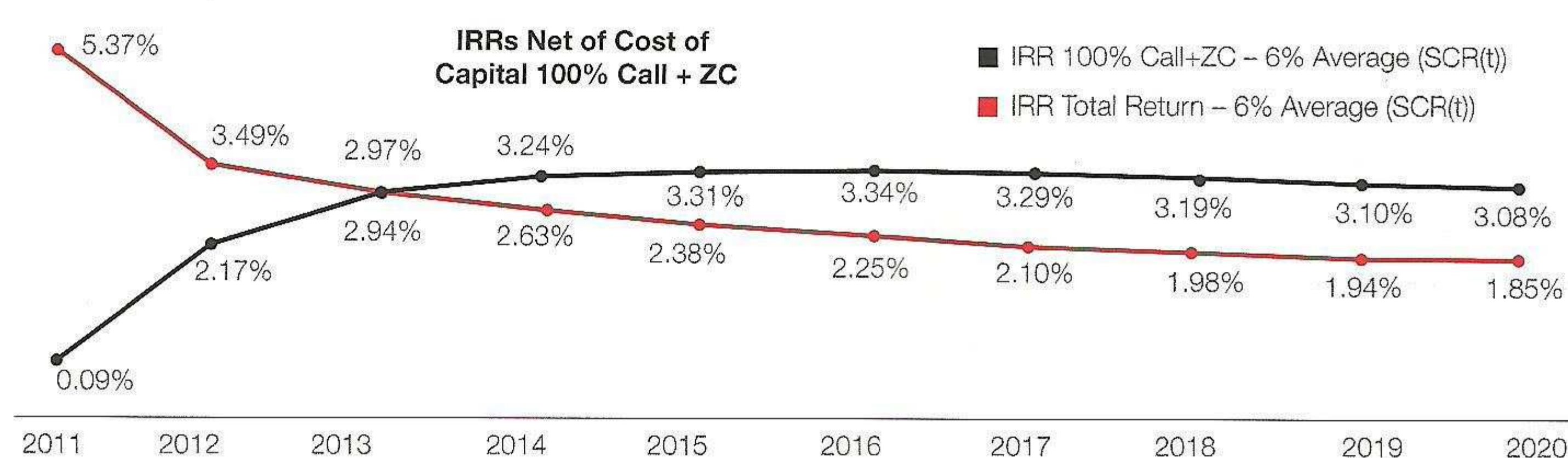
- The strategy is less risky with higher average net liability covering ratio and lower average SCR,
- The average IRR net of cost of capital is significantly higher than that of the direct equity investment,
- In addition, the tails of the distributions (IRR and net liability covering ratio) on the downside are significantly reduced.

Average IRR and SCR for direct indestment & ZC + Call strategy

Chart values:

Average SCR SX5E TR: 39.0% (2010), 40.0% (2011), 41.0% (2012), 42.1% (2013), 43.2% (2014), 44.3% (2015), 45.5% (2016), 468% (2017), 48.1% (2018), 49.5% (2019)

Average SCR 100% Call + ZC: 28.03%, 28.33%, 28.58%, 29.27%, 30.10%, 31.05%, 32.04%, 33.02%, 33.95%, 35.01%

IRR SX5E TR (t-1): 7.7%, 5.9%, 5.4%, 5.2%, 5.0%, 4.9%, 4.8%, 4.8%, 4.8%, 4.8%

IRR 100% Call + ZC (t+1): 1.8%, 3.9%, 4.7%, 5.0%, 5.1%, 5.2%, 5.2%, 5.2%, 5.1%, 5.2%

Legend:
- ■ IRR SX5E TR (t-1)
- ■ Average SCR SX5E TR
- ■ IRR 100% Call + ZC (t+1)
- ■ Average SCR 100% Call + ZC

Stress test methodology

IRRs Net of Cost of Capital 100% Call + ZC

- ■ IRR 100% Call+ZC – 6% Average (SCR(t))
- ■ IRR Total Return – 6% Average (SCR(t))

IRR Total Return – 6% Average (SCR(t)): 5.37% (2011), 3.49% (2012), 2.94% (2013), 2.63% (2014), 2.38% (2015), 2.25% (2016), 2.10% (2017), 1.98% (2018), 1.94% (2019), 1.85% (2020)

IRR 100% Call+ZC – 6% Average (SCR(t)): 0.09% (2011), 2.17% (2012), 2.97% (2013), 3.24% (2014), 3.31% (2015), 3.34% (2016), 3.29% (2017), 3.19% (2018), 3.10% (2019), 3.08% (2020)

	IRR Net of Cost of Capital					(MtM – SCR) / 61%				
	2011	2013	2015	2017	2019	2010	2012	2014	2016	2018
5% Percentile Call + ZC	-18.5%	-6.0%	-3.3%	-2.0%	-1.7%	1.2	1.2	1.3	1.4	1.6
Average Call + ZC	0.1%	3.0%	3.4%	3.4%	3.2%	1.2	1.3	1.5	1.7	1.9
95% Percentile Call + ZC	28.3%	18.2%	15.3%	13.8%	11.4%	1.2	1.7	2.2	2.8	3.7
5% Percentile STOXX50ER	-34.0%	-21.2%	-17.1%	-14.4%	-12.4%	1.0	0.7	0.5	0.4	0.4
Average STOXX50ER	5.3%	3.0%	2.4%	2.1%	1.9%	1.0	1.1	1.2	1.4	1.5
95% Percentile STOXX50ER	50.8%	33.1%	18.3%	14.8%	12.1%	1.0	1.5	2.2	2.8	3.1

The conclusion of the analysis can be extended to other equity indices and to other asset classes (commodities, hedge funds…). It illustrates the benefits of the use of derivatives in a Solvency II framework. With the implementation of Solvency II, we should see more and more insurers using structured products and OTC derivatives to maximise the expected return net of the cost of capital and to minimise the SCR.

Solvency I & Solvency II Cumulated Balance sheet (in €bn)

Chart data (in €bn):

	Values
Assets SI	1,424; 2,252; 1,417; 1,372; 992
Liabilities and Own Fund SI	1,544; 3,962; 664; 544; 743
MSR SI	267
Excess of Own Funds SI	
Assets SII	1,486; 2,267; 1,516; 1,286; 877
Liabilities and Own Funds SII	1,539; 3,711; 498; 141; 602; 941
SCR	586
Excess of Own Funds SII	

Legend:
- Other Assets
- Equity shares, real estate and funds
- Government bonds
- Corporate bonds, loans and cash
- Unit Linked (UL)
- Own Funds
- Other Liabilities
- Risk Margin
- Provision Non Life
- Provision Life excluded UL & Health
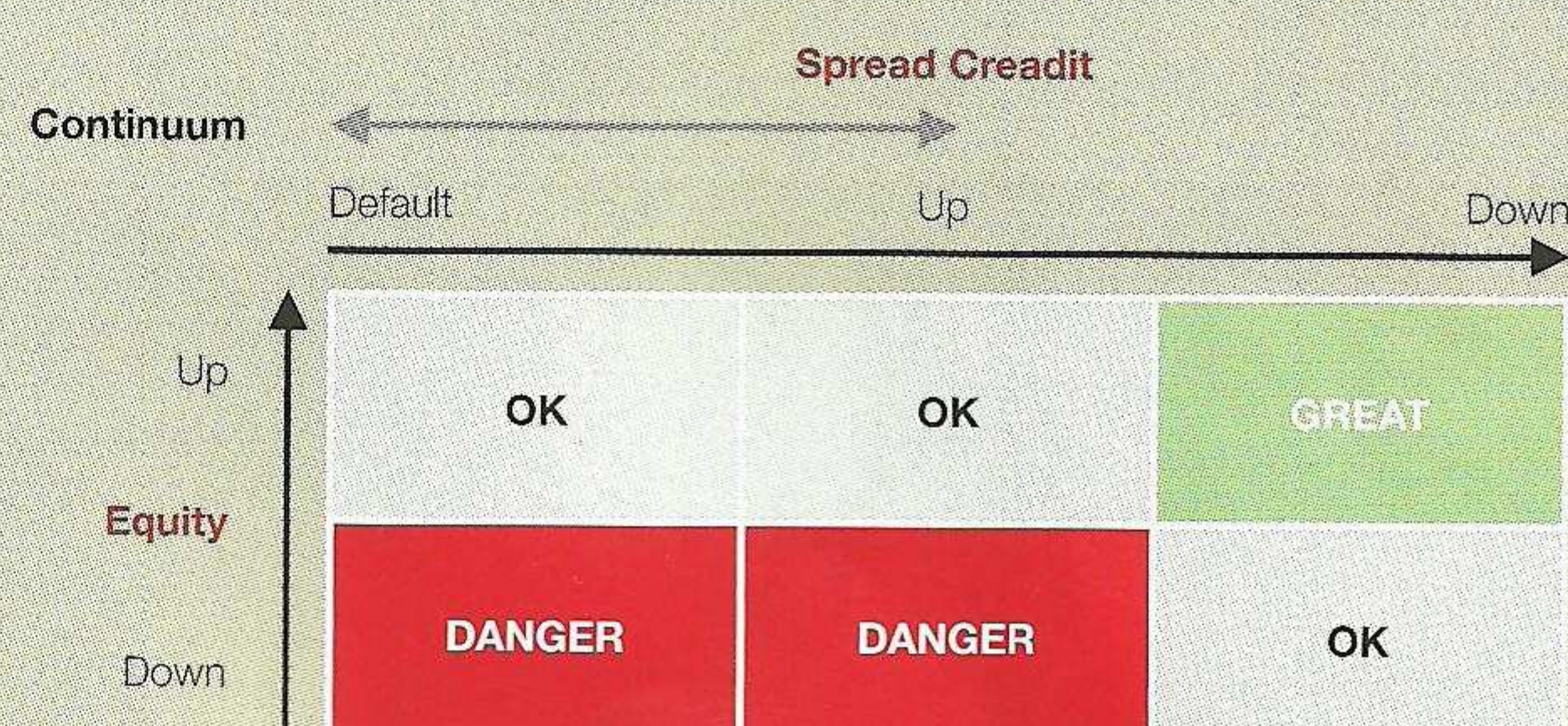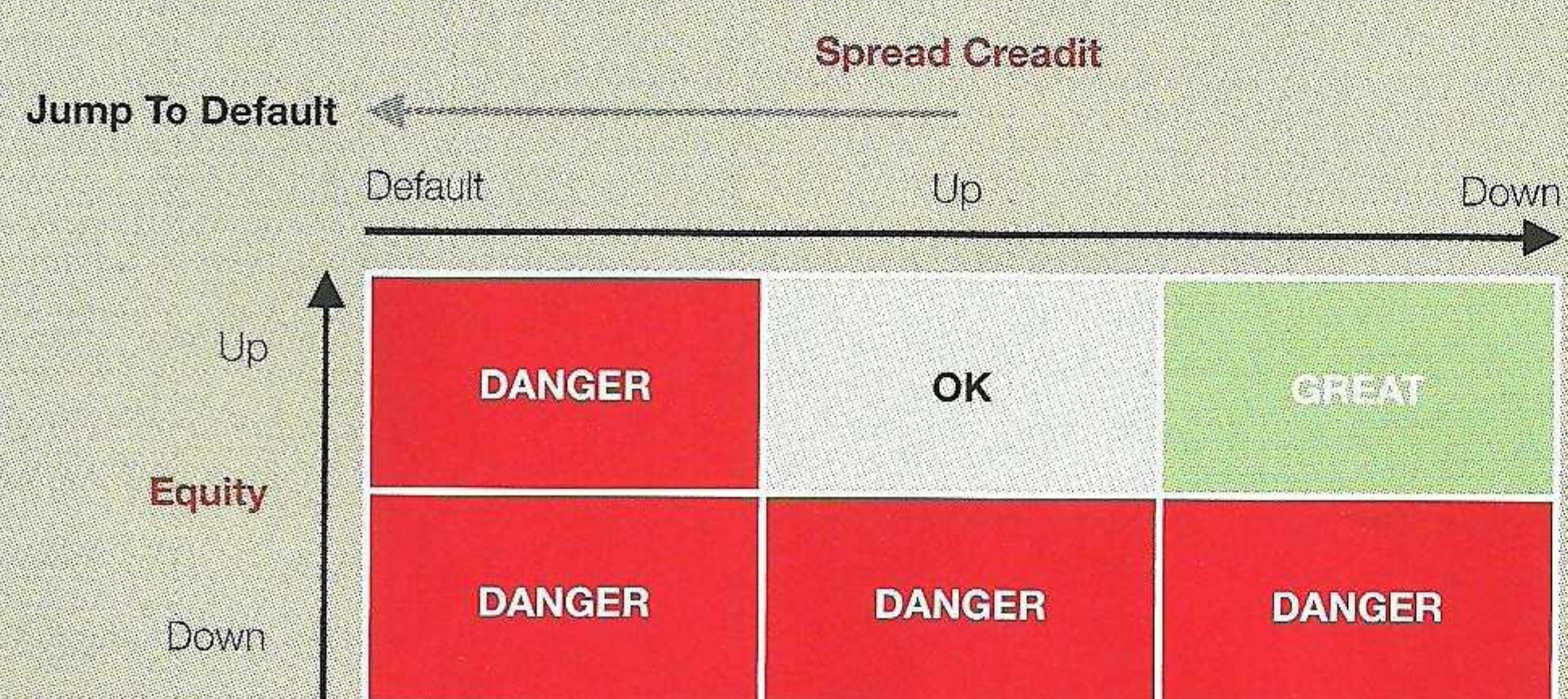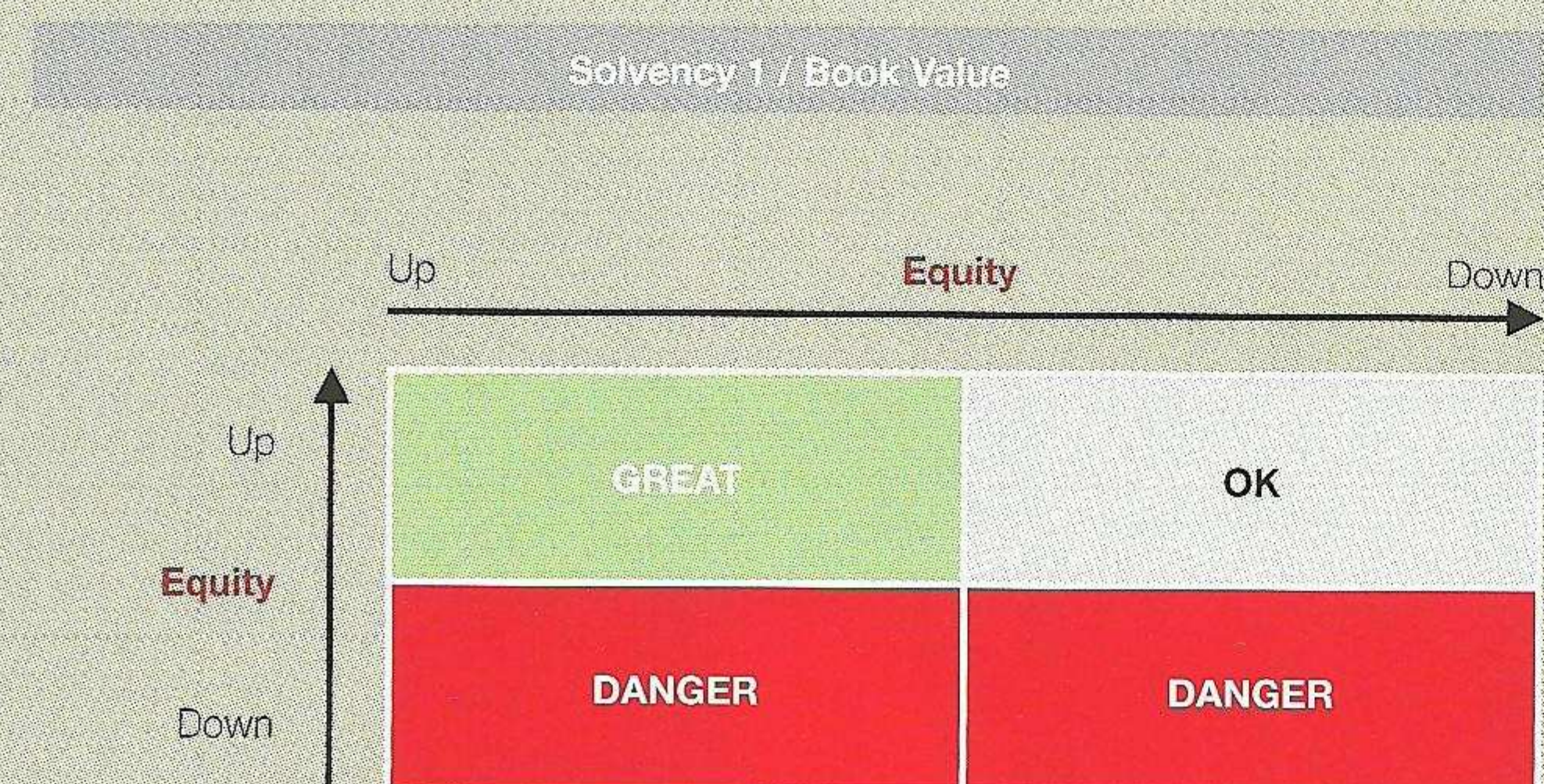- Provision Life UL
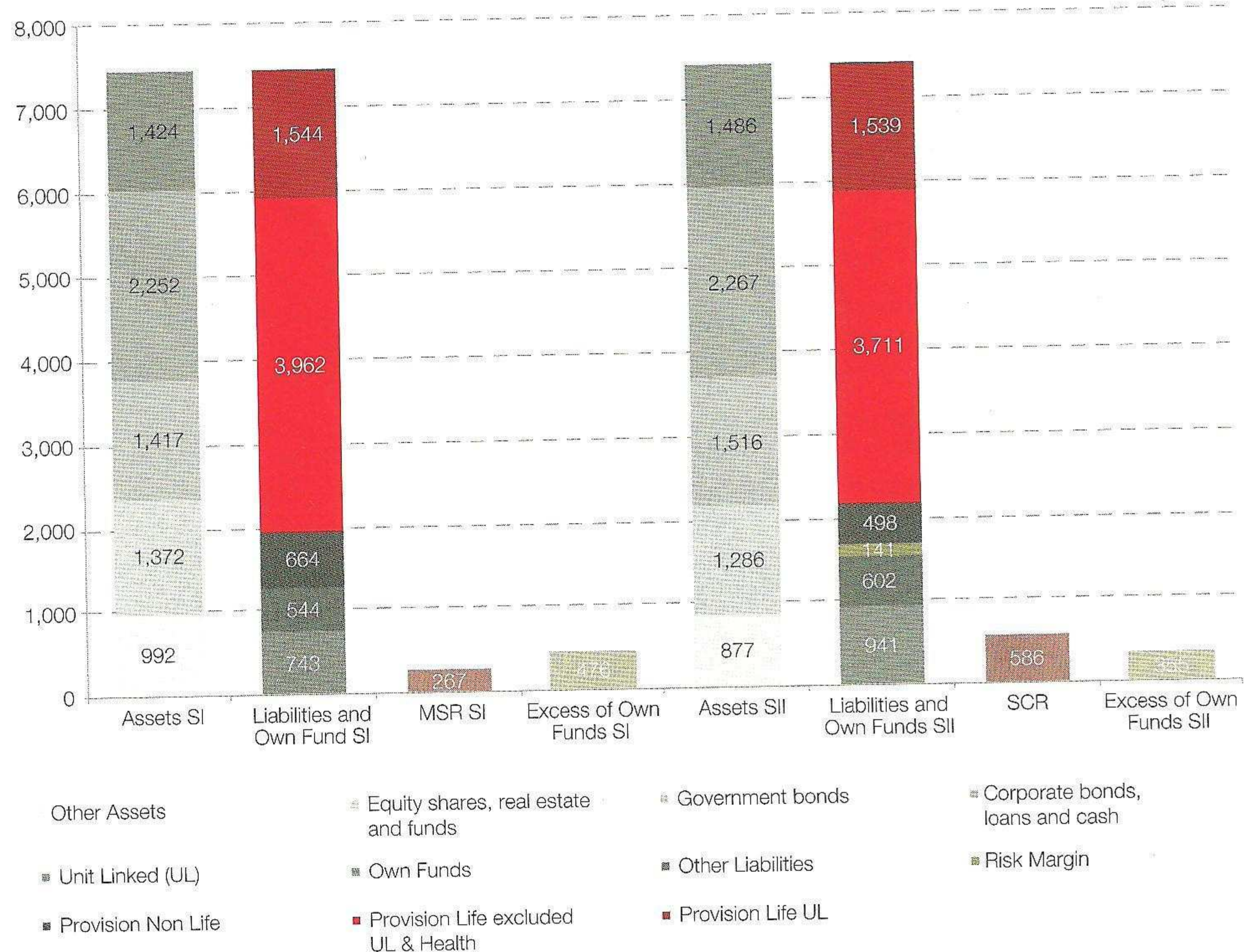
Hedging Strategy: Look after the VIF

In the QIS5 specifications, the European Commission has tentatively agreed to allow the inclusion into Tier 1 capital of the Value in Force (ViF) of insurance contracts, i.e. the Market Consistent Value of Future Profits that life companies would be able to extract from policyholder contracts while these remain in effect.

The inclusion of ViF into Tier 1 is clearly a good outcome, as according to the CRO Forum it represents Euro 100bn or 28% of the total excess surplus of Euro 355bn (QIS5 results) of the industry. For some companies, the ViF represents up to 50% of their expected available capital under Solvency II, and in some cases, more than 100% of the expected Solvency Capital Requirement. Regulators' concern is that ViF is highly sensitive to market movements and policyholder behavior. As seen between 2007 and 2008, the value of ViF can sharply decrease during crisis, leaving companies with less capital when it most needs it.

Securing this source of capital will become key to enable insurers to use ViF as a stable source of capital. Therefore insurance companies will likely seek to protect their amount of available capital; the management of the volatility of ViF will certainly be on the agenda in the Solvency II framework. Under Solvency I, the management of a With-Profit Book with long dated guarantees was effectively looking to avoid credit default (active management of credit portfolio) and protecting the value of Equity holdings (Equity Put, Equity Put Spread …).
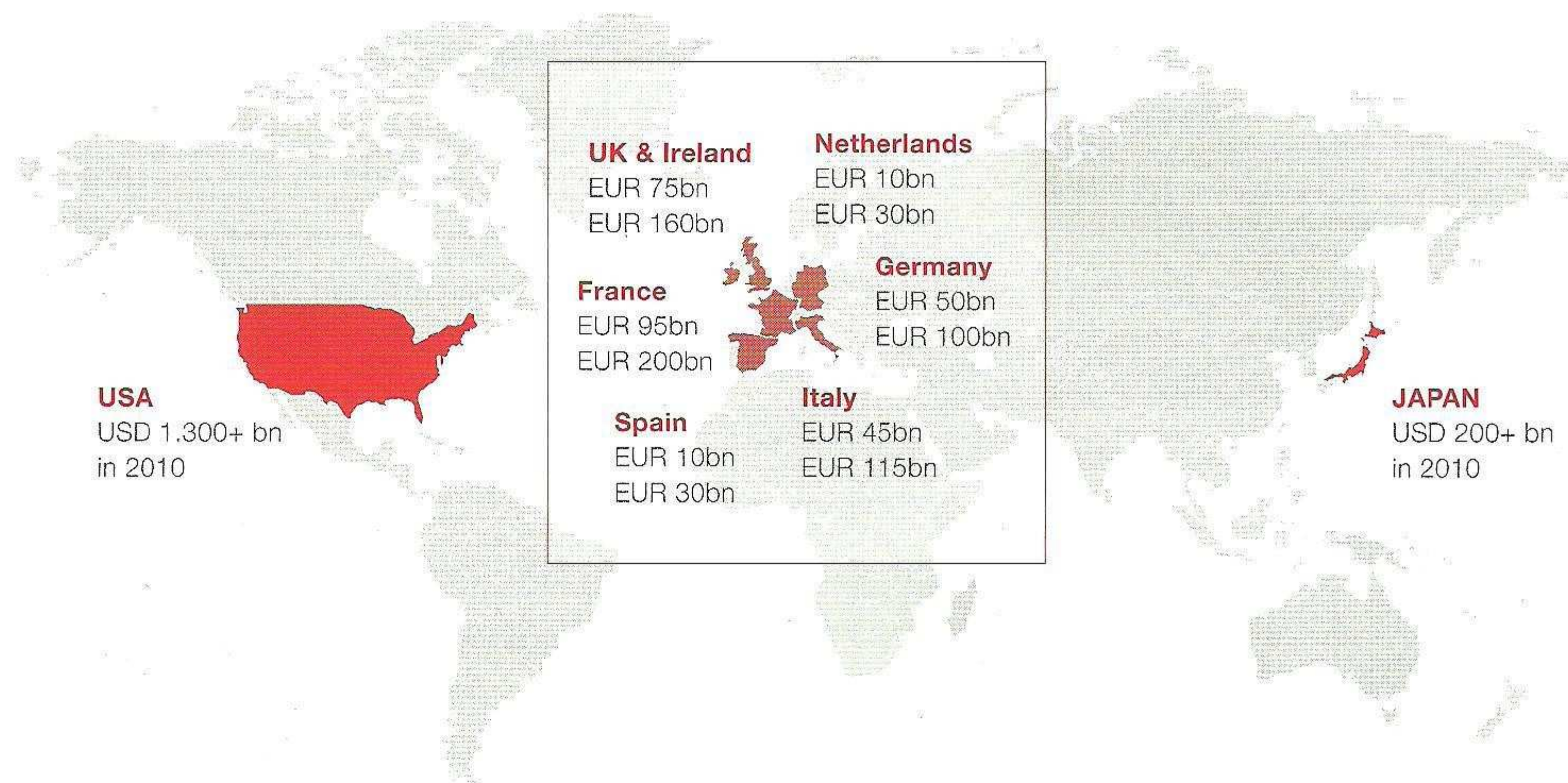
Solvency 1 / Book Value

Equity
Up — Down

Equity Up	GREAT	OK
Equity Down	DANGER	DANGER

Spread Creadit
Jump To Default ← | Default — Up — Down

Equity Up	DANGER	OK	GREAT
Equity Down	DANGER	DANGER	DANGER

**Hedge Equity
Avoid Default**

Solvency 2 / Fair Value

IR
Down — Up

Equity Up	OK	GREAT
Equity Down	DANGER	OK

Spread Creadit
Continuum ↔ | Default — Up — Down

Equity Up	OK	OK	GREAT
Equity Down	DANGER	DANGER	OK

**Hedge IR / Equity Negative Spiral
Hedge Credit/Equity Crisis**

Under Solvency II, the dynamics created by fair value accounting for assets and liabilities completely changes. The insurer wants to avoid a fall of the equity holding combined with a low interest environment. But it could support a bear equity scenario with high interest rate. And lower credit spread can compensate a negative equity performance.

As allocation to credit has increased, insurers will focus a lot their attention on reducing ViF sensitivity to credit. And they will look to benefit from the implied correlation between different asset classes to reduce cost of hedges. Protecting capital will also result in a lower SCR, creating a double benefit on the solvency ratio (stabilised Own Funds, reduced SCR). The cost of the hedge will be balanced against the cost of holding capital for the hedged risks, creating a true economic motivation to consider hedging strategies.

Number of Variable annuities products launched per country (SG estimation)

USA
USD 1.300+ bn
in 2010

UK & Ireland
EUR 75bn
EUR 160bn

Netherlands
EUR 10bn
EUR 30bn

France
EUR 95bn
EUR 200bn

Germany
EUR 50bn
EUR 100bn

Spain
EUR 10bn
EUR 30bn

Italy
EUR 45bn
EUR 115bn

JAPAN
USD 200+ bn
in 2010

Source: Watson Wyatt, Oliver Wyman

But recent evidence is showing that the market is starting to pick-up with significant developments targeting the accumulation phase of the pension business. Several pension providers are looking at default options within Defined Contribution pension schemes that would be an alternative to life cycle funds and would provide capital guarantee features. Few predict that Europe may over-take Japan as the second market by 2020.

The design of a VA offer requires a detailed understanding of the customers' behavior and a strong derivative expertise. Few very large insurers will manage the risks in-house, effectively unbundle the risks, and hedge dynamically the market risks in the capital market. It requires a large business to justify the cost of a team of derivative experts and the development of a trading platform.

Most insurers will outsource the risk management of the guarantee effectively only retaining the actuarial risks. A bank will provide to them the back to back hedge of the individual policy. SG CIB has developed over the last 10 years a recognised expertise in VA and has today a dominant market share in the structuring and hedging of new VA business in Japan and in Europe.

Asset Allocation: Illiquidity Premium

Maximizing yield on assets in a capital constrained framework is very challenging, especially in a low yield environment. Will yield pickup come from the illiquidity premium? Indeed, the most debated topics between banks and insurances (and pension funds) is liquidity.

Basel III and its cohort of CRD-3 and CRD-4 are introducing the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). It will constrain banks to source long dated funding to better match the maturities of their assets (mortgage, corporate loans, project finance loans ...) and to increase their funding through retail customers deposits.