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**Valuation Actuary Symposium
September 24-25, 2009**

**Session 12 PD: Recent Market Trends
with EEV/MCEV Reporting**

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Moderator

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SOCIETY OF ACTUARIES

Recent Market Trends with EEV/MCEV Reporting

2009 Valuation Actuary Symposium

Moderator: Hubert Mueller, Towers Perrin

Presenters: John Esch, Allianz Life

Hubert Mueller, Towers Perrin

Steve Stone, Sunamerica

September 24, 2009

Overview of Topics

- How EEV and MCEV have evolved
- Recent EEV/MCEV disclosures
- Uses of MCEV
- Use of market-consistent valuations in pricing and hedging
- Key considerations when implementing MCEV
- Link to EC / performance measurement



MCEV – Recent Developments and Challenges

2009 Valuation Actuary Symposium

Hubert Mueller
Principal, Towers Perrin

September 24, 2009

Overview

- How EEV and MCEV have evolved
- Recent EEV/MCEV disclosures
- Uses of MCEV

HOW EEV AND MCEV HAVE EVOLVED

Market-Consistent Embedded Value (MCEV) Principles were published in the wake of a dramatic financial turmoil

CFO Forum
Market Consistent Embedded Value Principles
June 2008

- Published by CFO Forum in June 2008
 - 17 key Principles
 - 145 areas of Guidance
 - Commentary on Principles & Guidance (Basis for Conclusions)
- Requires implementation of MCEV by 2009
- Available from www.cfoforum.nl

MCEV Principles are copyright CFO Forum 2008

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HOW EEV AND MCEV HAVE EVOLVED

The 17 MCEV Principles: main changes from European Embedded Value (EEV)

ILLUSTRATIVE

<ol style="list-style-type: none"> <li style="background-color: #ff9900; padding: 2px;">1. What is MCEV <li style="background-color: #ff9900; padding: 2px;">2. Coverage <li style="background-color: #993366; padding: 2px;">3. Allowance for risk <li style="background-color: #339966; padding: 2px;">4. Free surplus <li style="background-color: #ff9900; padding: 2px;">5. Required capital <li style="background-color: #ff9900; padding: 2px;">6. Value of in-force <li style="background-color: #993366; padding: 2px;">7. Financial options and guarantees <li style="background-color: #993366; padding: 2px;">8. Frictional costs <li style="background-color: #993366; padding: 2px;">9. Residual non-hedgeable risks 	<ol style="list-style-type: none"> <li style="background-color: #ff9900; padding: 2px;">10. New business and renewals <li style="background-color: #ff9900; padding: 2px;">11. Non-economic assumptions <li style="background-color: #993366; padding: 2px;">12. Economic assumptions <li style="background-color: #993366; padding: 2px;">13. Market-consistent discounting <li style="background-color: #993366; padding: 2px;">14. Reference rates <li style="background-color: #993366; padding: 2px;">15. Stochastic models <li style="background-color: #339966; padding: 2px;">16. Participating business <li style="background-color: #993366; padding: 2px;">17. Disclosure
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Key

 Little change	 Some changes	 New / significant changes
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HOW EEV AND MCEV HAVE EVOLVED

The MCEV Principles tackle the key MCEV-related questions

1. How should we set the 'risk-free' or reference rate?
2. Should there be an additional allowance for illiquidity or own credit risk?
3. How do we calibrate the option pricing model?
4. How should we allow for 'non-hedgeable risks' (NHR)?

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HOW EEV AND MCEV HAVE EVOLVED

Principle 17 Disclosures – Appendix A MCEV analysis of earnings

	MCEV – Analysis of Earnings			
	Free Surplus	Required Capital	VIF	MCEV
Opening <i>MCEV</i>				
Opening adjustments				
Adjusted opening <i>MCEV</i>				
New business contribution				
Expected existing business contribution (<i>reference rate</i>)				
Expected existing business contribution (in excess of <i>reference rate</i>)				
Transfers from VIF and <i>required capital</i> to free surplus				
Experience variances				
Assumptions changes				
Other operating variance				
Operating <i>MCEV</i> earnings				
Economic variances				
Other non operating variance				
Total <i>MCEV</i> earnings				
Closing Adjustments				
Closing <i>MCEV</i>				

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HOW EEV AND MCEV HAVE EVOLVED

Summary of CFO Forum MCEV Principles

Key areas of consistency:	Areas of potential divergence:
<ul style="list-style-type: none">■ Allowance for market risk■ Allowance for NHR process■ Analysis of movement■ Prescribed sensitivities■ Other EEV areas that have been tightened	<ul style="list-style-type: none">■ Approach where no market value exists■ NHR methodology■ AoM: expected return■ Credit spread sensitivity■ Other EEV areas continuing to allow discretion

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HOW EEV AND MCEV HAVE EVOLVED

The CFO Forum announcement from December 2008 highlights issues companies were facing with MCEV during market turmoil

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.

Source: www.cfoforum.nl/eev.html

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RECENT EEV / MCEV DISCLOSURES

In late 2008, markets were displaying highly unusual characteristics, compared to historic norms

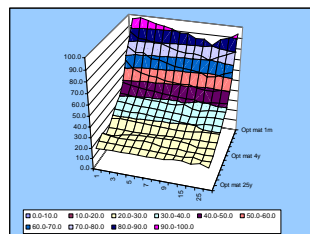
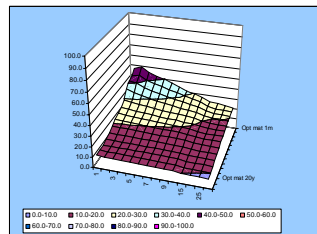
- Nil/negative LIBOR swap spreads (over government) at medium to long durations
- Corporate bonds, CDS protection and LIBOR swap yields suggest arbitrage opportunities exist, at least in credit markets
- Market changes frequently in excess of 2% of value
- Short term implied equity volatility increased to 75% or more
- Some implied swaption volatilities have doubled or more from end 2007
- The duration of OIS swap curves in UK£ and Euro extended significantly during 2008
- Different sources of data at times show very different results
 - e.g. Bloomberg corporates versus iBoxx corporates

**Does the concept of “willing buyer, willing seller” still hold?
Are market prices reliable?**

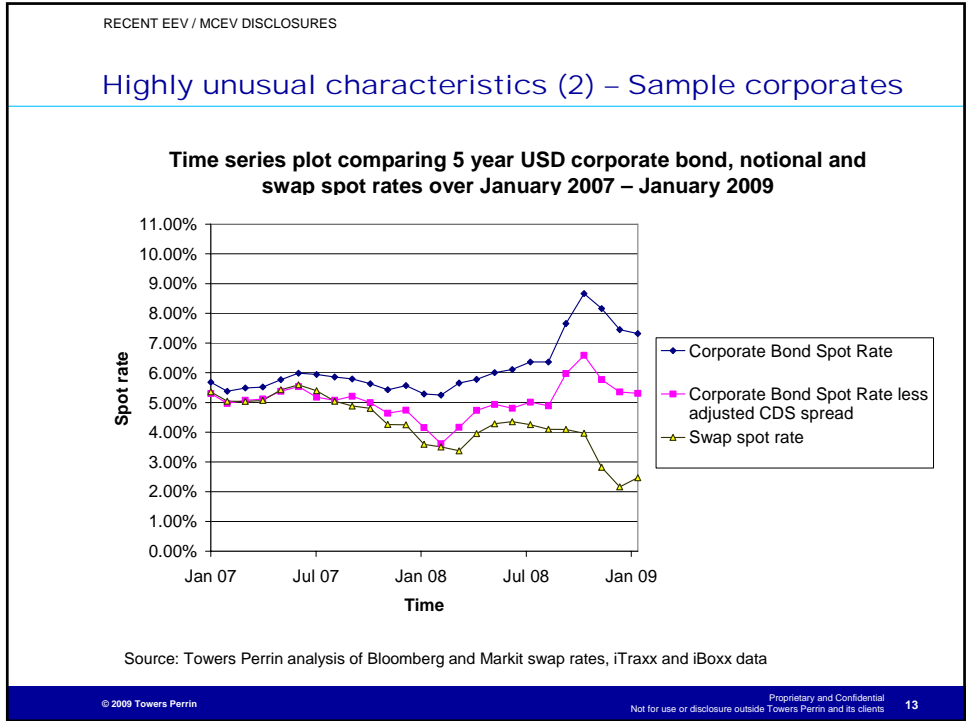
RECENT EEV / MCEV DISCLOSURES

Highly unusual characteristics (1) – Sample interest vols

EUR SWAPTION VOL SURFACES PER 30 JUNE 2008 AND 31 DECEMBER 2008



Similar observations for equity volatilities



RECENT EEV / MCEV DISCLOSURES

The issues discussed by the CFO Forum mask certain underlying, more fundamental questions

Issues Discussed In CFO Forum	Fundamental Questions
<ul style="list-style-type: none"> ■ Implied volatilities ■ Cost of non-hedgeable risks ■ Use of swap rates as risk-free rates ■ Illiquidity premium 	<ul style="list-style-type: none"> ■ Are markets deep and liquid? And if not, what to do? ■ What viable and credible calibration instruments exist? ■ Pick only one of swap or treasury, or allow minimum cost replicating portfolio? ■ How to allow for or model the risk of a liquidity and capital crunch? ■ Valuation for “hard to value” assets

On May 22, 2009, the CFO Forum announced a deferral of the mandatory MCEV implementation from 2009 to 2011

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RECENT EEV / MCEV DISCLOSURES

Some of the companies reporting EEV/MCEV at year-end 2008

	DATE	BASIS OF PREPARATION
Zurich	5 Feb 2009	Market-consistent EEV
AXA	19 Feb 2009	Market-consistent EEV
CNP	25 Feb 2009	MCEV Principles
Allianz	27 Feb 2009	MCEV Principles
Scottish Widows	27 Feb 2009	Market-consistent EEV
Munich Re	3 Mar 2009	Market-consistent EEV
Old Mutual	4 March 2009	MCEV Principles
AVIVA	5 March 2009	MCEV Principles
Generali	20 March 2009	Market-consistent EEV

In total, six CFO Forum companies have now adopted the MCEV Principles, and 30 other companies have published on an EEV basis at year-end 2008

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RECENT EEV / MCEV DISCLOSURES

End 2008 "market consistent" EEV / MCEV reporting – Comparison of reference rates

	REFERENCE RATES FOR YEAR-END 2008 EEV/MCEV
Zurich	Swaps, unadjusted
AXA	Swaps, increased by 50bps for European businesses, and 100bps for non-European businesses
CNP	Swaps, increased by 70bps for all lines
Allianz	Swaps, unadjusted (except Korea)
Scottish Widows	Gilts, increased by 154bps for annuity business
Munich Re	Swaps, unadjusted
Old Mutual	Swaps, increased by 300bps for US onshore business
AVIVA	Swaps, increased by 150bps for UK and NL immediate annuities, 300bps for US immediate annuities and 250bps for other US contracts
Generali	Government yields for Italy and Czech Republic; Swaps increased by 50bps for most other European businesses; Swaps unadjusted for all other businesses
Hannover Re	Swap, unadjusted

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RECENT EEV / MCEV DISCLOSURES

Aviva liquidity premium – Preliminary MCEV results

Adjusted risk-free rate

Aviva's MCEV methodology adopts the CFO Forum Principles and Guidance with the exception of the use of an adjusted risk-free yield due to current market conditions for UK and Netherlands immediate annuities and for immediate annuities, deferred annuities and all other contracts in the US. In stable markets, swap curves are an appropriate risk-free rate. However, in the current turbulent market it is possible, for products where backing asset portfolios can be held to maturity, to earn returns in excess of swaps by investing in corporate bonds and credit default swaps (CDS).

The reference rate for these products has been increased above the swap curve to estimate the additional returns available through replicating portfolios where backing assets can be held to maturity in the current market. Due to the limited availability of CDS assets, particularly at the long durations, this is a **material area of judgement** and sensitivity analysis has been provided on page 53 on the additions to the swap curves.

In current markets, adjustments have been made to the swap rate for UK and Netherlands immediate annuities and all US contracts. Details of adjustments can be found on page 49.

Source: Aviva, Preliminary report, 5 March 2009, p. 45

Central MCEV	Impact on MCEV of adjustment	Central VNB	Impact on VNB of adjustment
£12.9bn	£(6.1)bn	£409m	£(272)m

Source: Aviva, Preliminary report, 5 March 2009, pp. 2, 22, 53 & 55

First public application of Minimum Cost Replicating Portfolio

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RECENT EEV / MCEV DISCLOSURES

End 2008 "market-consistent" EEV / MCEV reports – Comparison of volatility assumptions

	Interest vols	Equity vols
ZFS	Average during 2008	Average during 2008
AXA	Average during 2008	Average during 2008
CNP	Average during 2008	Average during 2008
Allianz	Market vols end Sept	Market vols end Sept
Scottish Widows	Not disclosed	Not disclosed
Munich Re	Market vols end Dec	Market vols end Dec
Old Mutual	Market vols end Dec	Market vols end Dec
AVIVA	Market vols end Aug	Market vols end Aug
Generali	Market vols end June	Market vols end June

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USES OF MCEV

Uses of MCEV in North America

- Use of MCEV in Financial Reporting: MCEV (market-consistent EEV) publications by several multinationals at year-end 2008, including:
 - Allianz
 - Aviva
 - AXA
 - Munich Re
 - Old Mutual
- Use of market-consistent techniques in pricing and hedging
- Use of MCEV in M&A valuations
- Calculation from Market-Value Balance Sheet when developing economic capital (EC)

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USES OF MCEV

Use of market-consistent techniques in pricing and hedging

- MCEV techniques increasingly being used to price and hedge secondary guarantees
 - Reflects market-consistent cost of hedging
 - Use of risk-neutral scenarios
 - More focus on dynamic behavior and management actions
- Examples:
 - Variable Annuities with GMDB/GLBs
 - UL with Secondary Guarantees (UL SG)
 - Fixed Indexed Annuities with GLBs
 - CD-type Fixed Annuities
 - Segregated Fund Products (CAN)

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USES OF MCEV

The economic balance sheet provides the link between MCEV and EC

Earnings Approach:

$$\text{MCEV} = \text{MCVIF} + \text{Net Worth}$$

Balance Sheet Approach:

$$\text{MCEV} = \text{MV Assets} - \text{MV Liabilities}$$

* MVM = Market Value Margin

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USES OF MCEV

Use of market-consistent techniques in M&A valuations

- Increasingly being used for valuations of equity-based products and living benefit guarantees
 - Variable Annuities
 - UL SG
- Allows better reflection of impact of hedging
 - Consistent with investment bank pricing for hedging solutions
- Disconnect between buyers sellers has slowed down M&A activity of late
 - Buyers generally insist on use of market-consistent valuations
 - Most sellers still relying on real-world valuations
- Calibration of risk-neutral scenarios requires scrutiny
 - Replicating current market prices of assets
 - Volatility: scalar vs. surface
 - Consistency with real-world scenarios for s-o-s projections

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USES OF MCEV

Outlook: Despite some current issues, use of MCEV techniques is expected to increase over time

- 1 Six CFO Forum companies to date have adopted the MCEV Principles, with the rest expected to follow by year-end 2011
- 2 Market turmoil has identified weaknesses with current approaches
- 3 YE 2008 proliferation of various approaches has weakened credibility with analyst community
- 4 Opportunity for industry to work to build a more robust approach that can last through economic cycles
- 5 Increasing application of market-consistent assumptions in pricing and hedging of secondary guarantees
- 6 Greater acceptance of market-consistent techniques for M&A valuations

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Recent Market Trends with MCEV Reporting

Implementing MCEV for a Multinational

John Esch, Allianz Life Insurance Company of North America
September 24, 2009



Topics covered

Purpose & History of MCEV at Allianz

Implementation Process

2008 MCEV Results

Looking ahead

What were the Business Problems in 2000 that Allianz wanted to Solve?

1. Allianz Group: 200 Companies in 70 Countries
 - P&C, Life & a Bank
2. Which Companies Deserve More Capital and Which are Risking/Wasting Capital?
3. The Gap Between What is Really Happening vs. What is Being Reported

What's Missing In Accounting?

Tail risk “disappears” when not shown in accounting (Must Often be Probable)

Accounting lags (and may always lag) in being able to measure tail risk

Accounting Focus is on Past Results

Risk is About the Future

Accounting Focus is to “Follow the Money/Cash” via Debits & Credits

History of EV Reporting at Allianz

First Calculated in 1999

2000

- EV guidelines developed at Group level
- Movement analysis

2001

- Reviewed by external consultants – Group published results

2003

- Cost of options and guarantees estimated but not published

2004

- Move towards EEV principles
- Values of options and guarantees published

2005

- Published and disclosed EEV results

2006

- Published and disclosed Market Consistent Basis

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Topics covered

Purpose & History of EC and MCEV at Allianz

Implementation Process

2008 MCEV Results

Looking ahead

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IT/Infrastructure

- Hardware/software
- Organizational structure
- Project management (governance) structure

6

Implementation Challenges

Required Stochastic Processing

- Most Lines already there

Requires Risk Neutral Scenario Set

- Modified Internal “Log-normal” Generator
- Hedging Group Generators
- Scenarios Provided by Parent – “Outside Vendor”

If Already using Stochastic Pricing, to be added –

- Fairly simple add on to existing modeling
- Use Statutory earnings
- No need to model hedging – frictional cost main consideration
- Capital cost is also frictional – tax and investment expense
- Result = average of PV of DE’s

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Assumption and Methodology Implementation Considerations

Market Environment to Utilize

- Current, “Near-term” or “Long-term”
- Swap rates
- Market volatility
- Fund parameters
- Credit spreads

Dynamic Policyholder behavior

- Same as Real World or Adjusted
- Parameters to use

Areas of Discussion

- Liquidity Premiums
- Mean Reversion
- Sub-optimal behaviors

Thoughts on Implementation

Get the right people on board in early on

Company needs to dedicate resources

Plan on spending time educating others

Have stable and efficient actuarial projection platform (This means solid use of disciplined process for managing internal models)

Internal model is the fundamental mechanism through which the ERM process can be managed to create value for the firm.

Done right, it sets transparency and accountability for the management of the company's risks.

Topics covered

Purpose & History of EC and MCEV at Allianz
 Implementation
2008 MCEV Results
 Looking ahead

2008 Value of New Business

Development of Value of New Business (VNB) in Euros

	VNB	NBM	PV Prem
Adjusted 2008 Opening Value	98	1.4%	6,781
Change in Volume	-5	0.0%	-358
Change in business mix	-35	-0.5%	0
Change in assumptions	-422	-6.4%	172
Value of business as of 12/31/08	-364	-5.5%	6,595

Source: Allianz European Embedded Value Report

Value of New Business & New Business Margin

	VNB	NBM
1 Q 2008	18	1.4%
2 Q 2008	14	1.0%
1 Q 2009	-133	-6.6%
2 Q 2009	-10	-0.6%

Source: Allianz Group Financial Results (Q1, Q2 2009)

2008 Market Consistent Embedded Value

Analysis of Earnings of Embedded Value (MCEV) in Euros

	FS	RC	ViF	MCEV
Adjusted 2008 Opening Value	504	1,316	1,231	3,051
Value of New Business	-35	0	-329	-364
Expected contribution	209	5	243	457
Transfer from ViF/RC to FS	-327	225	102	0
Other Changes	-134	41	-481	-575
Economic variances	-1,189	844	-5,936	-6,087
Closing Adjustments	200	0	0	200
Closing MCEV at 12/31/08	-773	2,160	-4,705	-3,318

Source: Allianz European Embedded Value Report

Looking at Product Pricing

Annuities have primarily two risk categories:

- Insurance risks (mortality, persistency, utilization)
- Investment risks (hedging, credit spreads)

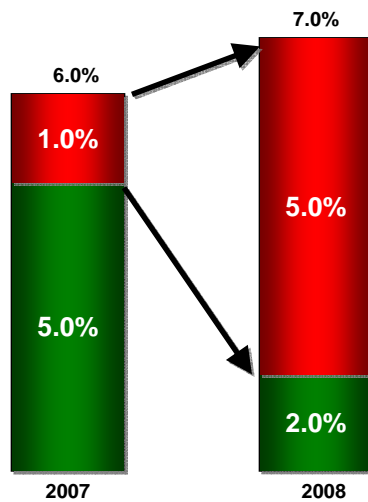
- Traditional profit measures of IRR and Profit Margin adequately measure expected insurance risk and sensitivities, but do not reflect extreme movements of investment risks
- Market Consistent Embedded Value (MCEV)
 - Measures the full extreme investment risk in products

Provides greater transparency and consistency in comparing companies

- MCEV sets out a level playing field

Bond Markets

Bonds are made of risk free component plus risk premium
 All assets (when adjusted for risk) = Risk Free

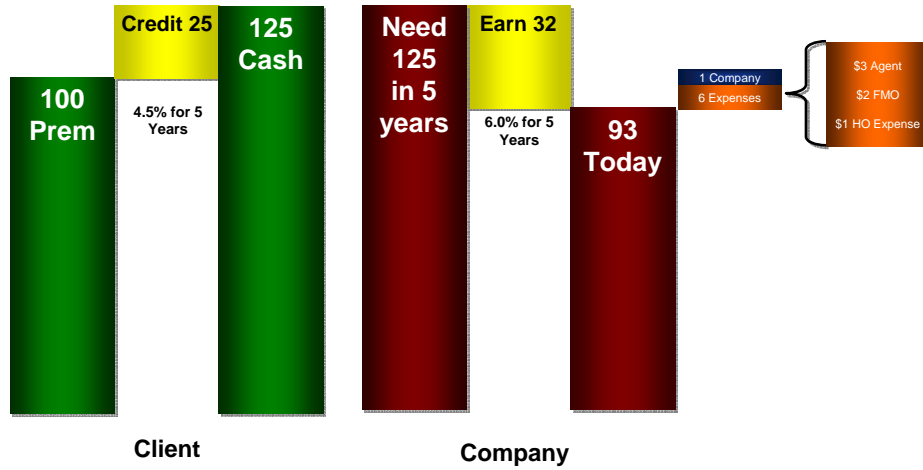


In 2nd half 2008 bond yields increased, but the risk free component fell

This means the riskiness of this asset increased **significantly**.

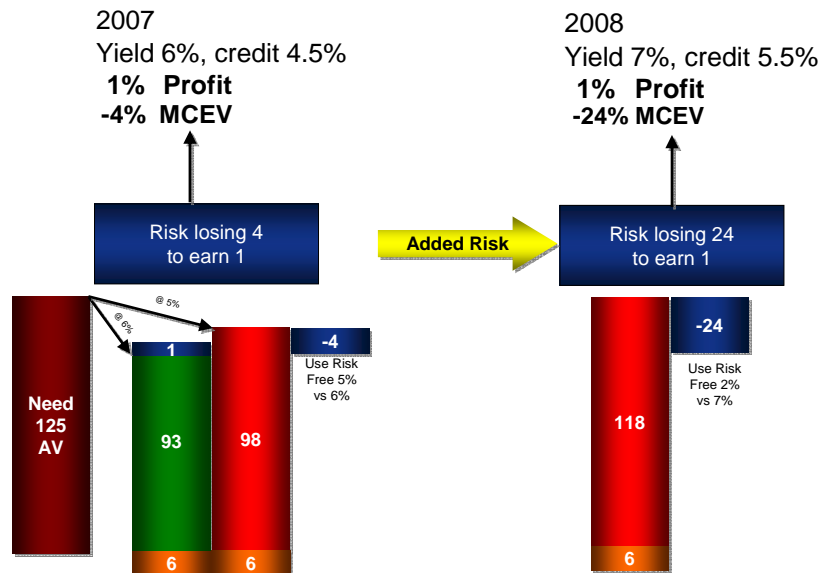
Yet some competitors reflected a full 1% rate increase.

Pricing a 5-year Multi-year Guaranteed Annuity



Same 5-year product: MCEV

Use Risk Free Rate to discount, not Risky Rate



Topics covered

History of EC and MCEV at Allianz
Implementation
2008 MCEV Results
Looking ahead

Looking ahead – MCEV Pricing

Why add this measure?

- Our Parent Reports on MCEV
 - Always will be the first Question – What is the MCEV?
- Complements a Real World Approach
 - Add on to Stochastic Real World Pricing
- Less Biased Approach to Valuing Guarantees

Looking ahead – MCEV Reporting

Current state

- Quarterly VNB reporting (monthly for internal)
- Annual full MCEV reporting (quarterly for internal)
- Key measure in managing our business

Future state

- Increase efficiency and governance in process
- More time for analysis of results, including what ifs
- Integrate with Solvency II
- Component of management/ measurement routinely completed

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Concluding Thoughts

Using MCEV beyond reporting has its Challenges but ...

The Benefits make it worth it -

- Help us answer the question, How I am Making (and Risking) our shareholder Money?
- MCEV is a Valuable Complement to Real World Pricing Especially for Products with Complex Guarantees
- Allows for Greater consistency in Valuing Risk across Products

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Contact

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Market Consistent Embedded Value: Use in Pricing and Hedging VAGLBs

Two Case Studies

Stephen Stone
September 24, 2009

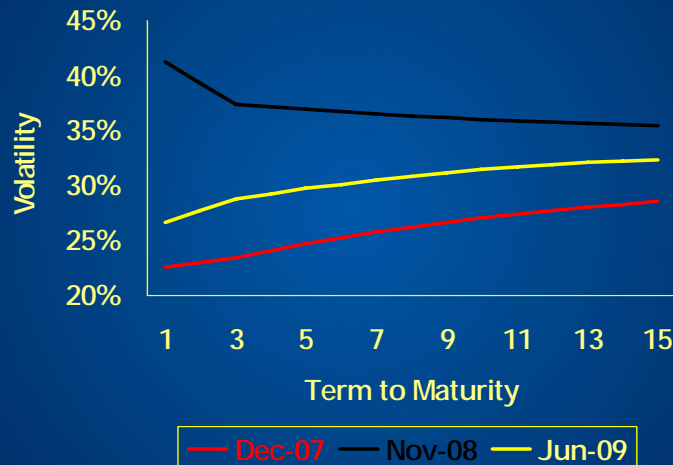
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the retirement specialist

Case 1: Volatility Modeling impact on product design and hedging strategy

- Wide variety of practice in volatility assumption
 - Market calibrated
 - Long-term constant volatility
 - Econometric
 - Hybrid
- FAS 157-3 and FAS 157-4 permit not using market calibrated due to market conditions
- Longer-term deviation from market calibrated requires subtle interpretations of literature
- Market calibrated resulted in significant vega losses in Q3 and Q4 2008

SunAmerica
the retirement specialist

Case 1: Term Structure of Implied Volatility S&P 500 Index Options



SunAmerica
the retirement specialist

Case 1: Volatility Modeling impact on product design and hedging strategy

- 2008 vega losses motivate lower risk product and more effective hedging strategy
- By indexing the VAGLB Rider Fee to the VIX a product with zero vega can be achieved
 - $\text{Fee} = \text{Base Fee} + \text{Multiplier} \times (\text{VIX} - \text{Base VIX})$
 - Example, $\text{Fee} = 100 + 5 \times (\text{VIX} - 20)$
- Fee adjusts consistent with short dated option prices
 - Option Premium is the cost of carry plus "expected present value" of the cost of delta rebalancing (gamma hedging)
 - Vega measures impact of volatility on the cost of gamma hedging
 - VIX Indexed rider fee matches cost of gamma hedging period-by-period over the life of the hedging program (approximately)
 - Combination of the previous three points result in the fees' vega being equal and offsetting to the claims' vega, resulting in a zero vega rider
- Market calibrated model motivates:
 - Low risk product design
 - Product with a natural hedging strategy (purchase short-dated gamma hedges)

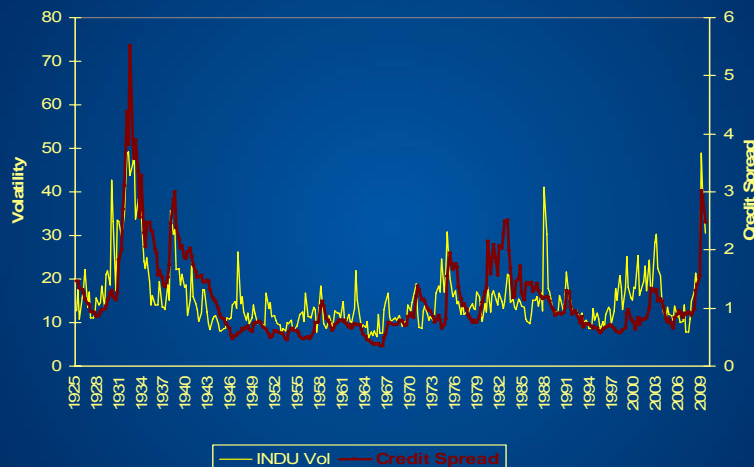
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Case 2: Credit Spread offset to Vega

- Stages of a VAGLB hedging program's funds usage:
 - In early years, hold cash
 - In later years start buying credit product
 - Once a claim is incurred 100% in credit product
 - Same investment proxy as a SPIA's
- In early years program is "short" credit product
 - Hedge with credit derivatives, or ...
- Between 10%-30% of Vega can be offset by credit exposure
 - Need to include credit spread in valuation

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Case 2: Volatility of the Dow Jones Industrial Average and Corporate Bond Credit Spreads (AAA – BBB)



Correlation = 0.73

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Case 2: VIX versus A Industrial Credit Spread



Correlation = 0.91

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