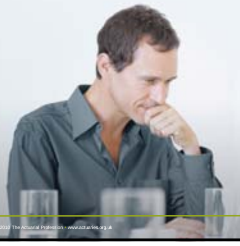
The Actuarial Profession
making financial sense of the future

CILA
Gary Finkelstein



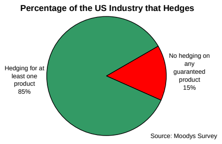
Advances in Risk Management and Product Innovation

11 May 2010

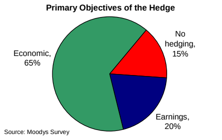
Goal of Risk Management

- Appropriate Charges
  - Product transparency & attractiveness
  - Finance the hedging program
  - Risk management is an integral part of product design
- Reduce P&L Volatility
- Reduce Capital at Risk
  - Consider full or partial hedge, based on preferences
- Moody's give ratings credits to those that hedge and negative credits to those that don't

Percentage of the US Industry that Hedges



Primary Objectives of the Hedge



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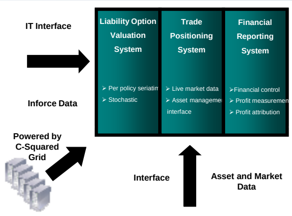
Advances in Risk Management / Manufacturing

- **Regular Valuations**
  - Of liabilities and Greeks
  - Asset valuation checks
- **Risk Rebalancing and**
- **Trading Decisions**
  - Email/ Pager Alerts
  - Validations
  - Execution of Trades
- **Financial Control**
  - Financial reports
  - Risk reports
  - Performance attribution
  - Experience modelling
- **Frequency of activities**



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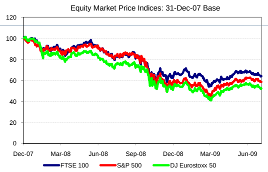
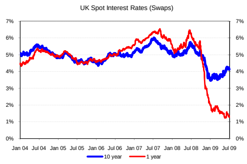
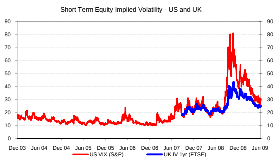
Global Financial Crisis

- Global decline in equity markets
- Reduction in interest rates
- Increase in equity volatility
- Credit risk failures: Lehman Brothers, Merrill Lynch, Bear Sterns

→ **The Perfect Stress Test**







Hedging Performance in Turbulent Markets

Moodys Report

"Variable Annuity Writers' Hedging Programs Tested by Market Turmoil"

August 2008

- "The heightened volatility experienced in the market during the period (Q307 – Q208) has caused increased liability requirements for guarantees embedded in insurer's variable annuity ("VA") products … Largely offsetting these liability increases have been gains recorded on hedging programs utilized by insurers to reduce the risk of VA guarantees. In most cases, the hedges have been quite effective in offsetting the increased liability requirements."
- "Companies have reported that liability increases for embedded guarantees have been significant; however, these have been largely offset by associated hedging gains. Although it is difficult to predict how well such hedging programs will react in more severely disruptive markets, should they occur, the fact that these hedges have performed well to this point is encouraging."

S&P Report

"Variable Annuity Equity-Based Guarantees Are Weighing On North American Life Insurers' Financial Strength"… but…

"Dynamic Hedging of Living Benefits is Proving its Worth"

Jan 2009

- "We regularly review the quality of insurers' hedging programs as part of our ERM evaluation process. We consider hedging of VA products to be a major risk control program for insurers"
- "Without these programs or tremendously redundant capital, insurers would have substantially weaker financial strength than they do today"
- "Hedge effectiveness, measured by how much the hedge asset increases in value compared with the increase in the liability, typically exceeds 90%-95%."
- "Hedge effectiveness of some programs declined to 75%-80%. We generally expect companies to maintain hedge effectiveness at these levels or higher to protect VA balance sheets from severe deterioration, which is consistent with strong ratings"

Hedge Effectiveness Reports

May 2008

Survey of major US VA writers

88% of respondents experiencing gains or unanticipated losses of less than 10 basis points of account value."

Nov 2008

Survey of major US VA writer hedge programs over the Sep-Oct 08 period

US VA hedge programs have been 93% effective in achieving their goals

Saved the US VA insurance industry $40 Billion due to hedge gains

May 2009

European VA hedge programs over the Sep-08 to Dec-08 period

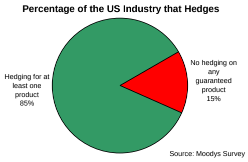
Have been 94% effective in achieving their goals

We expect use of hedging to increase

The Disconnect – Heterogeneous Results

- Not everybody hedged everything
  - some international blocks not hedged
  - some legacy blocks not hedged
  - some market risks not hedged, even partially
  - some risk parameters too liberal

    (acceptable fund tracking error thresholds, risk rebalancing thresholds, overnight/ overseas gap risk)
  - → Hedge effectiveness varied between 70 – 100%
- Some companies priced too aggressively and were slow in responding to new conditions
- Losses also incurred on non-VA guarantee segments
- Fixed annuities and exposure to bonds
- DAC write-downs



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Impact & Advances in Risk Management

- Hedges have performed as expected, and those with effective hedge programs and robust communication remain in the game
  - Futures and swap markets with strong collateralisation processes have held up well and functioned properly
  - Begin hedging unhedged business . → More blocks
  - Expand risk coverage (Greeks and fee revenue)
  - Tighter risk rebalancing thresholds
  - Shift to 24 hour trading
- Hedge costs have increased, mostly due to falling rates/ higher vols

  → Re-Pricing and product innovation continue

  → Product innovations to control risk and maintain attractive hedge costs
  - Passive funds, volatility managed funds, hedging within the fund
  - Level of benefits / equity content, ratchet caps, deductibles
  - Participation in performance of hedge assets
- Re-evaluation of merits of reinsurance, static and dynamic hedging
  - Market vs credit risk
  - Liquidity and accuracy of replication
  - Supplement macro hedges with dynamic overlays

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Company Responses in 2009/ 10

- Begin hedging previously un-hedged business
- Focus hedging on statutory capital protection rather than GAAP income stability
- Some companies had concerns about starting to hedge at market bottom
  - Glide-path approach (dollar-cost averaging)
  - Deductible approach
- Tactically introduce/ release some volatility and interest rate hedges
- Avoid over-reliance OTC long-dated options market. Explore alternative approaches to OTC dealer quotes for marking volatility for financial reporting
- Exercising options to adjust charges on in-force guarantees/ re-allocate assets

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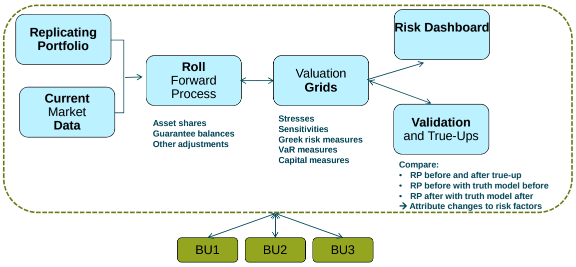
The Solvency-2 Use Test



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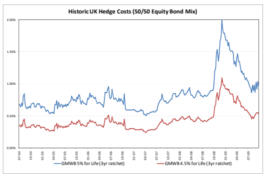
Impact on Guarantee Products

- Polarisation of the industry
  - A few have exited, but those with robust risk management and who are experiencing the benefit of sales growth are committed to the product class and developing their manufacturing capability
- Repricing and redesign of guarantee benefit levels
  - New launches continuing
  - Hedge costs increasing
  - Some product suspensions
  - Reductions in equity content
  - Move towards passive funds
  - Product innovation continuing



- Large losses on unhedged inforce business
  - Call on capital
  - Solvency concerns
- Demand increasing, product proposition strong as ever
  - UK volumes exceeded £1.1 Bn in 2008, up 100% from 2007
  - With-profit bond sales up 77% in 2008 from 2007
  - Sales of retail structured products hit a record £9.7Bn in 2008, up 25% from 2007
  - German volumes by policy count even larger
- Focus now on credit worthiness of the provider as well as guarantee benefit and price

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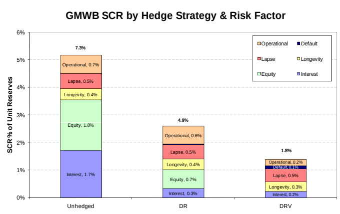
Solvency II Solvency Capital Requirement



Source: Variable Annuities by Ledlie et al (2008)

Indicative results for a GMWB for life product
Standard formula excludes risk factors such as volatility & basis
(Volatility risk stress shown on second scale.)
SCR is over & above best estimate / MV liabilities + risk margins

	Immediate Stress (capital strain/AV)	Cash Flow Projection (PVFP/AV)
Unhedged	5.8 %	12.9 %
DR Hedge	2.9 %	2.5 %
DRV Hedge	0.0%	2.0%

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Impact on Product Innovation

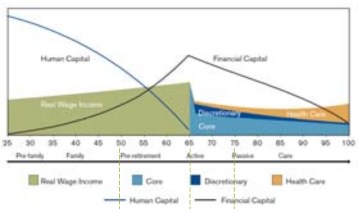
- Customer and Advisor perceptions
  - Demand for guarantees has increased
    - Reflected in growth volumes
  - Guarantees valued more highly
    - Willingness to pay higher price
    - Still is price sensitivity
  - GMxB propositions now better understood by advisors
    - Memory of 2008 will be with us for a while
- Greater focus on credit risk of provider
  - Market Shares Changing
- Benefit and fund restrictions
- Repricing / product innovation
- Sharing of risk → more sustainable business models
  - Volatility managed funds (target vol)
  - Hedge assets in policyholder account

Product proposition is very strong as long as the price / benefit is perceived to be attractive in the eyes of the customer and advisor

Customer Needs – Financial Lifecycle

Personal financial risks manifest themselves as a function of human capital, financial capital (wealth) and income.

Transition between human and financial capital at ages 50-65 give rise to more complex risk management needs

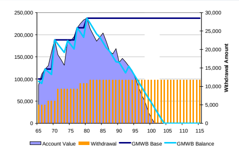


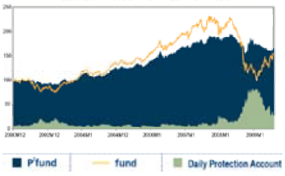
Mortality **Market** **Longevity**

Morbidity **Interest Rates** **Inflation**

Employment **Counterparty**

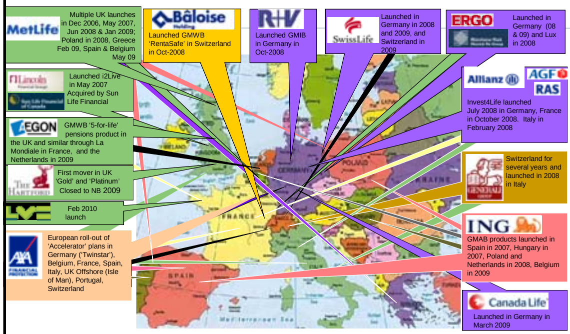
Alternative Guarantee – Product Designs





- VA
  - Clearly definable gtee benefits
  - Transparent known costs
- WP
  - Additional levers of risk management provide greater flexibility to innovate
- Protection Strategy
  - Hedge assets in p/h funds
  - Degree of risk sharing
  - Liquidity: hedge surrender value
  - Sustainable
  - Actual hedge cost borne by p/h

VA Launches in Europe (Apr 2010)



There is significantly more non-public activity

European VA Product Launches

- New product launches continuing apace
- Table includes all historic VA product launches
- Re-launches due to repricing and/or redesign

There is significantly more non-public activity

Company	Product	Type	Country	Date
Generali	Generali Rente Fonds safe	AB	Germany	Jan-10
MetLife	Trustee Invt Plan	AB / DB	UK	Mar-10
Liverpool Victoria	Flexibly Guaranteed Bond	GMAB	UK	Feb-10

Company	Product	Type	Country	Date
Hartford	Gold / SafetyNet	WB	UK	Feb-05
AXA	Twinstar	IB	Germany	Mar-06
AXA	Estate Planning Bond	WB / DB	UK	Jun-06
Aegon	5 for Life / Income for Life	WB / IB	UK	Sep-06
MetLife	Trustee Invt Plan	AB / DB	UK	Dec-06
ING	Generacion F Unico	AB / DB	Spain	Mar-07
AXA	Accumulator Future	AB / WB / DB	Spain	Mar-07
Lincoln	i2Live Retirement Plan	WB / IB	UK	May-07
MetLife	Guaranteed Investment Bond	AB / WB / DB	UK	May-07
AXA	Accumulator Capital Resources	WB	France	May-07
AXA	Accumulator	WB	Italy	May-07
AXA	Crest	AB	Belgium	May-07
ING	Euro Perspektiva	AB / DB	Hungary	Jun-07
Hartford	Platinum	WB / IB / DB	UK	Aug-07
Generali	Active Risparmio	AB / DB	Italy	Dec-07
ING	Euro Perspektiva	AB / DB	Poland	Jan-08
AXA	Twinstar Invest	AB	Switzerland	Jan-08
ERGO	Global Top Return	IB / AB	Germany	Feb-08
AXA	Accumulator	AB	Portugal	Apr-08
ING	RVS Guarantee Perspective	AB / DB	Netherlands	Mar-08
MetLife	Retirement Portfolio	WB / DB	UK	Jun-08
Allianz	Invest4Life	WB / DB	Germany	Jul-08
AXA	Accumulator Retirement	WB	France	Jul-08
R+V	PremiumGarantieRente	IB	Germany	Aug-08
MetLife	Orchidea	WB / DB	Poland	Sep-08
Swiss Life	Champion	IB	Germany	Oct-08
Baloise Life	RentaSafe	WB	Switzerland	Oct-08
Allianz	Invest4Life	WB / DB	France	Oct-08
AXA	Twinstar Income	WB	Switzerland	Nov-08
Swiss Life	Champion Duo	AB / DB	Switzerland	Nov-08
Aegon / La Mondiale	Terre d'Avenir	WB / DB	France	Jan-09
MetLife	Auvida	WB	Greece	Feb-09
Allianz	Invest4Life	WB / DB	Italy	Feb-09
ING	Lifelong Income	WB	Belgium	Feb-09
Canada Life	Garantie Investment Rente	WB	Germany	Mar-09
Swiss Life	Exclusive Invest DWS	AB / DB	Germany	Apr-09
MetLife	Auvida	WB / DB	Spain	May-09
MetLife	Citi VA	WB	Belgium	May-09
AXA	AXA pensiones privilege	AB / DB	Spain	Jun-09
ERGO	Vorsorge Invest Plus	AB	Germany	Jun-09
Generali	Active Risparmio (SP)	AB / DB	Italy	Nov-09
Aegon	AEGON Variabele Lijfrente	WB / DB	Netherlands	Dec-09

Source: Milliman

The Future

- Products with guarantees are here to stay
- Innovation will continue
- Risk management will be more robust and sophisticated
- Ability to manufacture will be a key core competency and source of competitive advantage

Thank You and Questions

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