

Pricing and Hedging Guarantees 1

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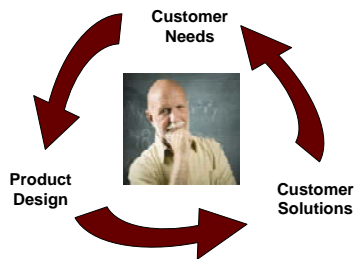
Agenda

In this session we will cover the following:

- Product – rationale / business case
- Product – pricing issues
- Market activity
- Risk management

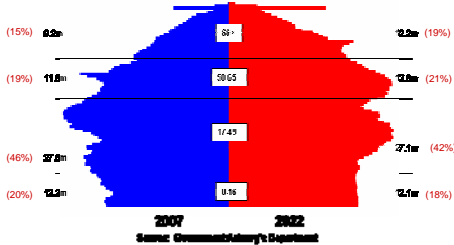
Proposition design

As an industry we should be designing our product and service propositions around genuine customer needs



Ageing population

There is a large and growing retirement market in the UK



This will create a significant market for income in retirement (both pension assets and non pension assets)

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Need: to supplement retirement income

Today's customers want financial solutions that can adapt to different market conditions and personal circumstances

✓ Want to benefit from  ✗ Whilst being protected financially against

Asset Growth	Poor returns
Income guarantees	Outliving assets
Flexibility / Access	Poor annuity rates
Tax efficiency	Dying too soon

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Need: to supplement retirement income

So how do traditional products stack up? : Investment Bonds

✓ Want to benefit from  ✗ Whilst being protected financially against

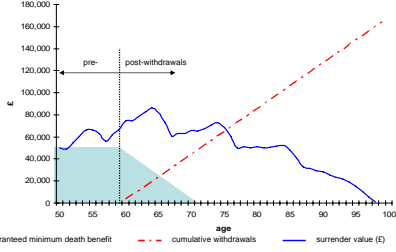
Asset Growth	Poor returns
Income guarantees	Outliving assets
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Tax efficiency	Dying too soon

1 in 3 (M60)
2 in 5 (F60)
chance of running out of money before death (taking 5% income)

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Death benefits

"5 for Life" gives a guaranteed minimum death benefit, giving a level of protection in the event of early death



Assumptions: Male aged 50 at entry, taking 5% withdrawals from age 60; 50% equity fund; actual market performance 1996-2005

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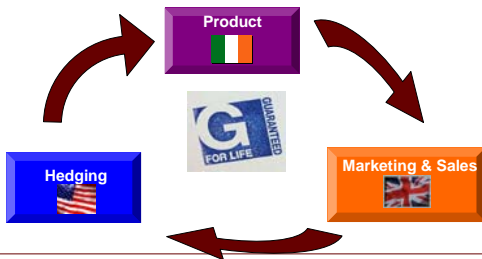
Personal taxation

- Lifetime GMWB taxed in the hands of a UK investor as a PLA
 - fixed capital content, as a percentage of initial investment
 - fixed by gender and age at starting g'teed income
 - 5% income is entirely tax free for life for male aged 62+ and female aged 66+
 - ad-hoc withdrawals by segment encashment
- Tax efficiencies over bond taxation

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"5 for Life" was a global development

Took advantage of favourable Irish tax treatment and GMXB risk management experience from the US variable annuities market



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“5 for Life” experience to date

- Customer profile closely matching pricing assumptions
- New concept
- Significant market education required
- Taking time to gain acceptance by IFAs ...
- .. but concept appeals to large salesforces of banks and direct operations



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Key uses of GMXB

- Lifetime GMWB
 - supplementing retirement income from non-pension assets (e.g. AEGON's '5 for Life')
 - 'third way' for pension retirement income between drawdown and annuities (e.g. Hartford 'Platinum')
- GMAB
 - minimum cash-in value at given future date
 - still exposed to annuity rates

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Key uses of GMXB (continued)

- GMIB
 - minimum guaranteed future annuity rate
 - possibly also including a minimum guaranteed roll-up to maturity date
- Hybrids
 - pick and mix combinations of GMXB guarantees with explicit charges

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Business case for GMXB

- offers differentiation in savings market (focus again on core competence – risk insurance)
- serves a real customer need
- profitable business
- fresh and innovative
- leverage US experience



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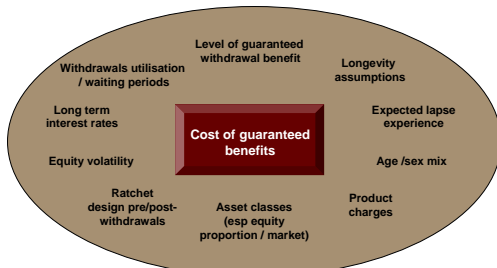
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Factors affecting cost of guarantees



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Asset classes

Key issue: volatility & hedgeability of assets

- The greater the proportion of equities held, the more expensive is the minimum income guarantee.
- The **closer** the fund composition is to readily hedgeable assets, the **greater** the efficiency of the hedge and the **lower** the required cushion in guarantee charge.
 - carefully control exposure to regional / sector equities, emerging markets and property
 - benefit from using main equity indices with large and liquid futures trading

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Pricing decisions

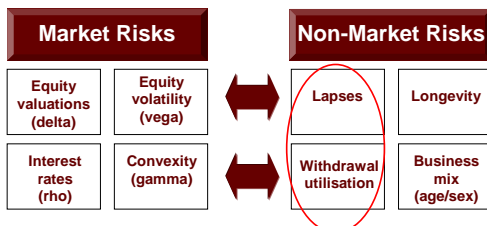
Varying guarantee charges by asset mix

- In theory guarantee charges should vary in line with fund asset allocation
 - but extra complexity for investor
 - charge simplicity vs tighter risk management?
- Practical application is mixed but most providers do vary guarantee charge by asset mix

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Guarantee risks

The nature of the guarantees leads to a variety of different risks with a complex interaction between them



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Policyholder behaviour

- Withdrawal utilisation
 - some policyholder choose to defer guaranteed income
 - others take maximum income at earliest opportunity
 - helps pricing if a greater number defer income
- Lapses
 - possibility of policyholder lapse if 'out of the money'
 - pricing is very sensitive to the assumed lapse rate

Behavioural risks and pricing

- risk management (hedging) strategy for **market** risks
 - static hedge will not work – has to be dynamic
 - 2/3rds of risks covered by delta and rho
 - cost / benefit of hedging vega (expensive instruments)
- **but** can't hedge policyholder **behavioural** risk
 - lapse rate, withdrawals utilisation, self-selection

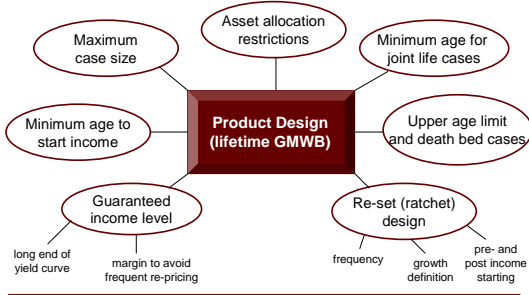


Build suitable prudence into pricing assumptions, and suitable demographic variables into delta and rho calculations and monitor ...

Pricing influencers

- Very sensitive to changes in economic conditions:
 - falls in long-term interest rates
 - equity volatility
- and
 - lapse assumption
 - longevity
 - age distribution
 - policy charges
 - definition and frequency of re-sets (ratchets)

Risk control through product design



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Risk control through investment design

- target asset allocations with regular / frequent rebalancing
- risk-graded, managed portfolios with suitable charges
- major equity markets allowing close delta hedge
- higher charge for higher equity exposure
- limiting investments where no close hedge possible (e.g. property, regional equity)

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Recent Product Launches Multinationals have been busy!

Company	Product	Type	Sold In	Underwritten From	Hedged In	Launch Date
Hartford	SalaryNet	GMWB	UK	Ireland	US	February 2005
AXA	Twinstar	GMB	Germany	Ireland	US and Paris	March 2006
AXA	HALF time	GMB / WB / AB (USD, GMB, B (Yen))	Japan	Japan	US and Paris	From March 2006, HALF Time February 2007
AXA	Estate Planning Bond	GMWB, GMB	UK	Isle of Man	Paris	June 2006
AG / Living Time	Living Time 75	GMWB / AB / OB	UK	UK	N/A	June 2006
AEGON Scottish Equitable	5 for Life	GMWB	UK	Ireland	US	September 2006
Manulife	IncomePlus	GMWB	Canada	Canada	US / Canada	October 2006
MetLife	Trustee Investment Plan	GMWB / AB	UK	UK	US	December 2006
Manulife	Step Life	GMWB	Japan	Reins to US / Canada	Confidential	December 2006
Manulife	IncomePlus	GMWB	Hong Kong	Japan	Confidential	February 2007
Hartford	Platinum	GMWB / B hybrid with DB	UK	Ireland	US	February 2007
ING	Generacion F Unico	GMB, GMB	Spain	Confidential	Confidential	March 2007
AXA	Accumulator Future, Selection	GMB, GMWB, GMB	Spain	Ireland	Paris	March 2007
AXA		GMWB	France	France	Paris	May 2007
AXA		GMWB	Belgium		Paris	2007 expected
Lincoln	SLive Retirement Plan	GMWB / B Hybrid	UK	UK	US	May 2007
ING	Europaspektiv	GMB / OB	Hungary	Hungary	Confidential	June 2007

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UK

Portfolio International Awards

- AXA's Estate Planning Bond
 - Best Inheritance Tax (IHT) Product December 2006
 - Also Ranked 1st for Estate Planning Packaged Products by Defaqto May 2006
- AEGON's Five for Life
 - Best Life Assurance Product December 2006
- Hartford:
 - Gold
 - Platinum
- Lincoln: i2Live
 - Accumulator
 - Drawdown
 - Annuity
- MET Life: Trustee Investment Plan (Secure Retirement Option)
- Other related:
 - Scottish Life: Protected Profits/ Riley -- EIA

There is more activity, but not yet in the public domain

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Europe

AXA Germany Twinstar

<http://www.axa.de/servlet/PB/menu/1095126/index.html>

ING Spain: Generacion F Unico

http://212.101.74.54/que_es.html



ING starts European Variable Annuity rollout in Spain

ING announced today the launch of its Variable Annuity (VA) product in Spain. This launch is the start of a broader European rollout, which will see the VA product available in Ireland in the second half of 2007, followed by France, Germany, Italy, the Netherlands, Portugal, Switzerland and the United Kingdom in the first half of 2008. The rollout will be subject to regulatory approval and the management team that will initially operate will have full access to the ING Group's best practices and expertise.

There is considerably more activity, but not in the public domain

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- LEHMAN BROTHERS Feb-07
- European Insurance Team
- AXA: 1-Overweight
- Target Price: EUR 36
- Investment summary
- AXA posted strong Q4 APE sales helped by some potentially more volatile group contract wins in France but also highlighting the resilience of the underlying performance in its key territories in the US, France, UK and Japan.
- AXA management was also particularly strong with revenues growing by 26% as well as the Q4 results owing to Alliance.
- One point of particular note is that the new German Twinstar product (variable annuity look-alike) continues to test well contributing 12.5% of German APE and probably more like a third of new business profits; this augurs well for the roll-out of similar products in the rest of Europe.
- We remain 1-Overweight.
- Analysis
- Life
- APE grew by 14% for the full year with 3% growth in Q4 which may seem low but which represents a very strong performance given that Q4 last year was boosted by some one-off sales.
- French sales were particularly strong in Q4 (up 47% q-o-q) boosted by some multiple wins in policy non-renewed single premium contracts.
- UK sales remained strong (up 29% q-o-q) as unit-linked investment bond sales took off in Q4.
- 12% variable annuity sales were robust rising we believe by 7% in dollar for the full year and by 14% in Q4. We estimate that AXA probably remained at its number 3 position in the VA market.
- In Japan, sales were helped by renewed focus on the medical product. The Yen denominated variable annuity look-alike product was been launched this quarter and will impact sales this year.
- In Germany, the Twinstar product (variable annuity look-alike) contributed 12.5% of German APE and probably more like a third of new business value; we estimate (new business value will be disclosed on Feb. 20).

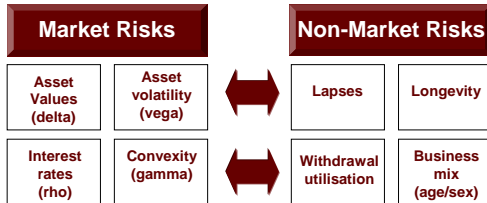
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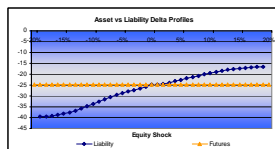
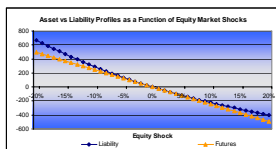
Guarantee risks

The nature of the guarantees leads to a variety of different risks with a complex interaction between them



Delta

- Delta measures the impact of a small immediate change in the value of the underlying asset



Instruments Used

Instrument	Delta	Rho	Vega
Equity Index Futures	✓		
Currency Forwards	✓		
Inflation & Credit Swaps	✓	✓	
Bond Futures	✓	✓	
Interest Rate Swaps		✓	
Interest Rate Swaptions			✓
Variance Swaps			✓
Equity Options (ET & OTC)	✓	✓	✓

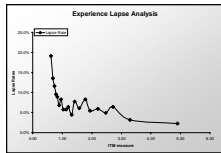
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Non-Market Risks

Non-Market Risks



- Generally no available instruments, but effective mitigation techniques can be achieved
- Lapses: Policyholders act dynamically, therefore need to be able to respond dynamically → Dynamic hedge more effective than static hedges. Need to be careful with assumption basis and pro-active in monitoring and gathering experience.
- Mortality: Margins in pricing basis important → Traditional actuarial techniques apply. Reinsurance IS possible.
- Other: As for traditional business. Diversification is beneficial.



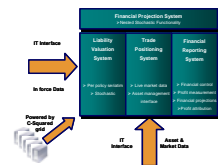
Source: Milliman Experience Study

- Reliable performance monitoring, financial reporting and responsive control is essential.

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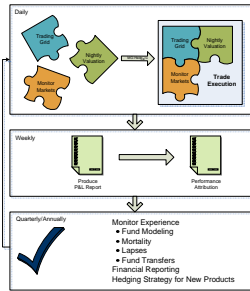
Practical Implementation I

- Components
 - Grid technology
 - Live interfaces
 - Liability option valuation
 - Trade positioning
 - Risk alerts and monitoring
 - Performance measurement
 - Financial Control
- Steps
 - Hedge design and testing
 - Infrastructure setup
 - On-going maintenance



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Practical Implementation II



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Questions?

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