



Variable and Fixed Indexed Annuity Market Guarantees – Introduction to Hedging Concepts and Basis Risk

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INTRODUCTION

Variable Annuity and Fixed Indexed Annuity Topics Covered

- Overall goal is to provide an introduction to Variable Annuities (VA) and Fixed Indexed Annuities (FIA) capital market guarantees, hedging concepts and associated risks
- VA guarantees
 - Market overview and description of a typical VA product
 - Description of VA risks and link with hedging
 - Hedging illustration and hedging considerations
 - Basis risk
- FIA guarantees
 - Market overview and description of typical FIA products
 - Description of FIA financial risks
 - Dynamic versus static hedging
 - Determination of hedging notional

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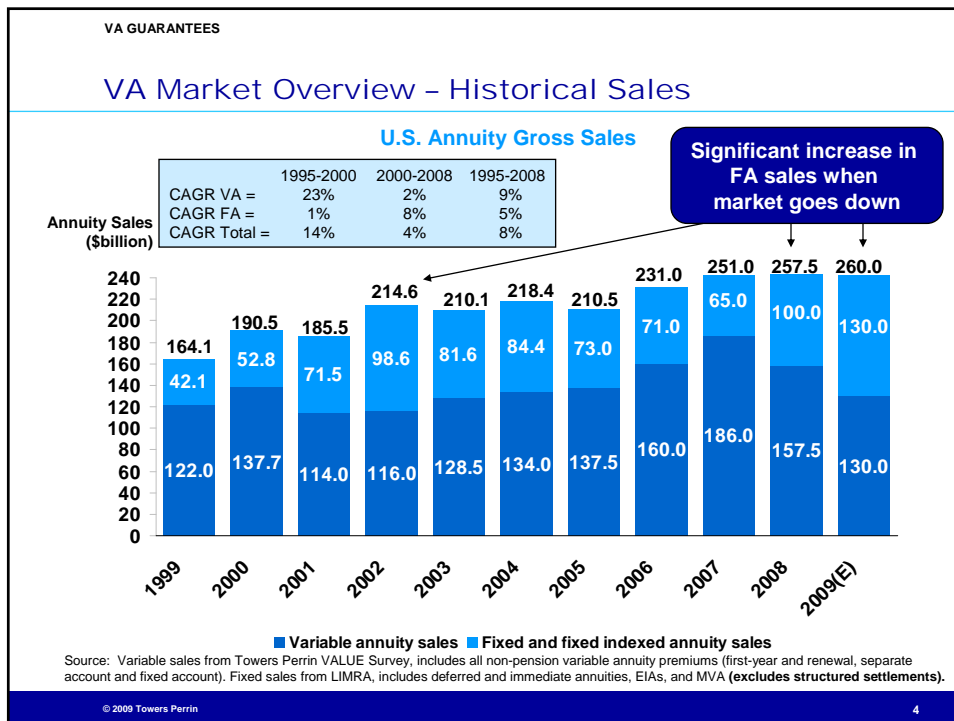
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INTRODUCTION

Overview of VA and FIA Markets

- VA market
 - Assets under management of \$1.2 trillion as of June 30, 2009
 - Gross sales year to date of \$63.2 billion as of June 30, 2009
 - VA sales more than 60% of annuity sales in 2008
 - Most VA sales are associated with Guaranteed Living Benefits (GLBs)
- FIA market
 - Gross sales year to date of \$15.3 billion as of June 30, 2009
 - Growing importance of GLBs
- Together, VA and FIA represent more than 60% of year to date annuity sales as of June 30, 2009
- Significant component of retirement assets in the U.S.
 - Accumulation phase
 - Distribution phase
- Both VA and FIA have strong capital market guarantees
 - VA: "equity with a put option"
 - FIA: "bond with a call option"

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VA Market Overview - Recent Sales and Leading Providers

Ranking		Company Name	Sales Volume (\$ billion)		Market Share (%)	
YTD 2009*	2008		YTD 2009*	2008	YTD 2009*	2008
1	4	MetLife	8.2	13.9	13.0	8.8
2	1	TIAA-CREF	7.1	14.5	11.2	9.2
3	6	Prudential Financial	5.5	10.2	8.7	6.5
4	3	AXA Financial/MONY	4.9	13.9	7.8	8.8
5	2	ING	4.1	14.2	6.5	9.0
6	7	John Hancock	3.8	9.5	6.0	6.0
7	12	Jackson National	3.8	6.5	6.0	4.1
8	5	Lincoln National	3.8	11.0	6.0	7.0
9	11	RiverSource Life	2.8	7.5	4.4	4.8
10	8	AIG/SunAmerica/American General	2.3	8.2	3.6	5.2
11	13	Nationwide Life	2.0	4.6	3.2	2.9
12	10	Pacific Life	1.8	7.8	2.8	5.0
13	15	Allianz Life	1.8	3.1	2.8	2.0
14	14	AEGON Companies	1.7	3.3	2.7	2.1
15	9	Hartford Life	1.4	7.9	2.2	5.0
		Total Top 15	55.0	136.0	87.0%	86.4%
		Market Total	63.2	157.5		

* Source: Towers Perrin's VALUE Survey (2009 data based on June 30)

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- ### Description of a Typical VA Product sold in 2009
- Most common design has a seven year surrender charge (B-Share)
 - Base product fees 125 to 175 bps
 - Base product often sold with a guaranteed minimum withdrawal benefit (GMWB)
 - Guarantees a certain amount of income for life (e.g., 5.0% of initial premium at issue age 70)
 - Product typically offers bonuses on the income benefit base to provide incentive to delay withdrawals
 - Rider fees typically from 90 to 150 bps
 - Lifetime income continues even if account value is depleted
 - Asset allocation restrictions (e.g., 70% maximum in equities)
 - Product often have a base guaranteed death benefit and an enhanced death benefit (15 to 35 bps cost for enhanced benefit)
 - Mutual fund fees of approximately 100 bps
 - A portion is returned to VA provider (revenue sharing)
 - Typical total fees for VA with GMWB of 300 to 400 bps
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Variable Annuity Risks and Link with Hedging

- Capital market risks (direct link)
 - Equity market risk
 - Interest rate risk
 - Credit risk
 - Liquidity risk
- Financial non-hedgeable risks (indirect link)
 - Basis risk
 - Model risk
- Policyholder behavior risk (indirectly link)
 - Lapse
 - Utilization
 - Rebalancing
 - Mortality
- Additional risk considerations related to hedging
 - Statutory solvency risk
 - Earnings volatility and tax risk

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Equity Market Risks

- Majority of VA separate account assets are invested in equities
- VA writer is exposed to a decrease in value of separate account assets (liability Delta).
 - Liability claims emerge when the account value is depleted
 - Exposure is similar to writing a long-term put option
- To offset this risk, there is a need to go short equities using an asset strategy (Delta hedging portfolio)
- Illustrative Delta hedging example on next slides

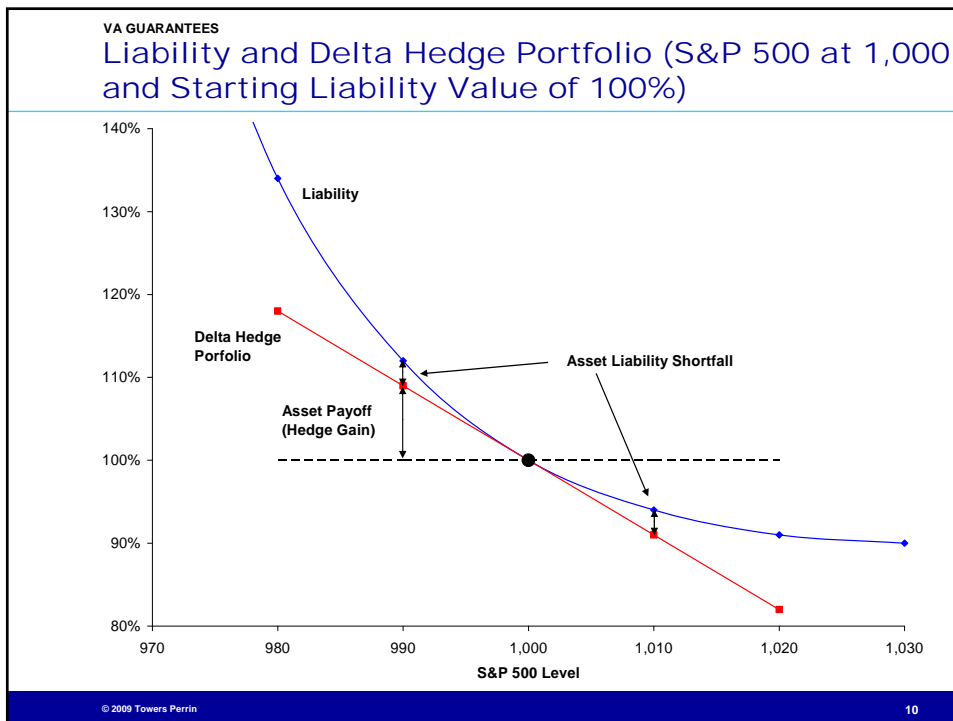
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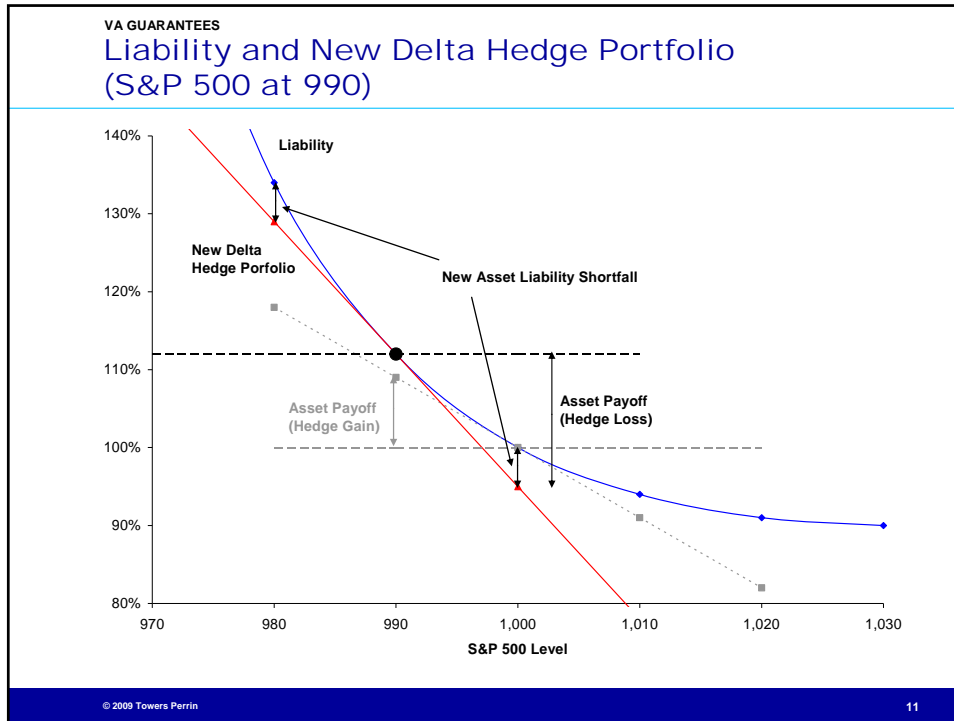
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Equity Market Risks - Illustrative Delta Hedging Example

- Starting S&P 500 at 1,000 points
- Set up Delta hedge portfolio (red line) to cover changes in liabilities (blue line)
- In first period, S&P 500 drops to 990 points
 - Delta hedging portfolio pays off (asset gain)
 - Hedge portfolio is rebalanced by increasing the short position
- Assume S&P 500 returns to 1,000 points, liabilities return to initial value but hedge loss in second period is superior to the prior hedge gain
 - Short position is larger in second period than in first period
 - Index movement is the same (10 points)
- Outcome: a loss is incurred on a cash basis

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- ### Equity Market Risk – Gamma and Vega Hedging
- Conclusion from example: Delta hedging strategy leaves residual exposure to realized volatility and Gamma losses
 - Gamma can be hedged by purchasing short-term asset options, but writer becomes exposed to an increase in price of those options
 - The main price driver for short-term asset options providing Gamma protection is implied volatility. Consequently, Gamma hedging reduces realized volatility exposure, but creates implied volatility (Vega) exposure.
 - To mitigate risk created by changes in implied volatility, can purchase ahead of time instruments providing Gamma coverage (or instruments that will provide a Vega offset)
 - Those instruments are typically long-term options, but other instruments like variance swaps can be used
 - As more and more market drivers (Greeks like Delta, Gamma and Vega) are hedged, risk is reduced (to the condition liability is defined correctly) and asset portfolio approaches state of “replicating portfolio”
 - Replicating portfolio is basis for risk-neutral or “market consistent” pricing of guarantees: price of liability equals cost of replicating portfolio
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Interest Rate Risk (Rho) – Interaction with Equity Risk and Relation to Credit Risk

- Derivative instruments utilized to hedge Delta, such as equity futures, “lock-in” a forward price for the underlying. This increases the cost of hedging a put option or a VAGLB liability (Rho exposure).
- Proceeds from the Delta hedge portfolio are invested as the market declines to provide for liability claims. Associated reinvestment risk is another source of Rho exposure.
- Risk-neutral pricing assumes a replicating portfolio where assets are invested at the risk free rate and borrowing is done at the risk free rate
- “Risk free” rate used is typically rolling 3 Month LIBOR (basis for swap curve)
 - Swap curve implies high rating; i.e., 3 Month rolling AA rating (with reset)
 - Swap curve is basis for market traded derivative instruments
- Swap curve movements may impact the price of separate account assets
- But, “swap rated bonds” are not typical general account assets

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Credit Risk – Implications

- Credit risk is correlated with equity market risk (credit spreads generally widen when equity market drops)
 - Capital structure argument
 - Flight to quality
- Credit risk impacts level of separate account funds, impacts guarantee price
- Credit risk may impact level of expected earned rate on general account asset
- Credit risk may also impact the actual cost of funds (cost of obtaining liquidity via true borrowing or selling existing assets)
- Hedging of credit risk is not typical, but risk is increasingly understood and monitored
- Credit risk is important for statutory solvency at company level

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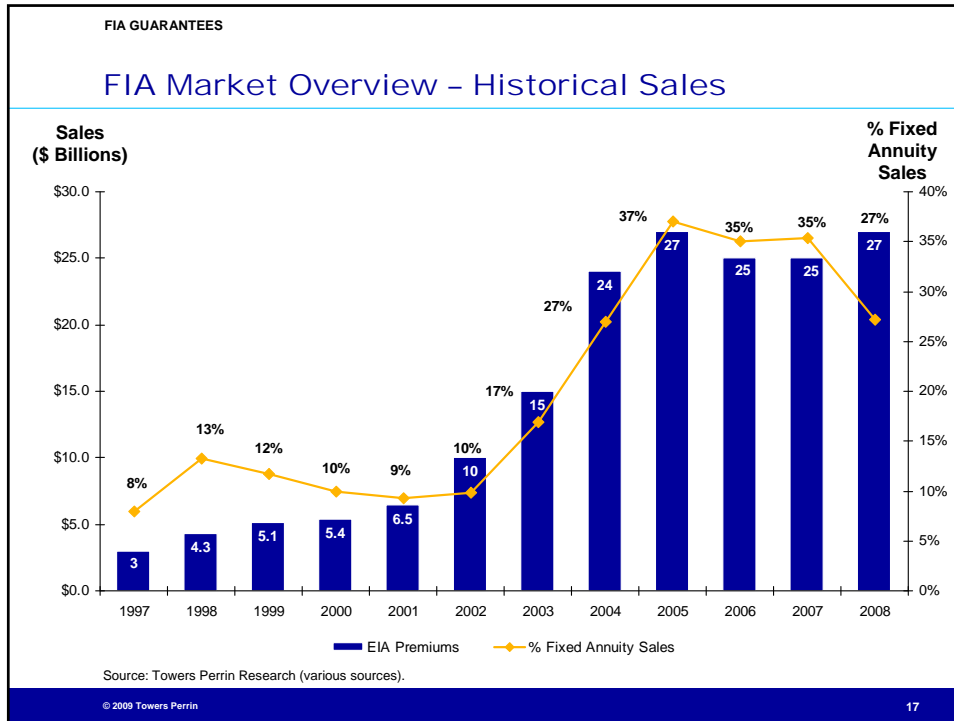
Hedging and Asset Strategy – Choices

- Product types covered by hedging
- Scope of coverage
 - Guarantee claims
 - Rider fees
 - Base product fees and revenue sharing
- Risk drivers (Greeks) covered
 - Delta
 - Rho
 - Gamma
 - Vega
 - Higher order Greeks and cross-Greeks
 - Separate account related credit risk
- General account asset strategy
 - Degree of credit risk
 - Asset duration and integration with Rho hedging

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Basis Risk

- Basis risk is increasingly considered with material impacts in 4Q 2008 for several companies
- Basis risk is created because of difference between actual underlying of liability versus assumed underlying driver of liability used in hedging
 - E.g., active manager with S&P 500 as benchmark vs. a blend of U.S. indices used for hedging
 - Systematic vs. non-systematic basis risk
- Mapping of separate account funds to hedgeable indices is a foundation for capital market pricing and hedging of the liability
 - May view as a model risk or basis risk
- Active management risk adds to volatility of underlying funds
- Asymmetry adds to guarantee costs relative to liability solely modeled using proxy funds
 - Value impact
 - Greek impact



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FIA Market Overview – Leading Providers

Top 5 Players

Company	2008 Sales (\$ Billions)	Change from 2007	Market Share (%)
AVIVA USA	\$7.1	+63%	26%
Allianz Life	\$4.2	-22%	16%
American Equity	\$2.2	+7%	8%
Midland National	\$1.6	-3%	6%
ING	\$1.4	+9%	5%
Top 5	\$16.5		62%
Market Estimate	\$26.7		100%

Source: Towers Perrin Research

- YTD 2Q 2009 sales totaled \$15.3 billion (+22%)

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Description of Typical FIA Products

- FIA market pre-2007
 - “Single-tier” products (surrender charges, bonuses) most common
 - “Two-tier” products (distinct annuitization value and cash value) ranked as top selling, but sales were concentrated in a few companies
 - Product story was centered around a particular crediting methodology, mostly using the S&P 500 as an index
- FIA market since 2007
 - Products offered with optional GMWB riders (in many ways similar to VA riders) replaced two-tier FIAs as top selling products
 - GMWB riders are offered by an increasing number of companies
 - Key GMWB features driving sales are initial bonuses on the income base and additional bonuses or “roll-ups”
 - Multiple indices and crediting methodologies are now common as part of FIA offering
 - Multi-year crediting methodologies gained some ground, but annual reset is still dominant
 - Higher single-tier bonuses, but with vesting schedule

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Description of Main FIA Financial Risks

- Asset risk
 - Credit
 - Prepayment
 - Liquidity
- Option cost risk
 - Varies by crediting methodology
 - Volatility levels
 - Volatility skews
- Policyholder behavior
 - Surrender risk
 - Utilization risk (GMWB)
 - Dynamic lapse risk (base product and GMWB)
 - Mortality risk
- Credited rate and cap setting (product risk mitigator)

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Dynamic versus Static Hedging

- Factors influencing companies
 - Size of in-force
 - Prevalent crediting methodologies
 - Perceived investment bank markup
 - Equity market risk appetite
 - Presence of GMWB
- Observed practices
 - Simplest exposures are mostly statically hedged (e.g., monthly average with annual reset)
 - More complex exposures are either dynamically hedged or statically hedged
 - Several FIA companies have been hedging dynamically at least a portion of their in-force for the last few years

Determination of the FIA Hedging Notional

- We have seen a wide range of practices for setting the hedging notional
- Hedge ratio = Hedge notional / Account value
- We have seen hedge ratios used ranging from under 65% to 100%, varying by product type and product duration
- Factors influencing companies in setting the hedge ratio
 - Product design
 - Single-tier vs. two-tier
 - GMWB vs. no GMWB
 - Product management strategy
 - Lapse expectations
 - Profitability metrics
 - Economic
 - Statutory
 - GAAP/IFRS
 - Risk appetite
- We expect sophistication to increase with regard to setting the notional

CONCLUSION

VA and FIA Market Guarantees – Conclusions

- Some similarities from a consumer and risk management perspective, but important differences
 - Fundamental concepts are similar, but the natural perspectives to approach the sale and risk management are different
 - Hedging concepts overlap, especially for VA and FIA GMWB riders
- FIAs are closer to the traditional business model of insurers, but are yet in many ways a niche market
 - Very few companies have significant presence in both markets
 - Uncertainty on regulation of FIAs
 - Concerns on distribution of FIAs
- The long-term outlook is positive for both markets
 - Demographics trends
 - VAs and FIAs respond to a growing need for income protection
 - Lack of alternatives offering a similar degree of flexibility

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