

Embedding Risk Management into VA (Life) Insurance Carrier

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September 5th, 2014

Allianz 

Agenda

1. Allianz Invest4Life – the Product Concept
2. Allianz Global Life Ltd. (Dublin) – the Central VA Risk Carrier of Allianz
3. Guarantee Generation and Risk Management



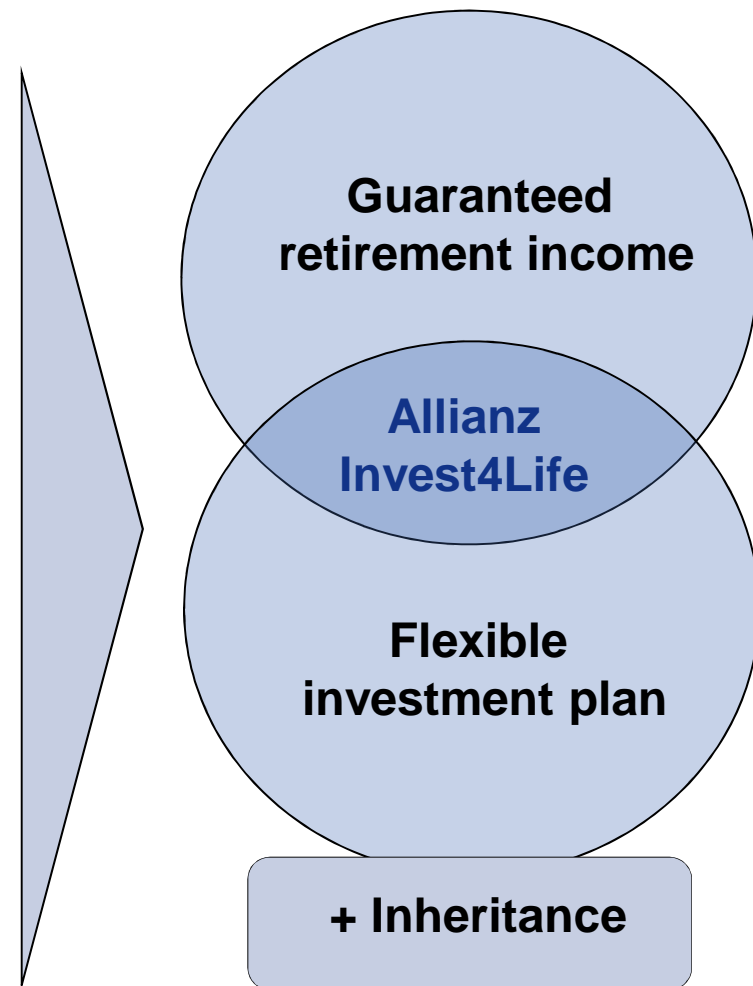
Allianz Invest4Life



Offering value to our customers in age segment 50+

Key facts

- 1** Unit linked product against single premium
- 2** Provides a lifelong guaranteed income in form of guaranteed minimum withdrawal benefits (GMWB)
- 3** Positive fund performance may increase initial guarantee income (ratchet)
- 4** The account value is available in case of death or surrender
- 5** Provides an investment in assets with high equity exposure
- 6** Optionally a guaranteed death benefit can be enclosed (GMDB)



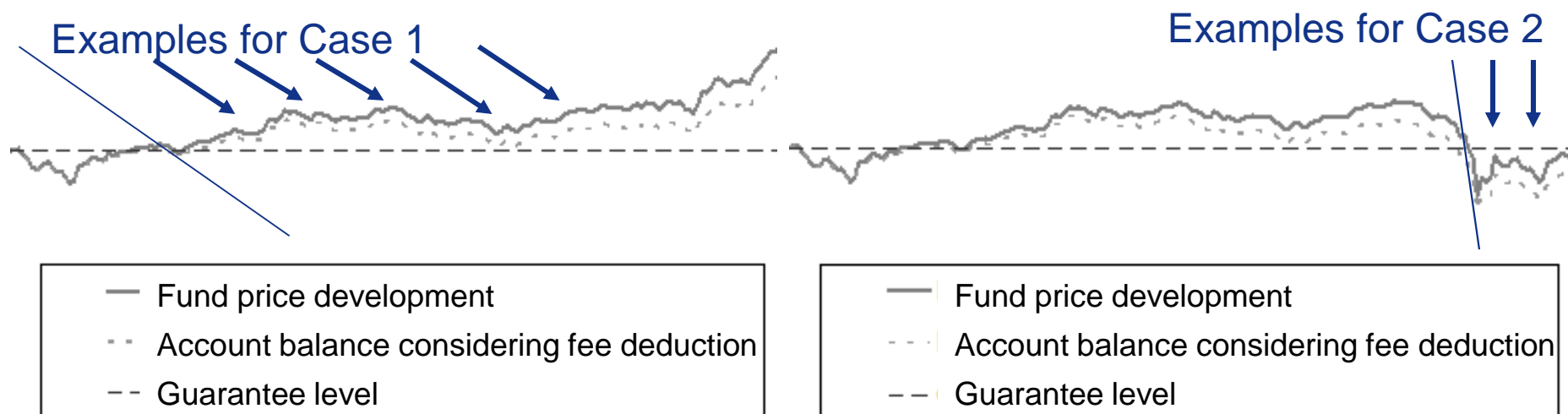
Generation of Guarantees (GMxB) for VA Products (1)

Underlying and Guarantee Concept

- § Investment in mutual fund(s) – unit-linked insurance product
- § Customers have access to the fund investment
- § Insurance carriers produce guarantees (GMxB) based on concepts from derivatives
- § Cost of guarantee financed by ongoing guarantee fee deduction during lifetime of policy

Guaranteed Minimum Death Benefit – GMDB

- § If the underlying unit-linked account balance is greater than guarantee level, account value is paid as death benefit (case 1)
- § Otherwise, death benefit equals guarantee level (case 2)



Generation of Guarantees (GMxB) for VA Products (2)

Guaranteed Minimum Accumulation Benefit – GMAB

- § Guarantee bites on maturity or for some products on specified anniversaries if policy is still in force
- § Benefit defined as minimum of account balance and guarantee level - similar to GMDB

Guaranteed Minimum Income Benefit – GMIB

- § Products guarantees a minimum income stream in form of a (traditional) annuity after accumulation phase
- § Customer loses access to unit-linked fund value after annuitization

Guaranteed Minimum Withdrawal Benefit – GMWB

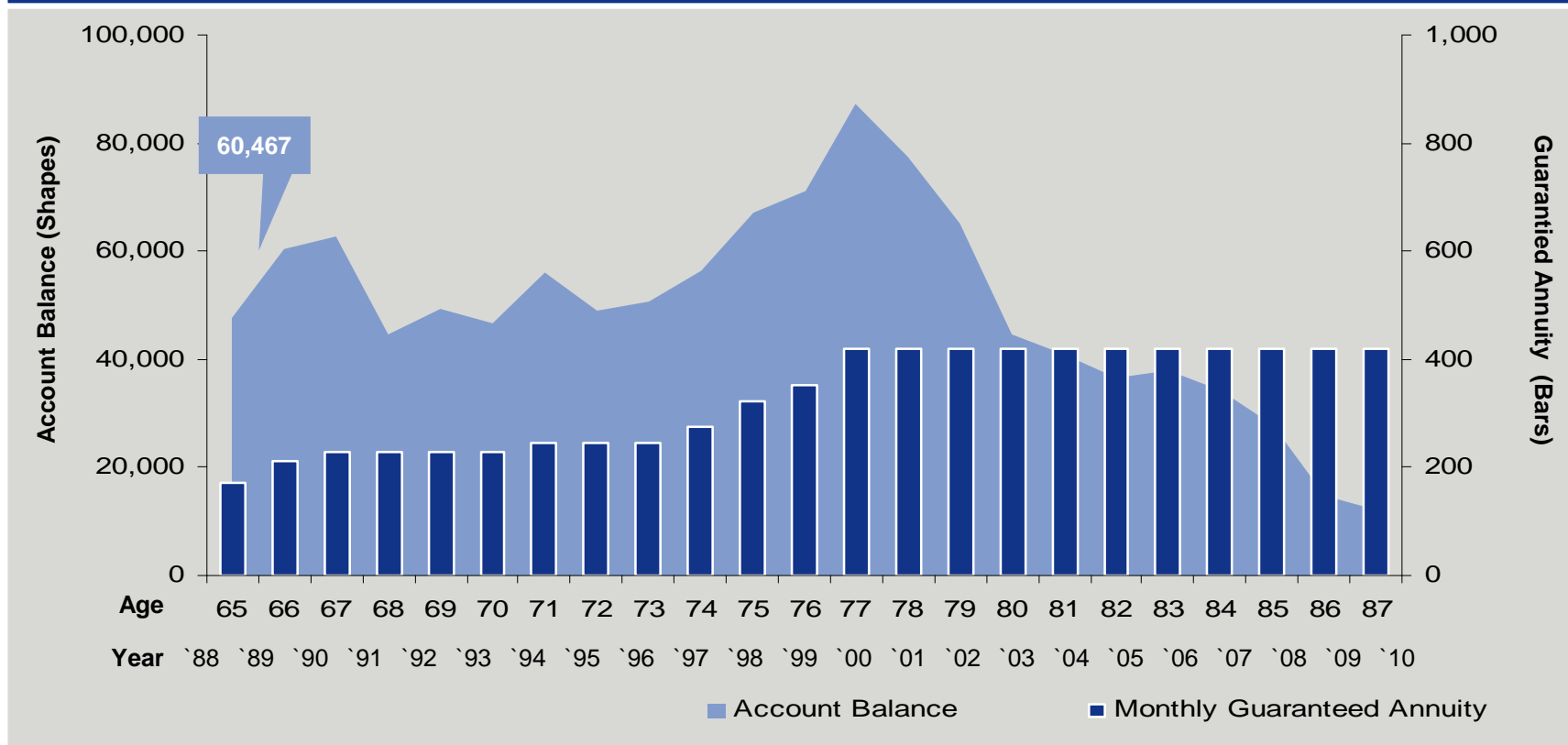
- § Products guarantees a minimum income stream through withdrawals from account balance
- § Underlying remains invested in mutual funds and is fully accessible for customer during decumulation phase

Additional Features to Increase the Guarantee Level During Lifetime of Policy (Ratchets / Roll-Ups)

Invest4Life – Illustration of the Product Concept (GMWB with Ratchets)



What would happen, if a customer aged 65 invested 50,000 Euro in Allianz Invest4Life and market performance 1988 – 2010 repeated?

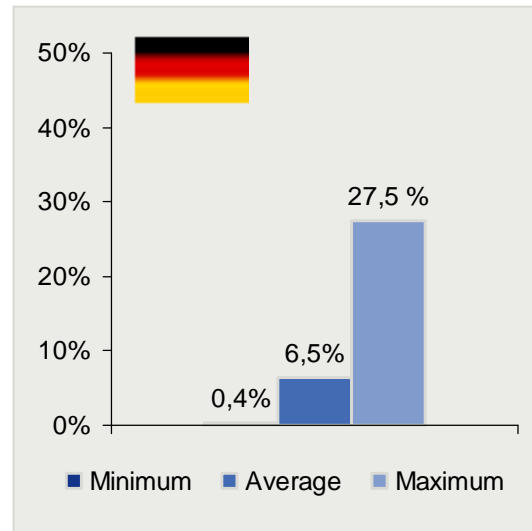


Start of Backtest: 01.01.1988, Funds chosen: Allianz Strategy 75
DISCLAIMER: Past performance does not predict future results

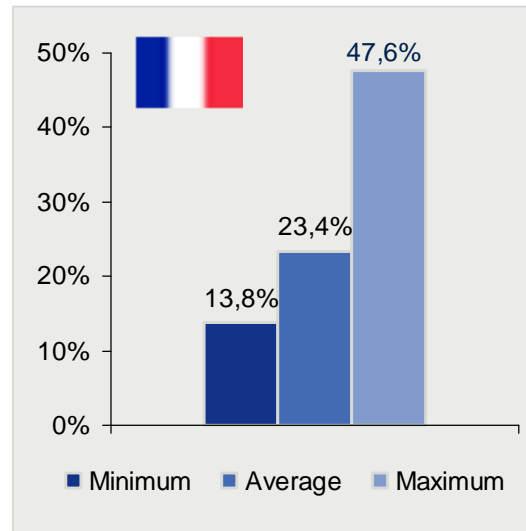
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Realized Ratchets – Invest4Life has kept its economic promises

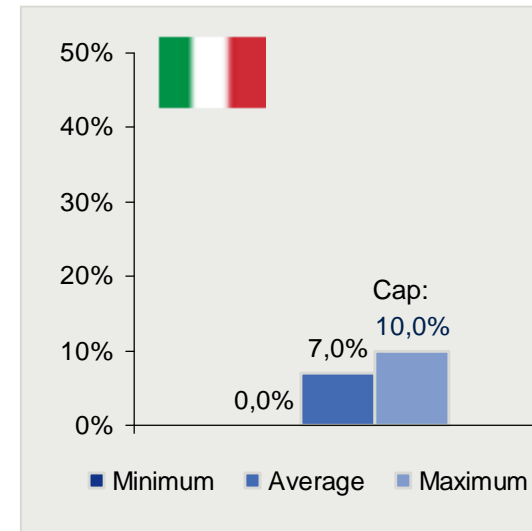
Ratchets on policy anniversary / due date realised in 2010 (as per 31/08/2010)



” **65%** of such policies received a ratchet



” **100%** of such policies received a ratchet



” **98%** of such policies received a ratchet

► Variances stem from different entry points and funds chosen by the customer.

Invest4Life Simulator

Simulator: Individual projection of account value and guaranteed annuity based on historic performance time series

ALLIANZ INVEST4LIFE

IHRE LEBENSLANGE RENTE MIT 4 VORTEILEN

Persönliche Daten

Ceburtsmonat: August Geburtsjahr: 1945 Geschlecht: männlich

[Zurück](#)

Wartezeit
Ihre erste Rente erhalten Sie:

sofort

sofort → in 10 Jahren

Beitrag
Ihr gewünschter Einmalbeitrag:

50.000 €

10.000 € → 500.000 €*

* Höhere Beiträge sind auf Anfrage möglich.

Monatliche Garantierente
Sie wünschen eine garantierte monatliche Rente** von anfänglich:

170,85 €

34,17 € → 1.708,50

** bei einem Versicherungsbeginn am 01.08.2010.

Simulation*

Rentenphase

Fondswert / Todesfallleistung

47.500 € 170 € 679 €

65 98 chron. Alter

Lebenslang garantierte Rente

* Das Beginnatum der Simulation ist der 01.01.1970. Für die Simulation wurden im Zeitraum 1970-2002 Indizes verwendet, welche die langfristige Ausrichtung des Allianz Strategy 50 widerspiegeln. Im Zeitraum 2002-2008 wurde der Allianz Strategiefonds Balance verwendet. Seit Auflegung am 01.01.2009 wurde die Wertentwicklung des Allianz Strategy 50 zugrunde gelegt. Die individualisierte Simulation soll lediglich die Produktcharakteristika verdeutlichen. Aus dem dafür verwendeten historischen Daten können keine Schlussfolgerungen für die zukünftige Entwicklung des Fonds abgeleitet werden. Insbesondere können die im Schaubild dargestellten garantierten Rentenbeträge nicht zugesichert werden, da diese von der tatsächlichen Fondsentwicklung abhängen.

Allianz Strategy 50

für ausgeglichene Aktien- und Rentenanlagen

Allianz Strategy 75

für besondere Chancen am Aktienmarkt

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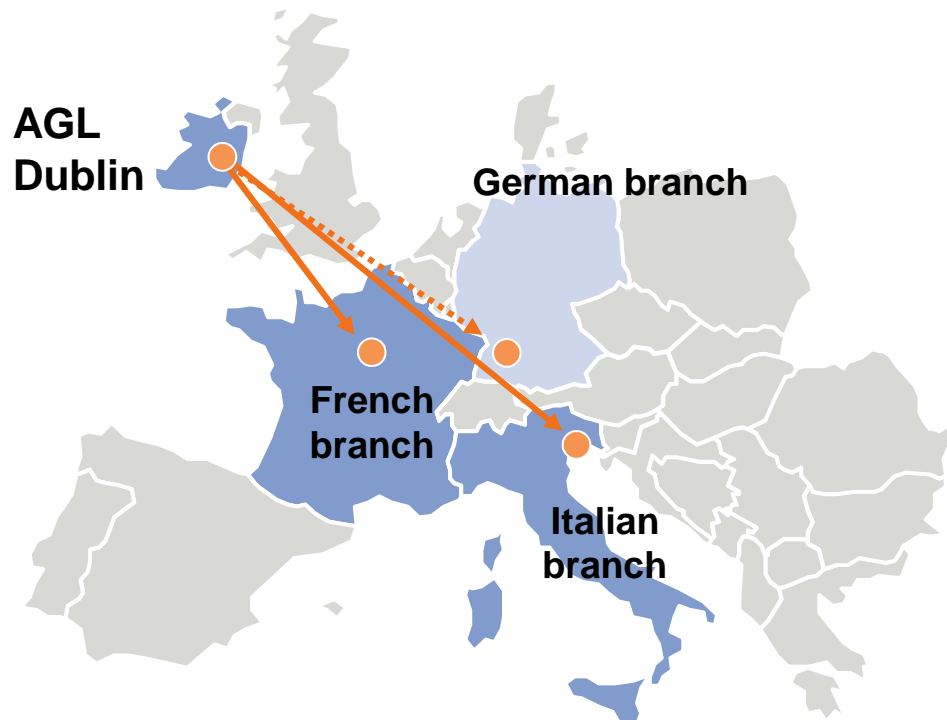
2. Allianz Global Life Ltd. (Dublin) – the Central VA Risk Carrier of Allianz

3. Guarantee Generation and Risk Management

Central risk carrier for EU variable annuity business: Allianz

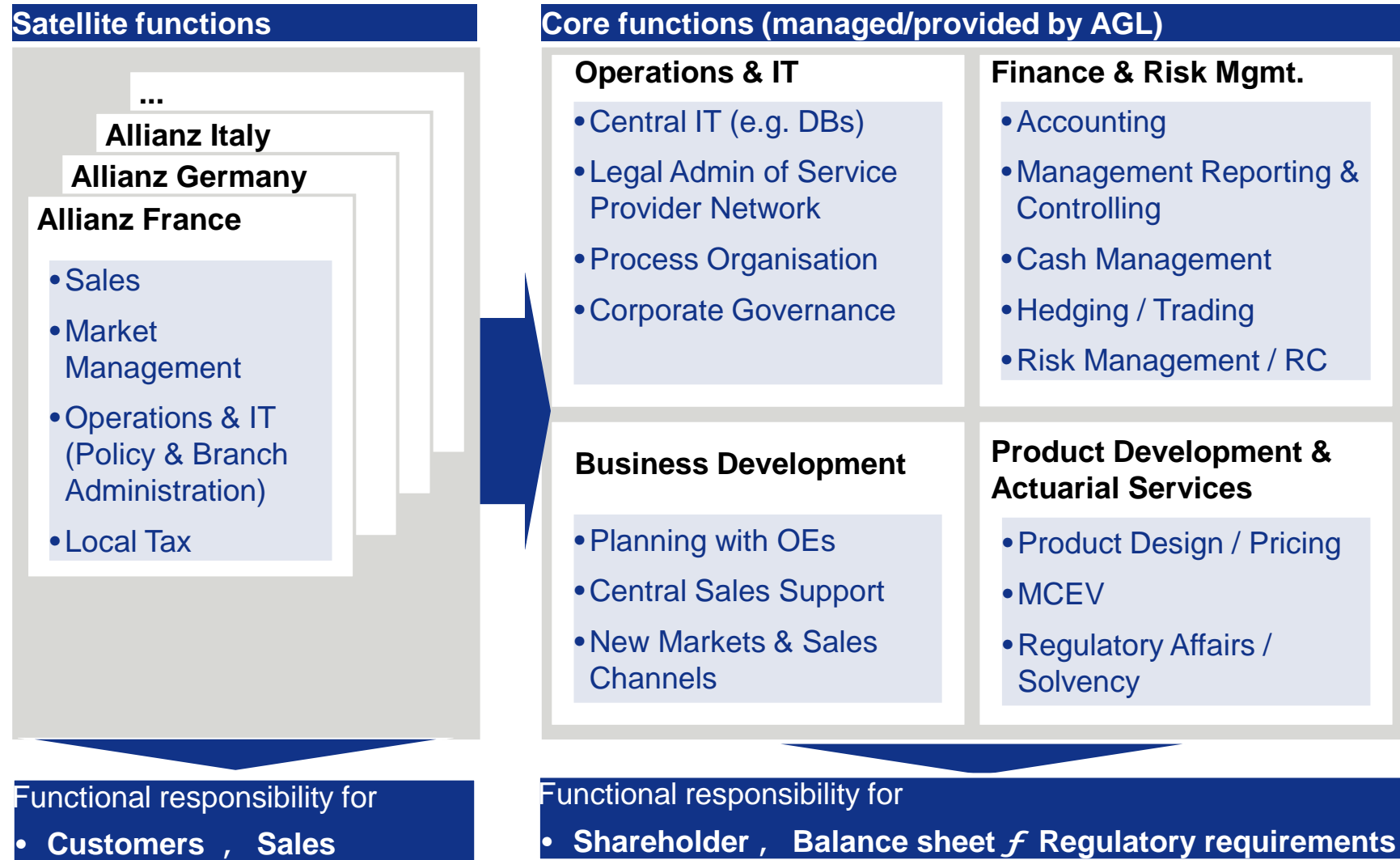
Allianz Global Life Ltd. (AGL)

Local branches created in relevant countries



- § VAs carried on balance sheet of central risk carrier in Dublin for reasons of experience in VAs and scalability (“Allianz Global Life Ltd”, 100% owned by Allianz SE)
- § Local branches established in each relevant country to sell under Freedom of Establishment
- § Customers have contracts with local branches according to applicable law (e.g. local contract law)

AGL's set-up exploits local and central expertise and implies a clear split of local and central responsibilities



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Precondition for Risk Management: Proper Governance Structure

Principle: **Three lines of defense** to ensure corporate risk culture

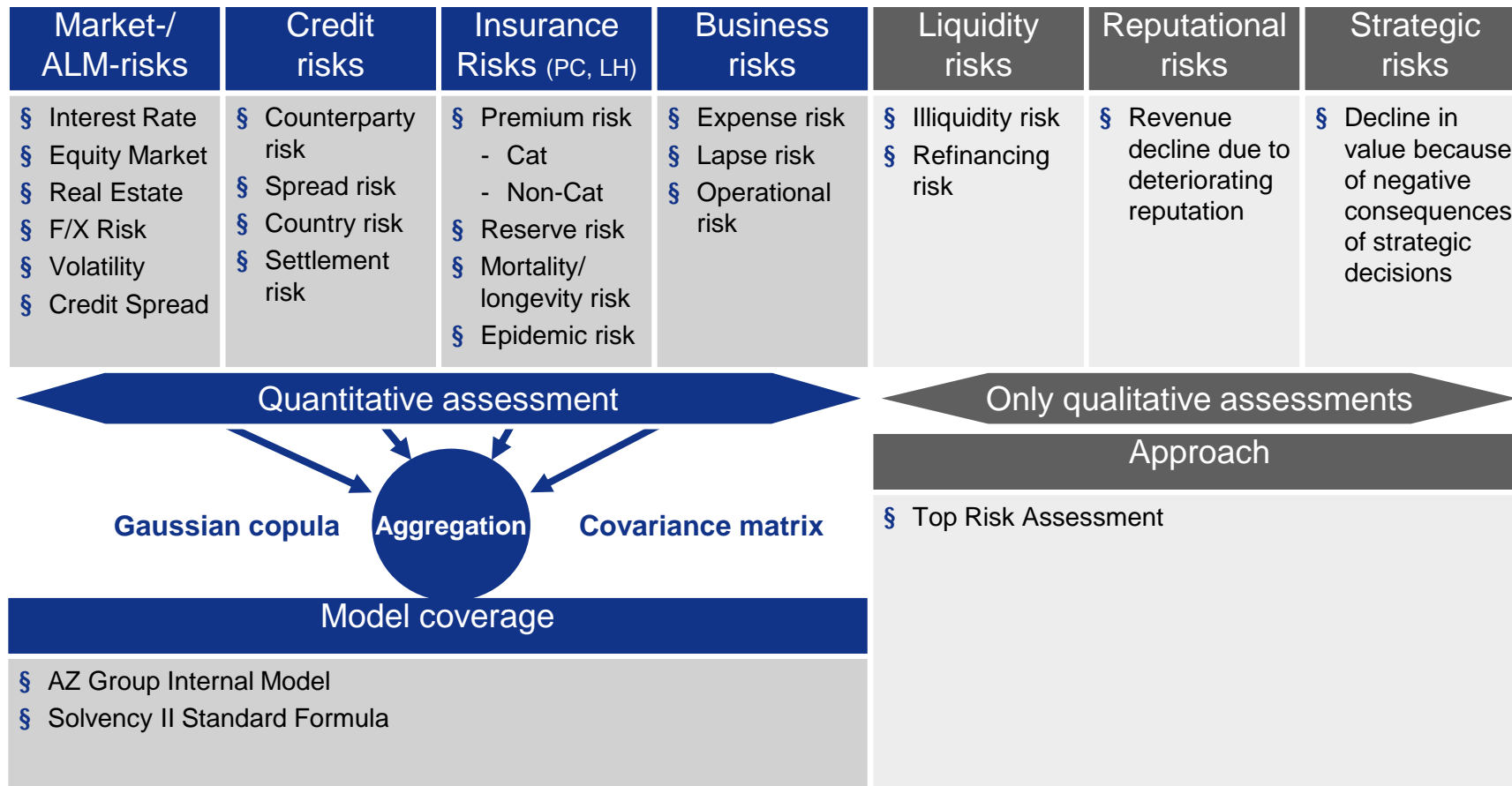
First Line	Second Line	Third Line
Senior business managers are ultimately responsible for the profitability and risk profile of their business	Independent Risk (and Actuarial) functions which sets the framework in which the business can take risk (Risk Management Framework including all related policies)	Audit and Compliance functions provide verification that the risk management framework is applied appropriately

Need for central Risk Management body as platform for all stakeholders:
The Risk Committee

Ultimate responsibility lies with the **Board**

Risk universe / Risk Taxonomy

Risk assessment based on Solvency II risk types and methods



AGL's Risk Management Set-up according to Allianz Group Standards



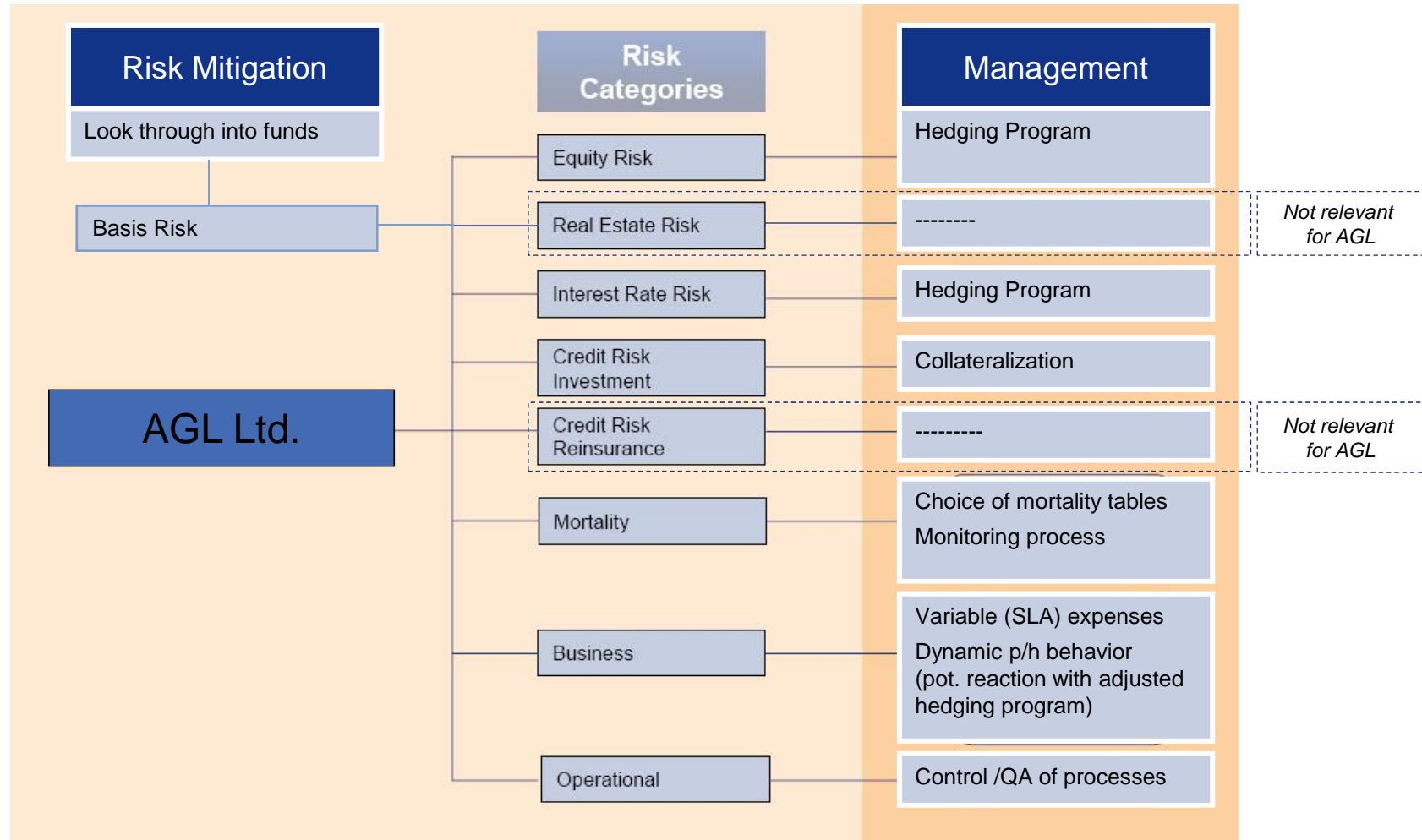
Central Body for Risk Management and Risk Related Decisions is AGL's monthly Risk Committee (RiCo), particularly concerning

- § Product approvals / profitability monitoring / re-pricing
- § Hedging program
- § Monitoring economically and statutory adequacy of capitalization
- § Qualitative Risk Monitoring

Risk Management Function Split according to AGL's Business Model

Risk Type	Responsibility
<ul style="list-style-type: none"> § Market risks (equity, interest rate, etc.) § Insurance & business risks (excl. OpRisk) § Credit risks § Operational risks (as far as out of scope of service level agreements (SLAs) with local OEs) 	AGL's Risk Management (local OE involved in risk management via AGL's RiCo)
<ul style="list-style-type: none"> § Operational risks (as far in scope of SLAs with local OEs) § Tax and legal risks 	Local OE's Risk Management (Allianz France, Allianz Italy and Allianz Germany)

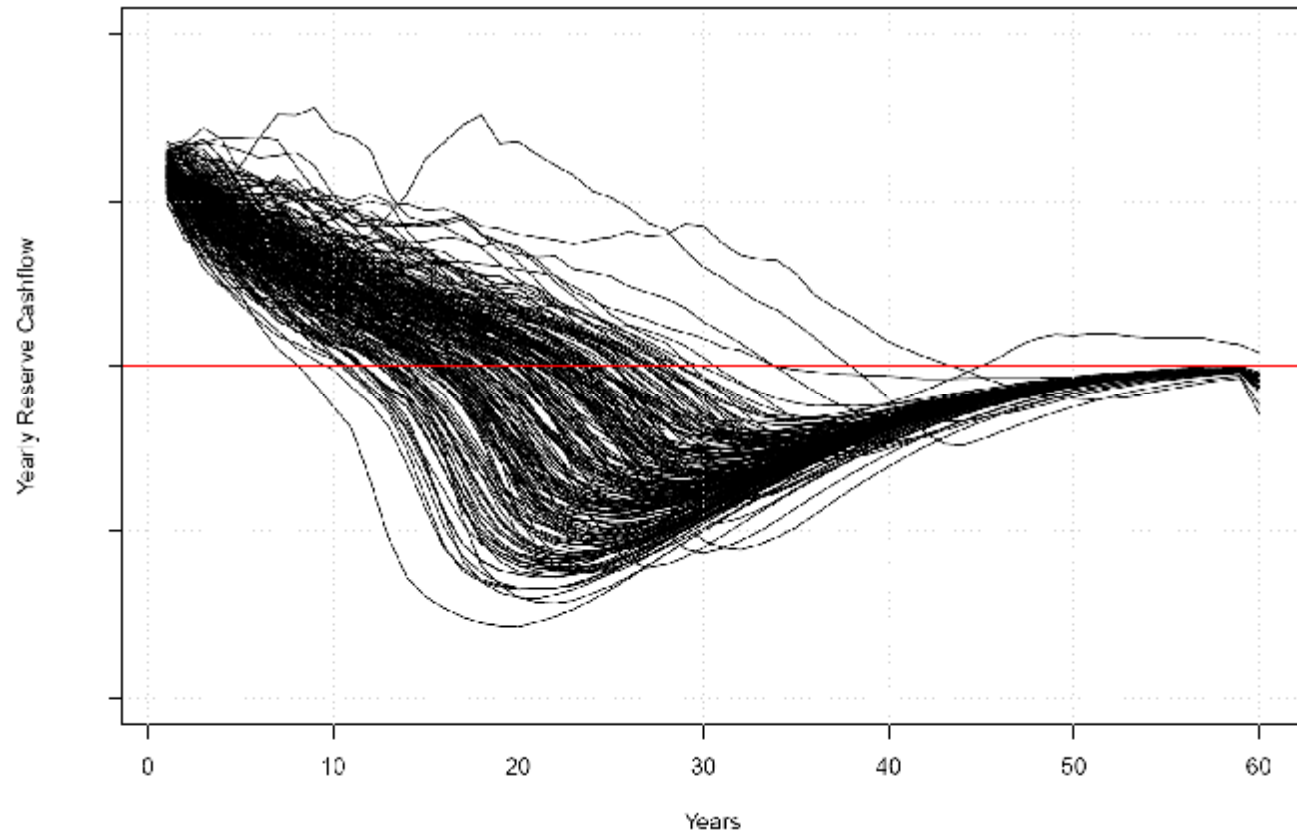
Risk Management in Context of AGL's Inforce Management



Managing the Financial Guarantees (1)

Cash Flow Profile as Basis for Economic Value of Guarantee

- § Cash flow profile reflects guarantee fees and guarantee claims
- § Stochastically generated based on market consistent scenarios
- § Example: Cash flow profile for model GMWB portfolio

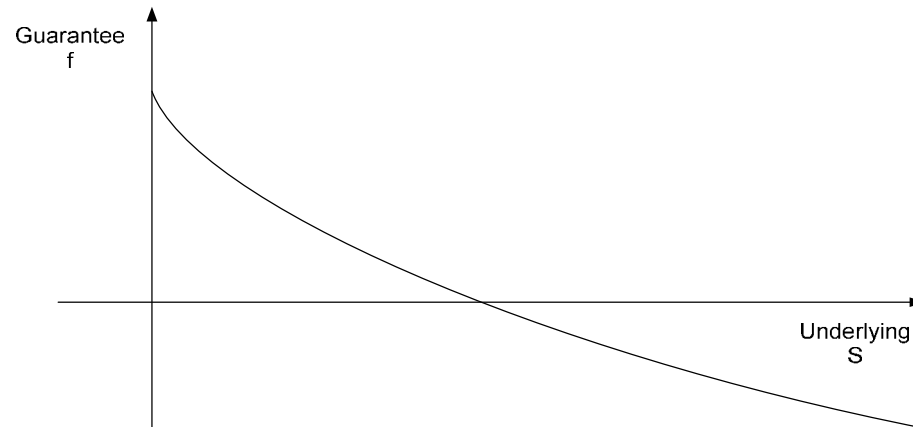


Economic Value of Guarantee via Path Dependent Discounted Cash Flows

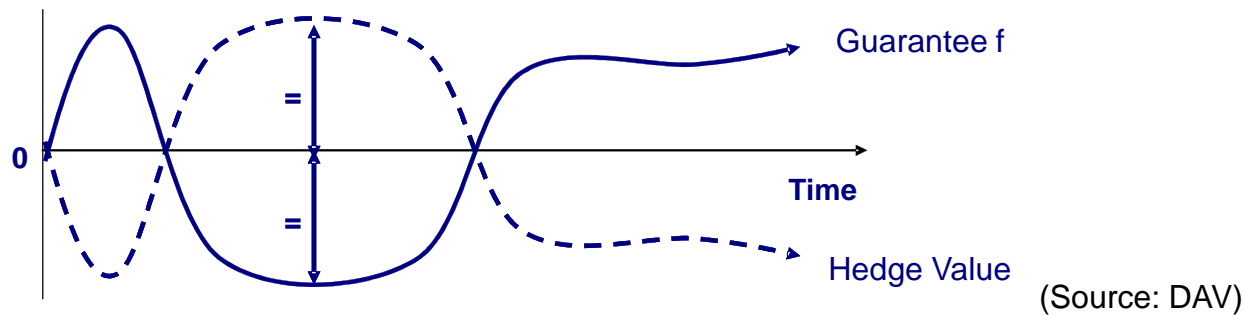
Managing the Financial Guarantees (2)

Development of Economic Value of Guarantee

- § Guarantee value depends on economic environment
- § E.g., guarantee value increases with falling fund prices



Impacts on P&L from Economic Development Mitigated via Hedging Programs



Ratchets Keep Guarantees at the Money and Avoid Adverse P/H Behaviour

Hedging Program – Overview

§ Financial risk monitoring and management linked to a corporate hedging policy

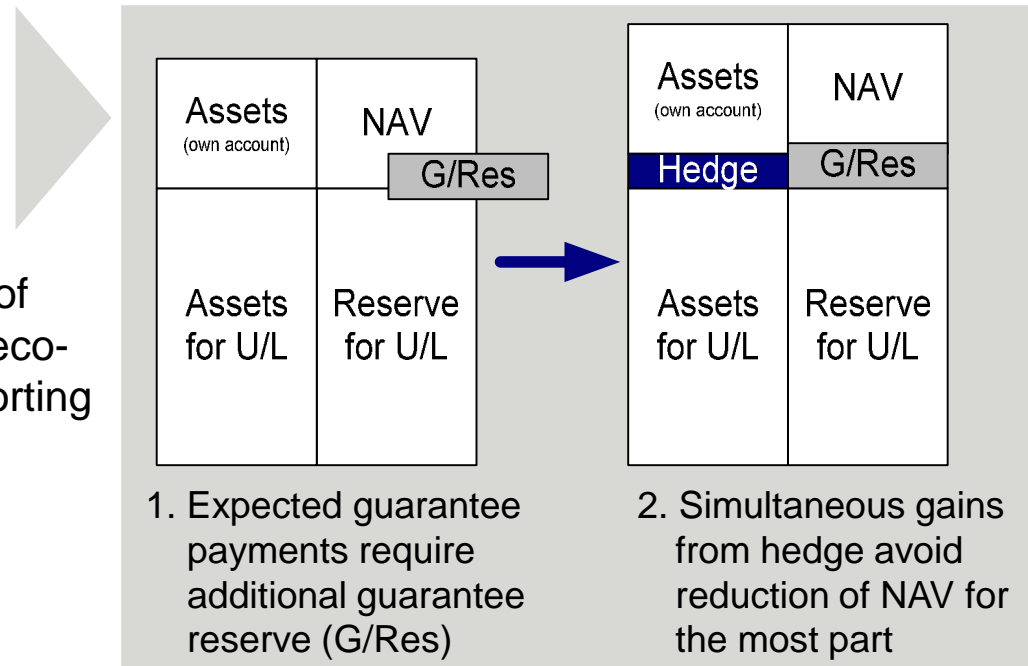
§ Hedging policy aims at offsetting effects on economic results (NAV)

- resulting from capital market changes
- as far as these changes are within scope of hedging

§ Sketch of methodology – example:
Equity markets fall and consequently guarantees are expected to produce payments to policyholders

§ Ireland allows for high effectiveness of economic hedging programs due to economic evaluation under different reporting regimes

- Irish Solvency / Solvency I
- IFRS
- MCEV / Solvency II





Finance Mathematical View on Hedging



The guarantee value of a VA product reflects a derivative that can be viewed as a function $f()$ dependent on the price S of the underlying asset, time to maturity t , volatility σ of the underlying asset and the risk free rate of interest r .

Taylor series expansion of f gives

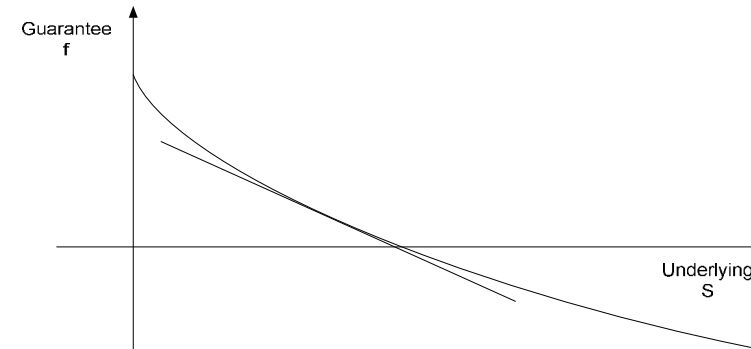
$$\Delta f(S, t, r, \sigma) = \underbrace{\frac{\partial f}{\partial S}}_{\text{Delta}} \Delta S + \underbrace{\frac{\partial f}{\partial t}}_{\text{Theta}} \Delta t + \underbrace{\frac{\partial f}{\partial r}}_{\text{Rho}} \Delta r + \underbrace{\frac{\partial f}{\partial \sigma}}_{\text{Vega}} \Delta \sigma + \frac{1}{2!} \underbrace{\frac{\partial^2 f}{\partial S^2}}_{\text{Gamma}} \Delta S^2 + \mathbf{L}$$

- § Changes in the guarantee value f can be equally approximated through the sensitivities called Greeks
- § Hedging can be viewed as setting up and maintaining a portfolio which approximates a selected set of Greeks according to the corporate hedging program
- § In practice the limited set of selected Greeks and the discrete trading intervals imply hedging errors

The Greeks (1)

§ Delta Δ is the rate of change of the option price with respect to the underlying

$$\frac{\partial f}{\partial S} \approx \frac{f(S) - f(S^*)}{S - S^*}$$



§ Rho (ρ) is the rate of change of the option price with respect to interest rate

$$\frac{\partial f}{\partial r} \approx \frac{f(r) - f(r^*)}{r - r^*}$$

§ Gamma (Γ) is the rate of change of delta (Δ) with respect to the price of the underlying asset

$$\frac{\partial^2 f}{\partial S^2} \approx \frac{\Delta_{up} - \Delta_{down}}{(S_{up} - S_{base})^2} = \frac{f(S_{up}) - 2f(S_{base}) + f(S_{down})}{(S_{up} - S_{base})^2}$$

The Greeks (2)

§ Vega (v) is the rate of change of the value of a derivatives portfolio with respect to volatility

$$\frac{\partial f}{\partial \sigma} \approx \frac{f(\sigma) - f(\sigma^*)}{\sigma - \sigma^*}$$

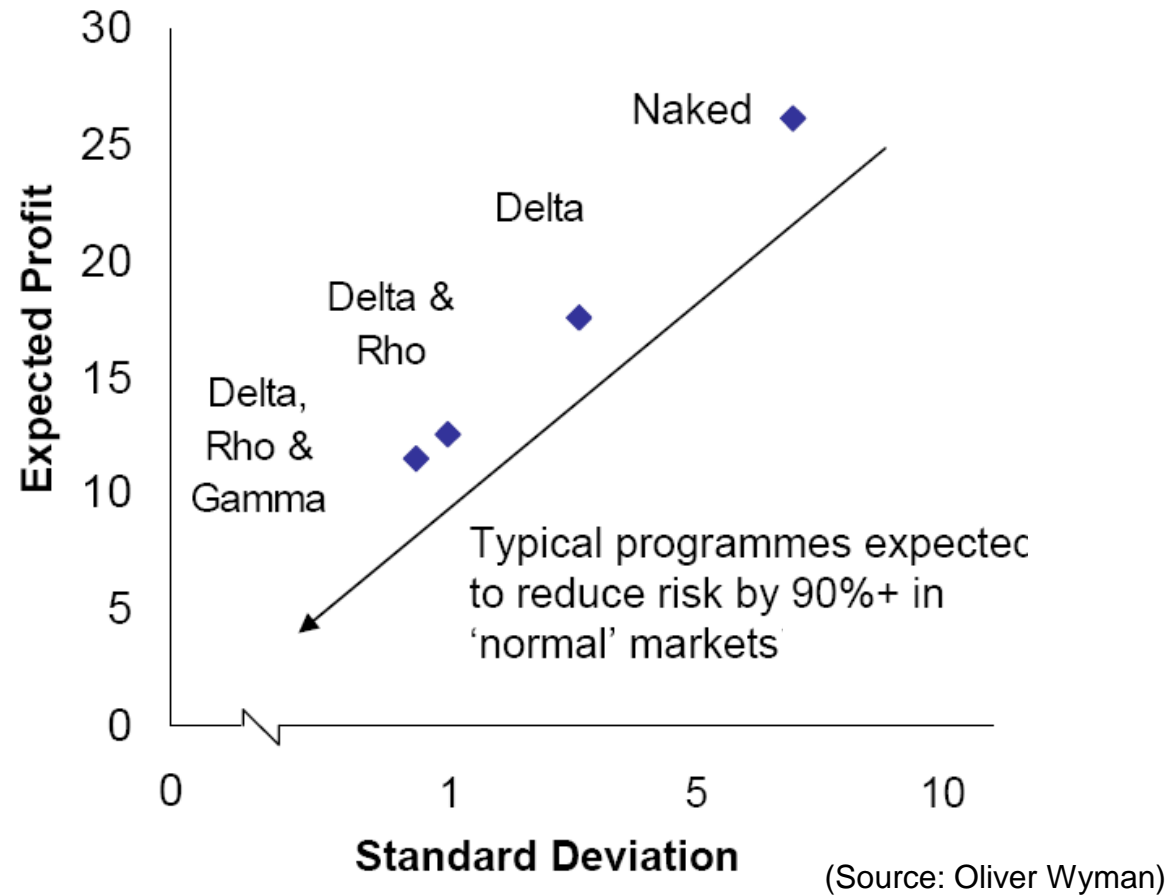
§ Theta (Θ) of a derivative (or portfolio of derivatives) is the rate of change of the value with respect to the passage of time

$$\frac{\partial f}{\partial t} \approx \frac{f(t) - f(t^*)}{t - t^*}$$

§ In practice often only the numerator of the above definitions/approximations are called Greeks. E.g. the Delta of an option is given by the difference of the base option price and the option price when the underlying has been shocked by a small amount (e.g. 1%):

$$\Delta \approx f(S) - f(S^*)$$

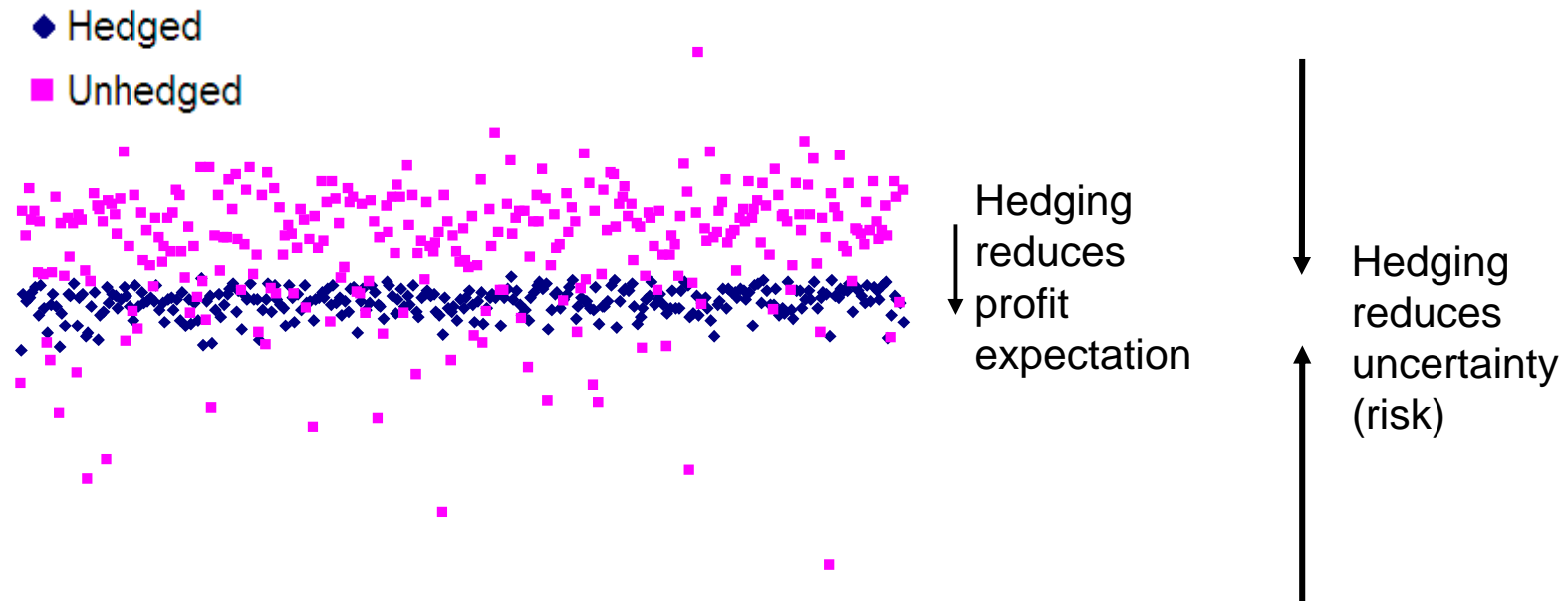
Scope of Hedging – Efficiency and Profitability (1)



► Adjustment of Profit Expectation for Inforce Portfolio Possible

Scope of Hedging – Efficiency and Profitability (2)

Impact of Hedging on Present Value of Future Profits in a Stochastic Real World Model



(Delta/Rho hedging of a GMWB product)

Hedge Reports (Attribution Analysis) as Central Tool for Monitoring, Management and Reporting

General Definition

§ Attribution analysis is a performance-evaluation tool used to analyze the abilities of portfolio or fund managers. Attribution analysis uncovers the impact of the manager's investment decisions with regard to overall investment policy, asset allocation, security selection and activity.

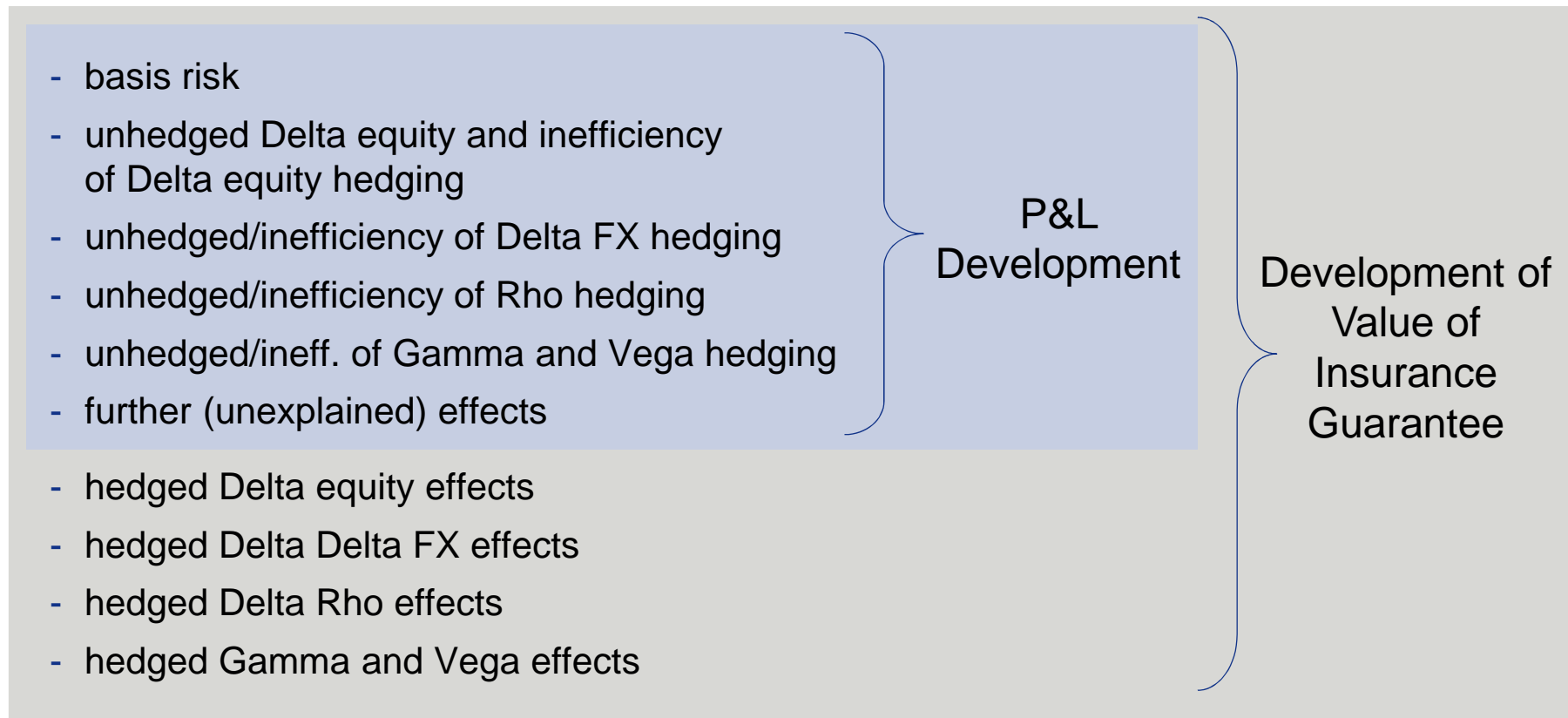
Application in AGL's Context

§ Analyzing and explaining development of

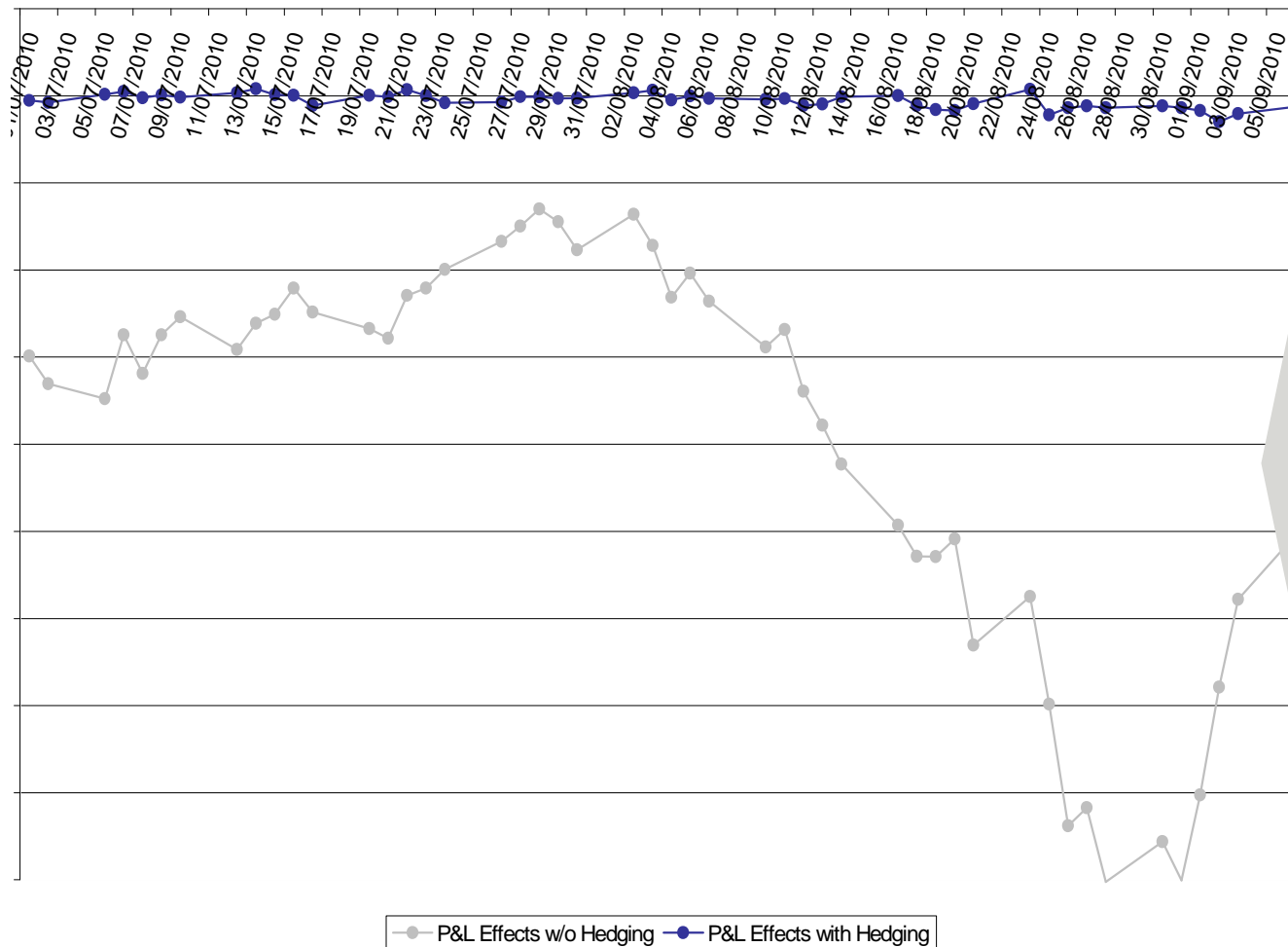
- the value of guarantee claims and guarantee fees of AGL's inforce book ('unhedged guarantees', 'liabilities')
- the (economic) P&L effects (in fact 'liabilities' netted with 'hedging results')

Attribution Analysis

Economic Development of Value of Guarantee Claims and Fees attributed to



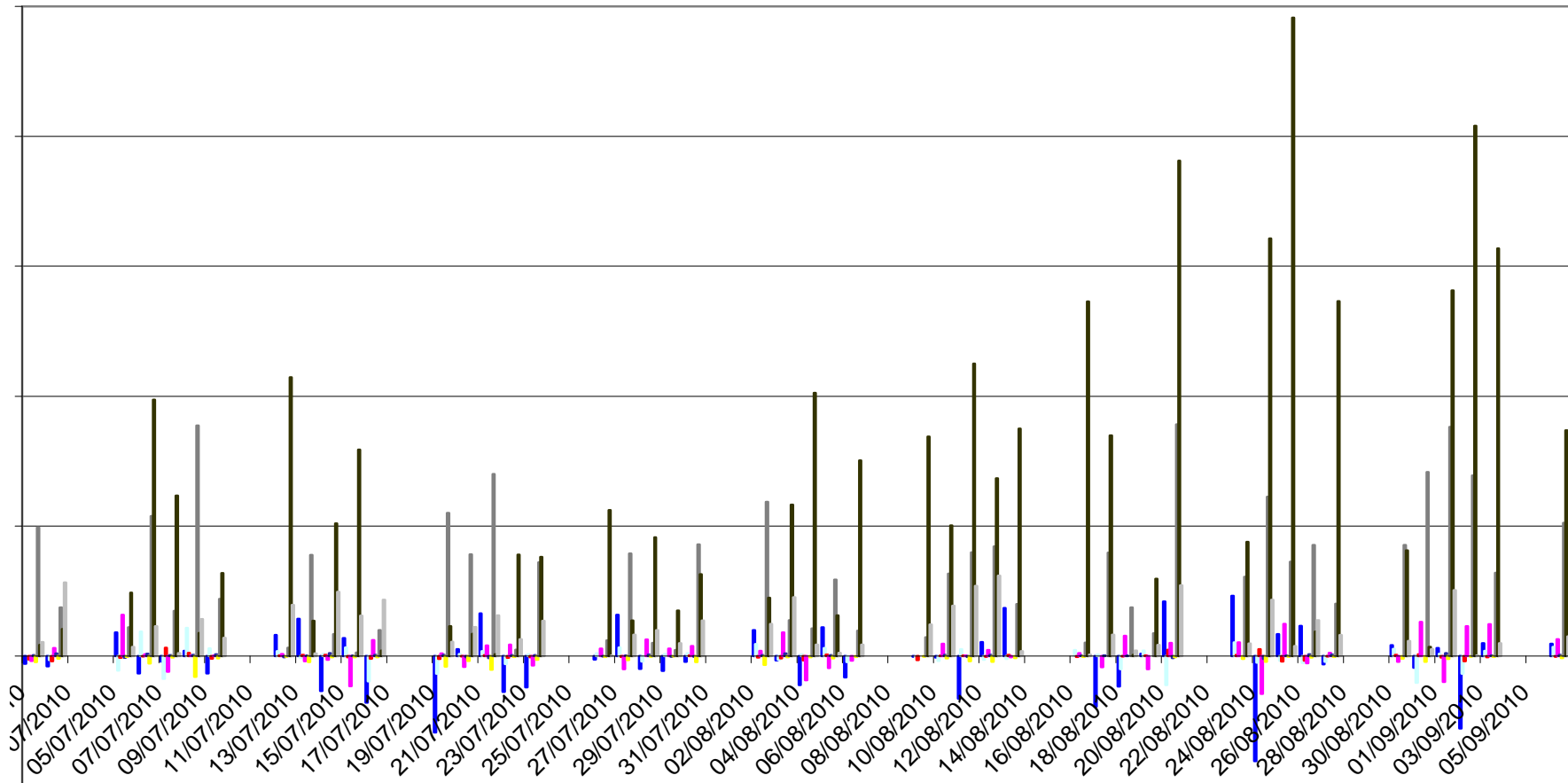
Hedging Results – Observed Effectiveness of Hedging Market Implied P&L Effects during July – September 2010 (P&L Result w/o and with Hedging)



- Hedging program continued to perform very soundly in Q2 (high effectiveness) in volatile market environment
- Extreme movements of economic guarantee
- Market implied P&L effects (oscillation of grey line) have been mitigated
- Offset of P&L effects with hedging reflects time value of guarantees and impact of minor inefficiencies

P&L Effects w/o Hedging: Aggregate market implied change of liabilities (guarantee values) since start of hedging program
 P&L effects with Hedging: Aggregate market implied change of liabilities - aggregate change of hedge assets
 (i.e. economic effect that is observable in P&L when actual hedging results are taken into account)

Hedge Report – Daily Explanation of Market Implied P&L Effects



Risk Capital Requirements for VA Products in Ireland

Economic Risk Capital

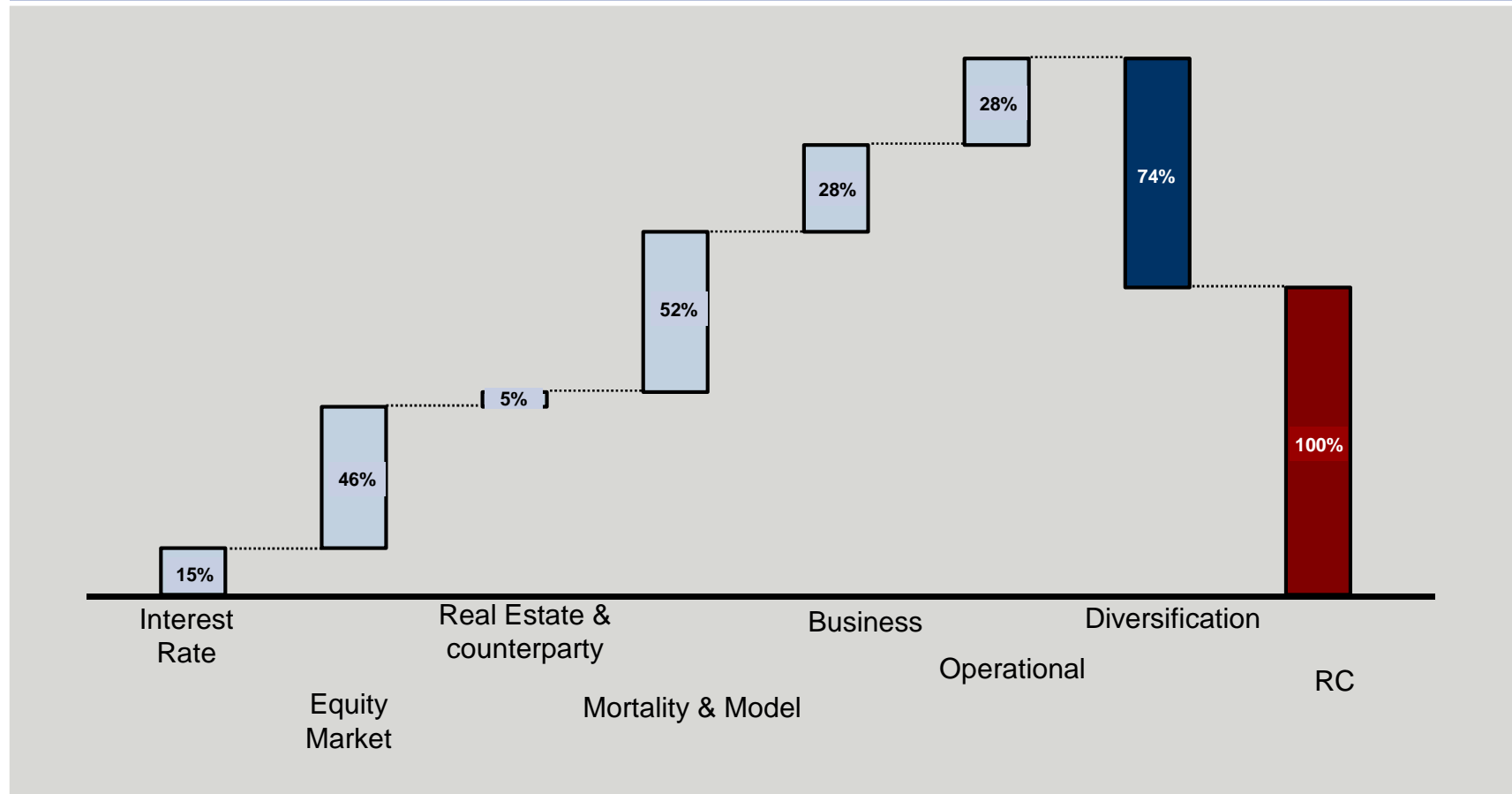
- § Economic Risk Capital modeled according to Allianz Group's internal model (see below)
- § Capital requirement for AGL mainly driven by
 - Equity risk
 - Longevity risk

Statutory Requirement in Ireland

- § Capitalization according to adjusted Solvency I regime (reserve calculation based on CTE approach)
- § Switch to Solvency II regime under way

Required Economic Risk Capital

Elements of Required Capital



Summary

Variable Annuities Provide Positive Value Proposition for Customers 

Solid Product Design and Risk Management Allows to Create Stable Income Stream 

Adjustment of Profit Expectation for Inforce Portfolio Possible - According to Risk Appetite 

Ignoring the Product's Risks Exposes Undertakings to Extreme Threats 

Thank You for Your Attention!

Allianz 