

The Mechanics and Regulation of Variable Payout Annuities

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Types of Variable Payout Annuities

- **VPAs are life annuities that pay benefits that depend on investment performance, the treatment of longevity risk and profit sharing rules.**
- **Like all life annuities, they lack flexibility and do not allow for bequests.**
- **The main VPAs are participating (with-profits) and unit-linked annuities.**
- **The main advantage of VPAs is that they avoid the annuitization risk.**
- **They also allow participation in higher investment returns, although this is offset by greater exposure to investment risk.**
- **Other disadvantages are their greater complexity, their lack of transparency, and their need for robust and effective regulation and supervision.**

Exposure to Investment Risk

- **This risk is real but is often exaggerated. The risk of large losses and financial ruin is present when annuity reserves are heavily invested in high-risk assets.**
- **The risk of financial ruin is mitigated by the dollar-averaging process of long-term retirement saving during both the accumulation and decumulation (payout) phases.**
- **It can be further mitigated by investing in more stable asset allocations.**
- **Investment risk is contained by the offer of guaranteed minimum benefits.**
- **Finally, pensioners may well save some of their retirement income when annuity payments are higher than average, thus avoiding large fluctuations in consumption.**

The Mechanics of Variable Annuities: Initial and Subsequent Payments

- **The calculation of initial payments is the same for all types of annuities. It is based on an assumed investment rate of return (AIR) and appropriate mortality tables.**
- **Choice of a low AIR results in lower initial payments and higher later payments, and vice versa.**
- **A very low AIR distorts the pattern of benefit payments and favors long-lived individuals.**
- **An AIR equal to the long-term real rate of interest allows room for inflation adjustments.**
- **Subsequent payments reflect the difference between the RIR (realized investment rate of return) and the AIR and the treatment of longevity risk.**

The Standard Unit-Linked VPAs

- In standard UL VPAs, the longevity risk is assumed by the providers. They charge a contractual fee for longevity and expense risks. Conservative mortality tables are used. There are also UL VPAs where the longevity risk is shared among the annuitants (CREF, PPM).
- Subsequent payments depend on the net RIR, after the deduction of fund management expenses. They change by the formula

$$B_t = B_{t-1} * (1+RIR_{t-1})/(1+AIR).$$

- The creation of a mortality fluctuation reserve is required when the providers assume the longevity risk.
- Minimum guarantees may be offered, subject to additional fees. Limitations may then apply to the choice of investment funds.

Traditional Profit Participating VPAs

- **Traditional PP VPAs offer guaranteed minimum benefits and discretionary bonuses that depend on net investment performance and longevity experience.**
- **For the guaranteed benefits, the investment and longevity risks are assumed by the providers. For the bonuses, they are assumed by the annuitants.**
- **Initial payments are calculated in the same way as for UL VPAs.**
- **Providers use a profit sharing rule and apply a bonus smoothing mechanism in order to ensure stability in bonus declarations, which is favored by annuitants.**
- **Profit sharing rules and bonus smoothing mechanisms generally lack transparency.**
- **Several countries prescribe minimum profit sharing rules between shareholders and policyholders but no country seems to prescribe the bonus smoothing mechanism.**

Escalating Profit Participating VPAs

- **Escalating PP VPAs offer guaranteed minimum benefits that are targeted to grow at a stable rate, with the basic aim (but no commitment) to maintain their real value.**
- **They may provide effective protection against inflation risk without requiring access to an ample supply of inflation-linked securities.**
- **Regular bonuses are guaranteed once they are declared but may be suspended if investment performance is very poor. Discretionary bonuses that are not guaranteed may also be declared at irregular intervals.**
- **Their operating characteristics are otherwise similar to those of traditional participating VPAs.**

Regulatory Issues: Marketing Policies

- **Use of basic conduct rules.**
- **Creation of a centralized database.**
- **Imposition of caps on broker commissions.**
- **Prevention of deceptive pricing practices (high teaser AIRs, low bonuses, hefty exit fees).**
- **Avoidance of perverse marketing practices (miners and teachers).**
- **Use of practical rules on switching (major question, actuarial impact, exposure of very old annuitants to misguided switching pressure).**

Regulatory Issues: Pricing Policies

- Regulation of initial payments by stipulating the AIR and mortality tables.
- Choice of a low AIR (close to long-term real rate of interest) and conservative mortality tables.
- Imposition of caps on commissions and operating fees (with allowance for reasonable return on equity capital).
- Stipulation of minimum profit-sharing rule(s).
- Specification of an acceptable smoothing mechanism.
- Move to more flexible regulation when supervision is effective and meaningful transparency is well established.

Regulatory Issues: Reserving Policies

- **Providers are required to keep separate accounts and reserves for VPAs.**
- **Mortality tables are gender-specific even if for pricing purposes unisex mortality tables are used.**
- **The reserves must be equal to the higher of the current value of assets backing the VPAs or the present value of the guaranteed benefits.**
- **The present value of expected future bonuses must also be included.**
- **Present values are calculated using market-rates of interest for the guaranteed benefits but expected returns on annuity-backing assets may be used for the bonuses.**
- **Assets must be “marked-to-market” although many countries still allow assets to be valued at book or smoothed values, especially for the assets that cover future bonuses.**

VPAs and US-Style VAs

- **VPAs differ from US-style variable annuities (VAs).**
- **The latter are investment products with an annuitization option that is not frequently exercised.**
- **Non-annuitized US-style VAs allow for bequests and offer various types of guaranteed minimum benefits.**
- **The Lifetime Guaranteed Minimum Withdrawal Benefits (LGMWBs) represent an interesting compromise between the offer of longevity insurance and the demand for flexibility and bequests.**
- **US-style VAs face complex business and regulatory issues on marketing, pricing and risk management. They also require access to efficient hedging facilities. For these reasons, they are not recommended for the second pillars of middle and low income countries.**

Conclusions

- **VPAs have several advantages but pose strong regulatory and supervisory challenges.**
- **They require a high level of transparency and integrity on the part of providers.**
- **They are exposed to investment risk and require mitigating provisions.**
- **They also require strong regulation of the calculation of initial payments, marketing policies, operating fees, profit-sharing rules, smoothing mechanisms, and reserving policies.**
- **Move to more flexible regulation is advisable when supervision is effective and transparency is well established.**



Participating Payout Life Annuities: Lessons from Germany

Maurer, Rogalla, and Siegelin

Washington, 10. Jan. 2012

Life Annuities:

Annuity provider pays regularly lifelong benefits to the annuitant

- Annuity benefits depend on underlying **actuarial assumption** and on **risk sharing arrangement** between annuity provider and annuitant
- Risk categories for life annuities
 - Investment risk / Systematic & individual longevity risk / Inflation risk
 - Default risk of annuity provider
- Types of annuity benefits:
 - Fixed annuity = certain in nominal terms
 - Variable annuity = linked to specific asset portfolio chosen by annuitant
 - **Participating (PLA)** = linked to the overall (“collective”) experience of annuity provider on mortality, investment, and other sources

Literature and Contributions

- **Literature:**

- ✓ Many work on fixed / variable life annuities: Mitchell et al. (1999), Horneff et al. (2008, 2009, 2010), Vitas et al. (2010), ...
- ✓ Little research on PLA: Kartashov/Maurer/Mitchell/Rogalla (2011); Kaschützke/Maurer (2011)

- **We ask:**

- ✓ How does German surplus sharing system work?
- ✓ What is regulatory framework?
- ✓ How do uncertain (individual / systematic) mortality and uncertain investment return influence the payout stream to the annuitants?
- ✓ Is the surplus sharing between shareholders & policyholders fair?

Participating Life Annuities (PLAs) in Germany: General Structure

- Benefits Payments of PLA contain:
 - Guaranteed lifelong benefits + additional surplus due to profit sharing
 - Guaranteed Benefits: Based on **conservative actuarial assumptions**
 - Surplus: **Overall** (“collective”) experience on investments, mortality, costs
- Surplus Measurement & Allocation
 - Pre-specified rules codified in laws
 - Supervision by German Financial Supervisory Authority (BaFin)
 - Important role of appointed actuary
- Surplus Payment Options
 - Surplus Lump-Sum vs. Surplus Annuitization

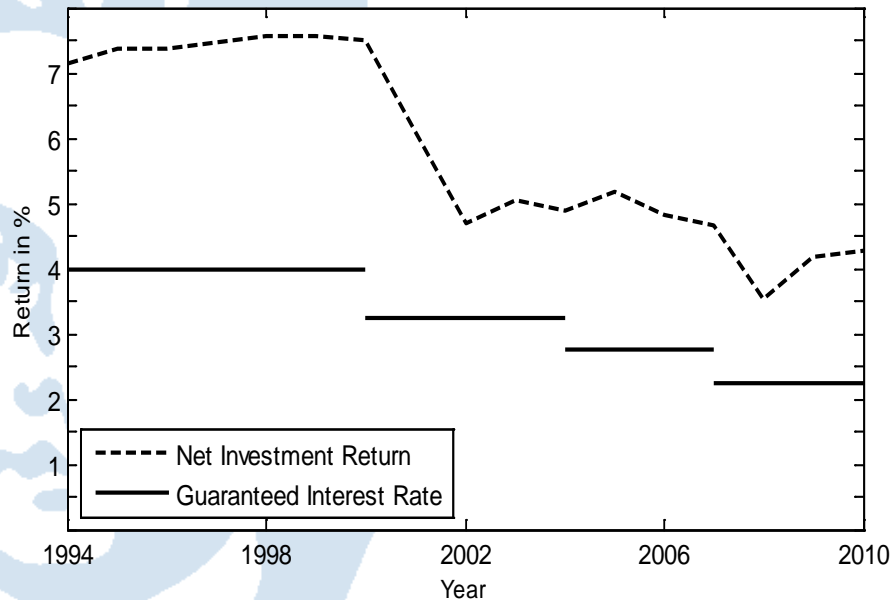
Participating Life Annuities (PLAs) in Germany: Regulation

- Guaranteed Benefits
 - **Maximum** interest rate (to calculate reserves / premiums)
 - Development of annuitant specific **mortality tables** (society of actuaries)
 - Solvency II
- Asset Allocation of reserve funds
 - **Investment restrictions** on equity, alternatives, derivatives, currency risk
- Profit Sharing Mechanism
 - Measurement of profits sources (accounting measures; yearly)
 - Sharing of profits between annuitants and shareholders
 - Sharing of profits between different product lines (cross subsidies)
 - Allocation to individual annuitants

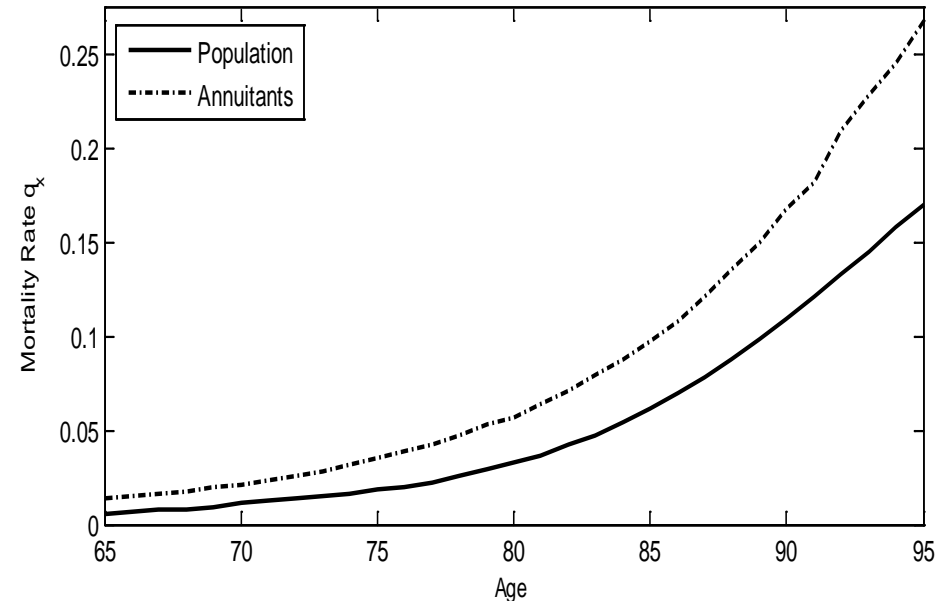
German Surplus Sharing

Surplus Analysis by Source of Return

Investment Returns: Guaranteed versus Realized Returns



Mortality Rates: Annuitant versus Population



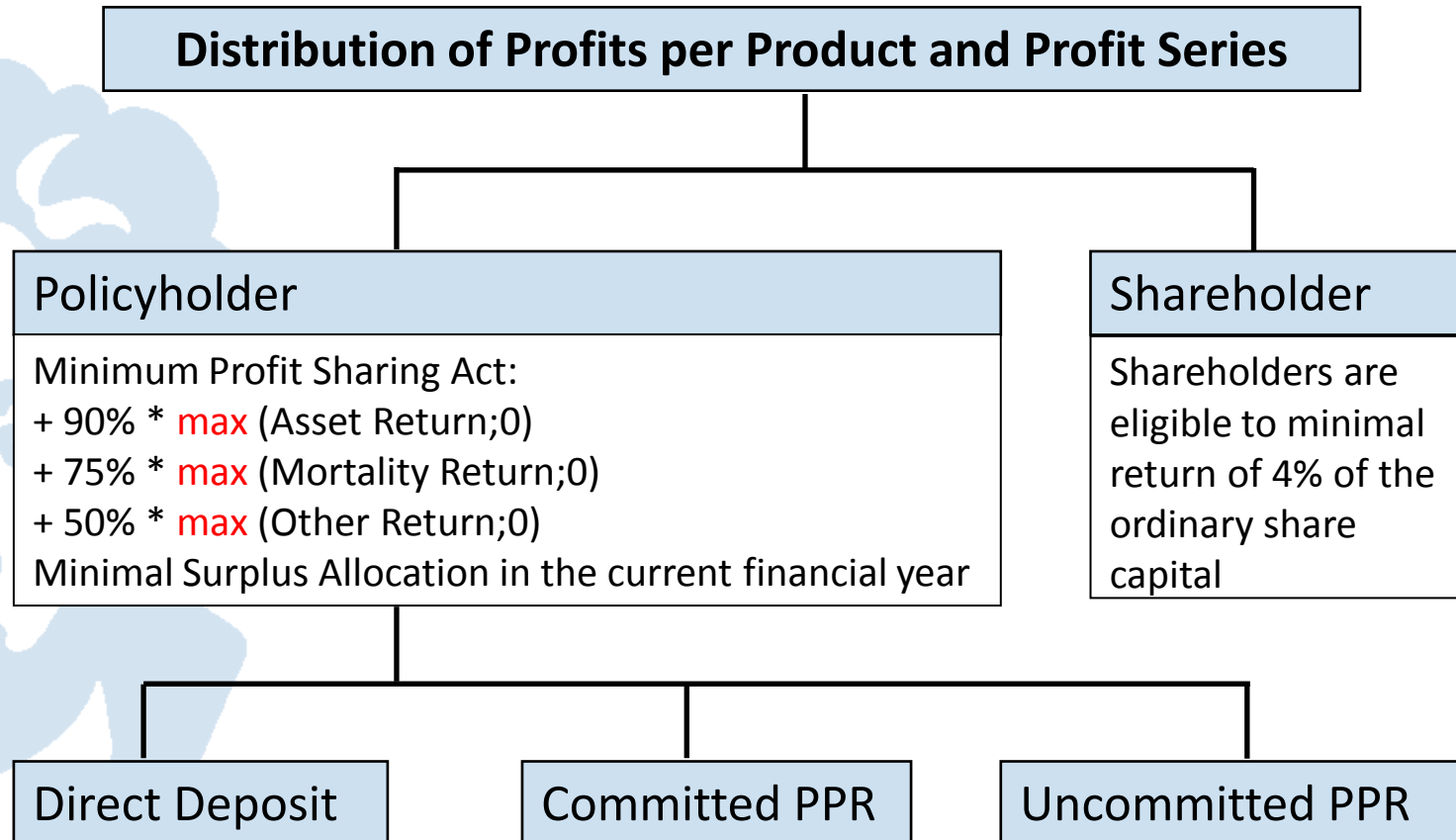
German Surplus Sharing

Surplus Analysis by Source of Return

Source of Return	2007		2008		2009	
	in Mio €	in % of Surplus	in Mio €	in % of Surplus	in Mio €	in % of Surplus
Mortality Return	6,352	46.2%	6,489	95.3%	6,464	54.7%
Assets Return	8,530	62.0%	892	13.1%	5,485	46.4%
Cost Return	913	6.6%	771	11.3%	1,147	9.7%
Other sources	-2,041	-14.8%	-1,346	-19.8%	-1,277	-10.8%
Surplus	13,754	100%	6,815	100%	11,819	100%

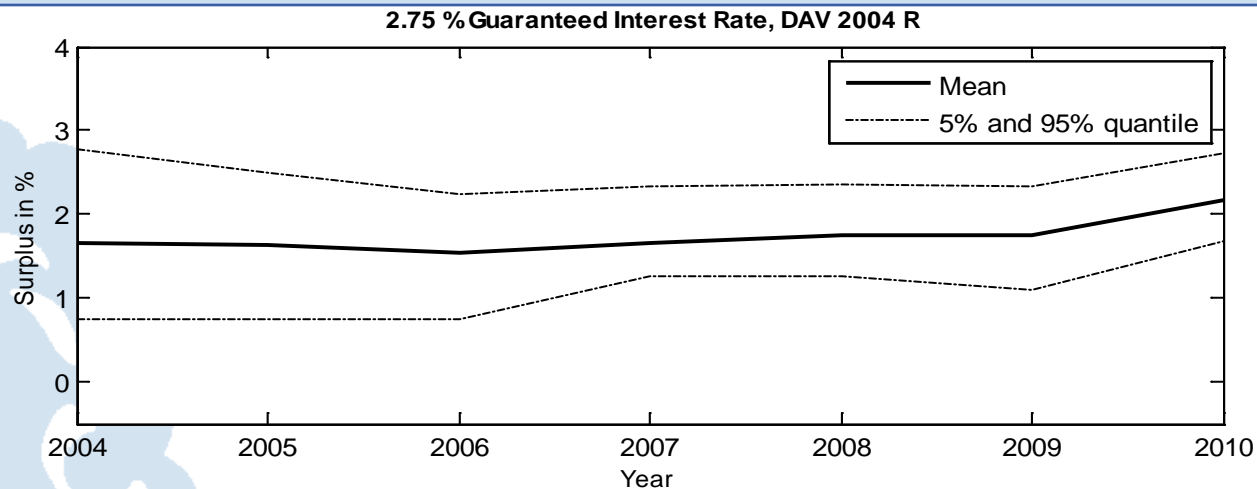
Notes: Aggregated values over all product groups of all 101 (100/99) German Life Insurers in 2007 (2008/2009).
Source: Federal Financial Supervisory Agency, Statistics for Direct Insurers 2009.

German Surplus Sharing for PLA

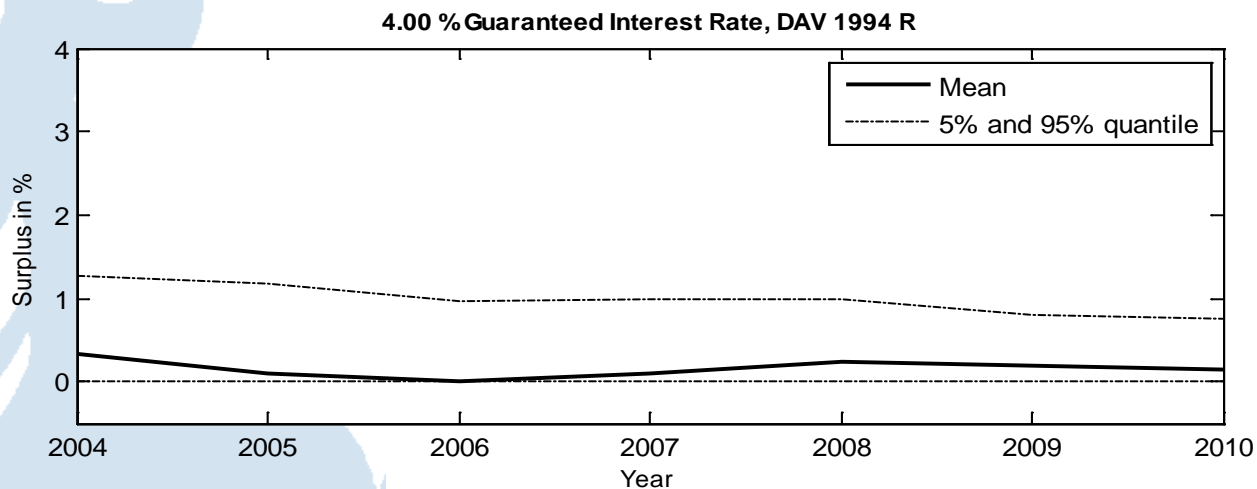


Empirical Evidence

Distributed PLA Surplus in Percent of the Actuarial Reserve Cross sectional analysis between various LI-companies



Low interest rate
Low mortality
("new policies")



High interest rate
High mortality
("old policies")

Empirical Evidence: Allocation of Realized Surplus

	2005	2006	2007	2008	2009
Surplus in Billion Euro	14.2	14.1	13.5	6.6	11.6
Surplus Allocation %	92.9	92.6	92.6	86.9	90.0
In % of the PPR	2.6	2.5	2.3	1.1	1.9

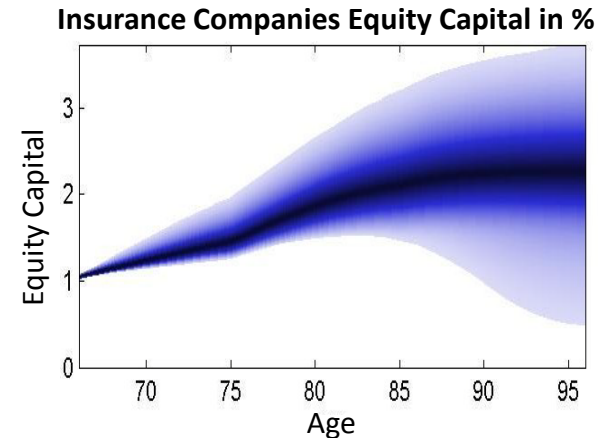
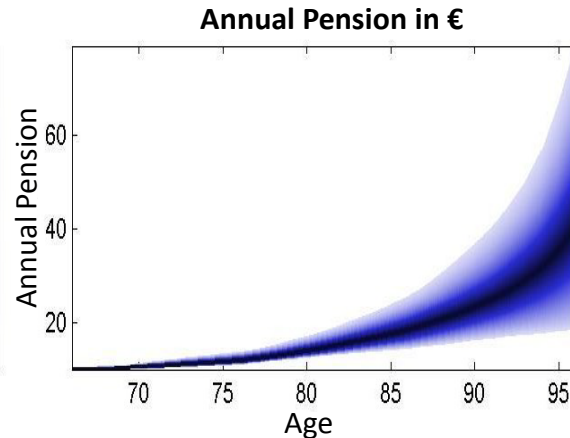
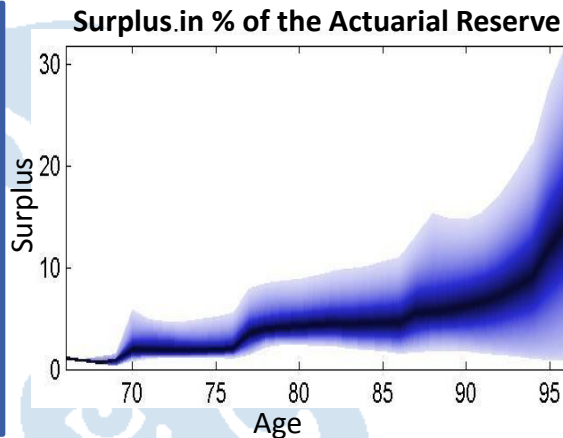
Notes: Aggregated values over all German Life Insurers, 2005 - 2009. Source: BaFin, annual report 2009.

Simulation Analysis

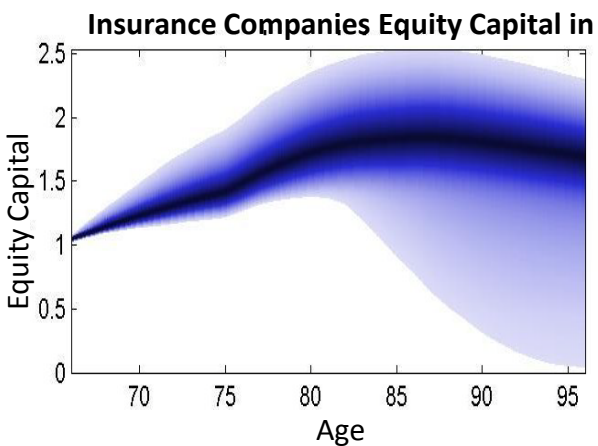
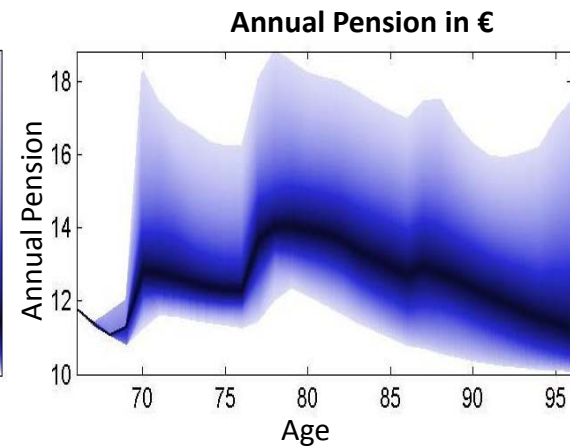
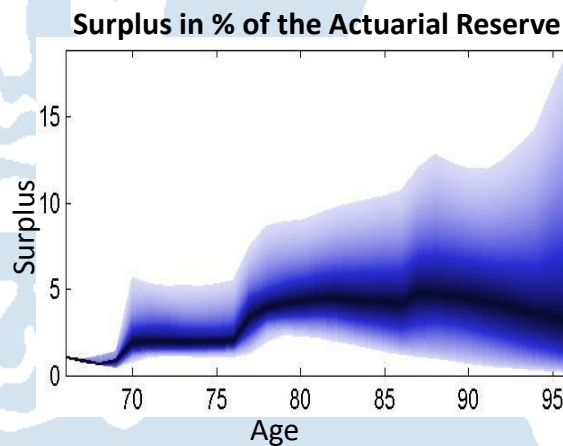
- Stochastic Asset Model (10/90 constant asset mix):
 - Bonds Portfolio (Prices/Coupons) & Equity Portfolio (Dividends/Prices)
- Stochastic Mortality Model: **Lee Carter** (cohort 10,000 individuals, age 65)
- Stochastic Company Model:
 - Evolution of Balance Sheets & Profits (incl. Accounting Rules)
 - Surplus Model for participating annuities (Lump Sum / Annuitization)
 - Solvency requirements
- Output (50'000 runs): Surplus; Benefits, Equity Capital, Money Worth Ratio

Surplus Annuitization vs. Surplus Lump-Sum

Base Case Scenario



Surplus Annuitization



Surplus Lump-Sum

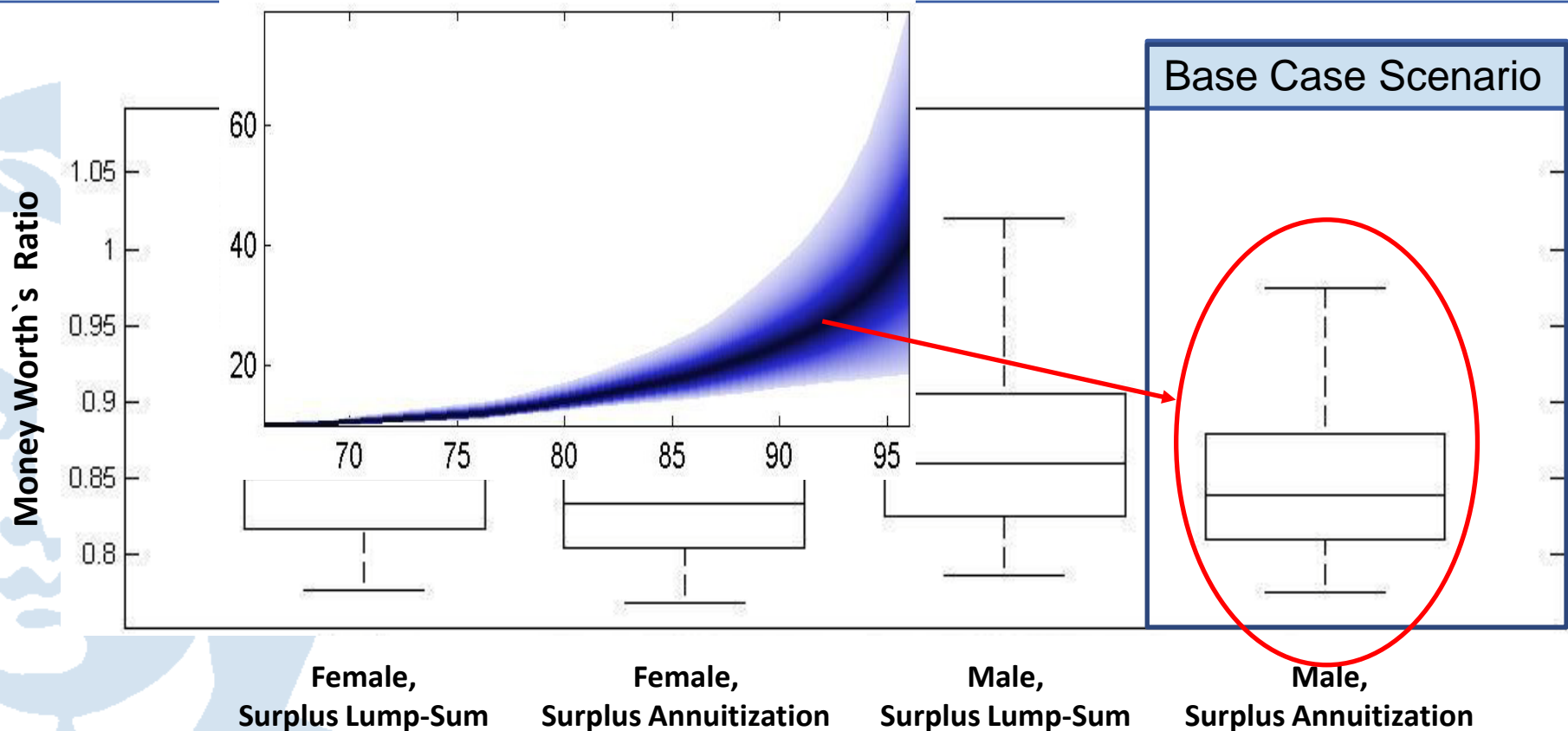
Conclusion & Questions

- PLA important alternative to fixed / variable annuities
 - In case of not fully developed capital markets / lack of mortality tables
 - Depending on asset allocation: protection against inflation risk
 - Allows to include more **illiquid assets** (liquidity premium)
 - Effective way of sharing systematic mortality risk between annuitant / provider (alternative: new longevity instruments)
 - Instrument to avoid **timing risk** in case of mandatory annuitization
 - Transparency low / regulatory requirements high / costs
- Critical question: Level of guaranteed benefits

Sensitivity Analysis

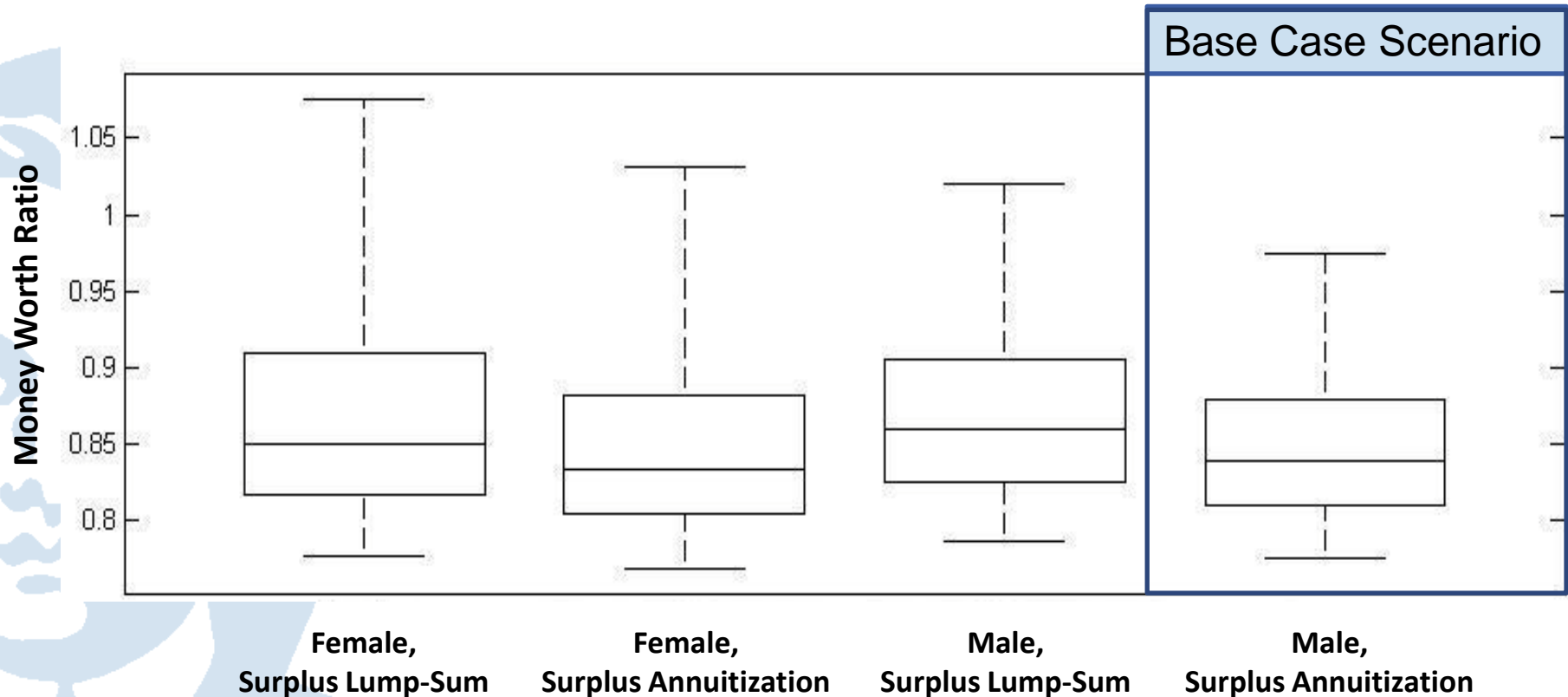
Comparison of Payout Options and Genders

Annual Pension in €



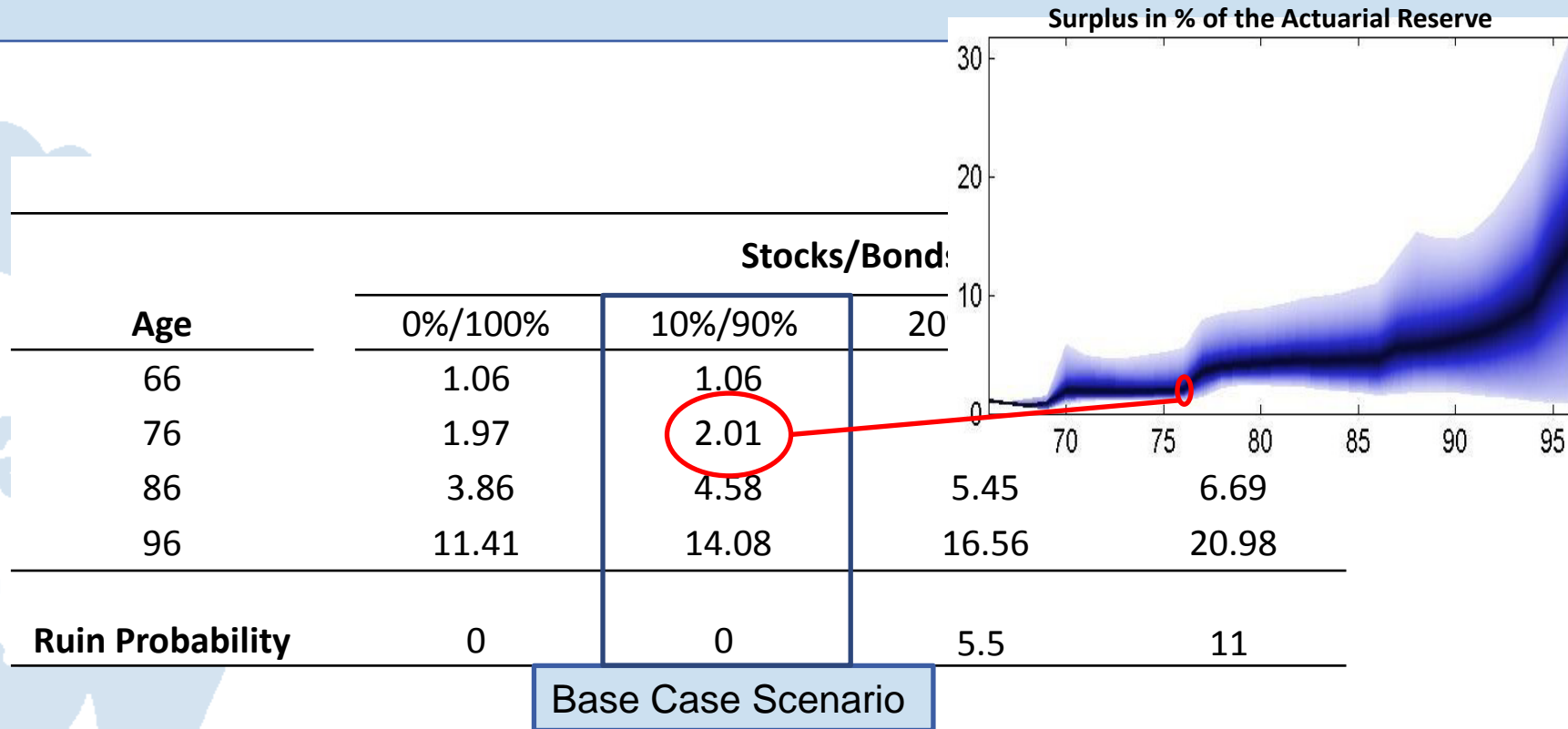
Sensitivity Analysis

Comparison of Payout Options and Genders



Sensitivity Analysis

Average Distributed Surplus for Alternative Asset Allocations



Sensitivity Analysis

Average Distributed Surplus for Alternative Asset Allocations

Age	Stocks/Bonds			
	0%/100%	10%/90%	20%/80%	30%/70%
66	1.06	1.06	1.06	1.06
76	1.97	2.01	2.17	2.50
86	3.86	4.58	5.45	6.69
96	11.41	14.08	16.56	20.98
Ruin Probability	0	0	5.5	11

Base Case Scenario

Sensitivity Analysis

Average Distributed Surplus for Alternative Surplus Allocation Percentages

Age	Regulatory Min	92% of Surplus	95% of Surplus
66	1.06	1.06	1.06
76	1.83	2.01	2.07
86	3.81	4.58	4.77
96	10.09	14.08	14.91
Ruin Probability	0	0	0

Base Case Scenario

Oversight and Regulation of Variable Annuities *Comments*



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Background:



Payout annuities are insurance:

- Premium paid (1 time or multiple payments)
- Provide income benefits for life.

Advantages:

- Cannot outlive your assets: peace of mind!

Disadvantages:

- Illiquid: usually cannot get your money back (or must pay a lot)
- Fees/loads/admin charges
- Complexity: e.g. period certain, return of principal, indexed or not, etc.

Understanding SPI annuities:

$$PV(Annuity) = \sum_{Payments} \frac{\text{Payment Amt} \times \text{Pr(Survival)}}{\text{Discount factor}}$$

- Life annuities pay benefits until death.
 - ✓ If variable instead of fixed, Payment Amt depends on investment performance, mortality, interest rates.
- To estimate payouts must model all these variables.

Money's worth of single premium annuities are good: EPVs of \$1 premium (men age 65)

	<u>UK</u>	<u>US</u>	<u>Australia</u>	<u>Italy</u>
Pop	.90	.81	.91	NA
Ann	.97	.93	.99	.96

See Mitchell (2002; Treasury Yield Curve)



Variable Annuities are a very **Interesting Product:**

- Offer potential for FLOOR + bump-up if \$ available.
- Compared to fixed nominal annuity, they may have a better chance of tracking inflation.
- Also *may* mitigate credit risk inherent in fixed nominal annuities – depends on form.



Participating vs. Nonparticipating Annuities

- *Nonparticipating* policy: insurer bears all risk (stock market, mortality risk, interest rate)
- *Participating* policy (usually VA): risk shared with participants.
- ✓ Recent paper on VILDAs : **Variable Investment-Linked Deferred Annuities.***

* Kartashov/Maurer/Mitchell/Rogalla. “Lifecycle Portfolio Choice with Stochastic & Systematic Longevity Risk, & Variable Investment-Linked Deferred Annuities.” NBER WP 2011

VILDAs very attractive:

- Flexibility of VILDAs permits investing annuity assets in equities.
- Insurers must charge loads $>30\%$ to bear systematic mortality risk.
- So many will favor *participating* annuities (unless insurers can hedge at VERY low price).
- *Result*: much higher lifetime consumption than without.



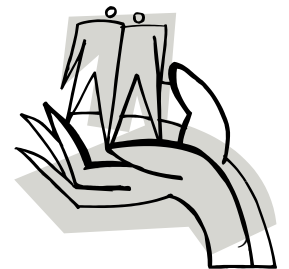
Considerations:

- Demand side: Inability to understand VAs
 - Variable payouts & nature of partial guarantee
 - Fixed (nominal) vs participating
 - Illiquidity and fees
 - Complex features: teasers, term certain, death benefits, etc
- Supply side: Difficulty of managing VAs
 - Participating annuities will need different reserves and hedging than nonparticipating



Government Roles

- Product considerations: Vittas and Maurer very helpful here.
- Solvency funds: not treated in detail (and these must be supervised too).
- Tax treatment can be key: e.g. Australia taxes fixed nominal annuities more kindly than real!
- Product standardization and market transparency
 - Chile SCOMP, Singapore 5-flavor mandate
- Financial Literacy



Urgent questions as annuity market grows:

- Importance:
 - More DC, fewer DB pensions;
 - Retirees handling decumulation;
 - Some nations (Germany) require mandatory annuitization (85).
- Key risks going forward:
 - Capital market;
 - Mortality;
 - **Inflation;**
 - **Political.**



Thank you!

For more information:

www.pensionresearchcouncil.org

