

Risk Management by Product Design...

... for Traditional Participating Life Insurance Contracts
with Interest Rate Guarantees

- Bonn, April 2014
- Jochen Ruß



Introduction

Slides 3-8

Product landscape - successes and failures

Slides 9-11

New Traditional Products

Slides 12-21

Alternatives to guarantees instead of alternative guarantees

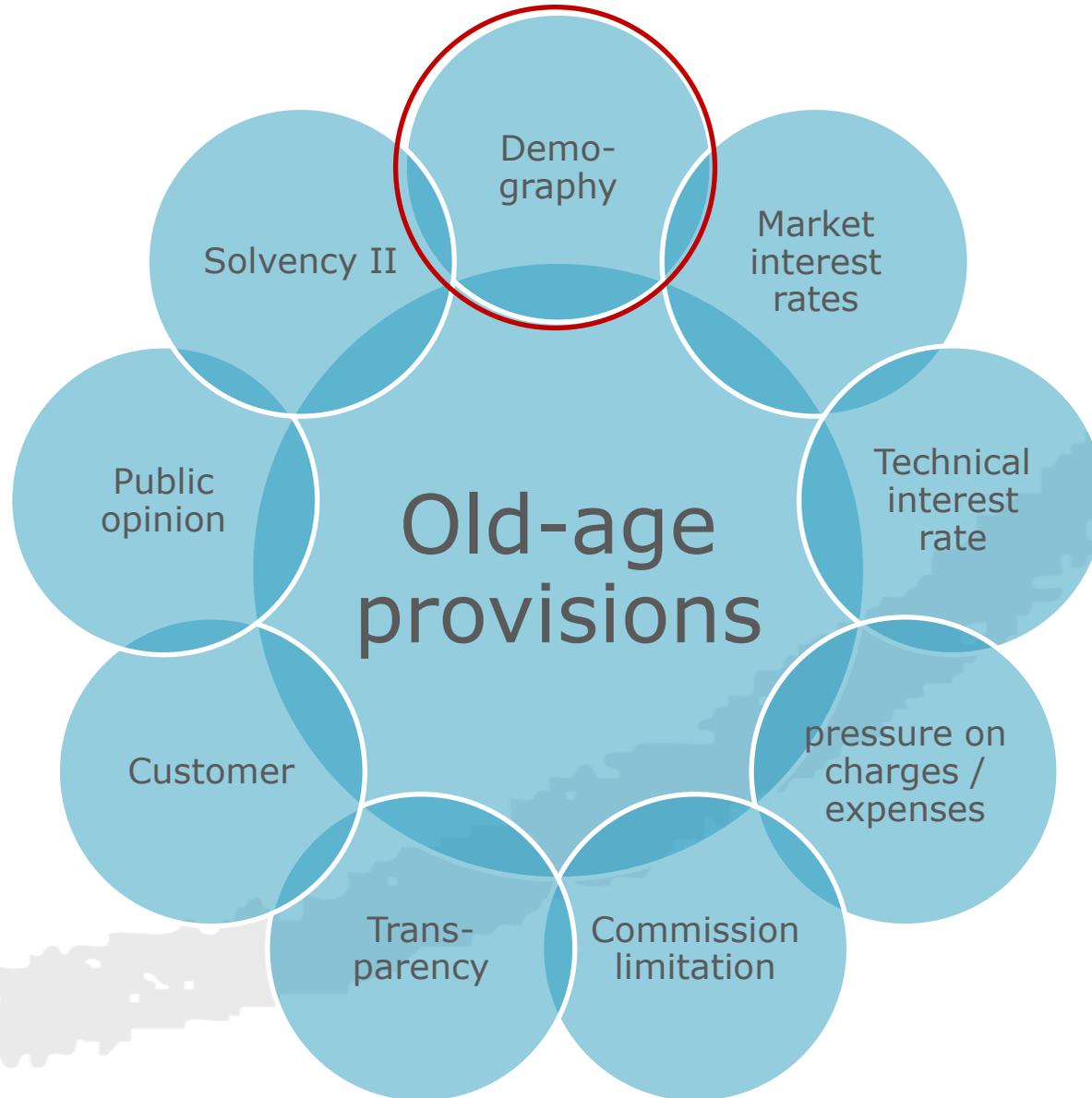
Slides 22-26

Conclusion

Slides 27-28

Introduction

Providers of old-age provision are facing a number of challenges

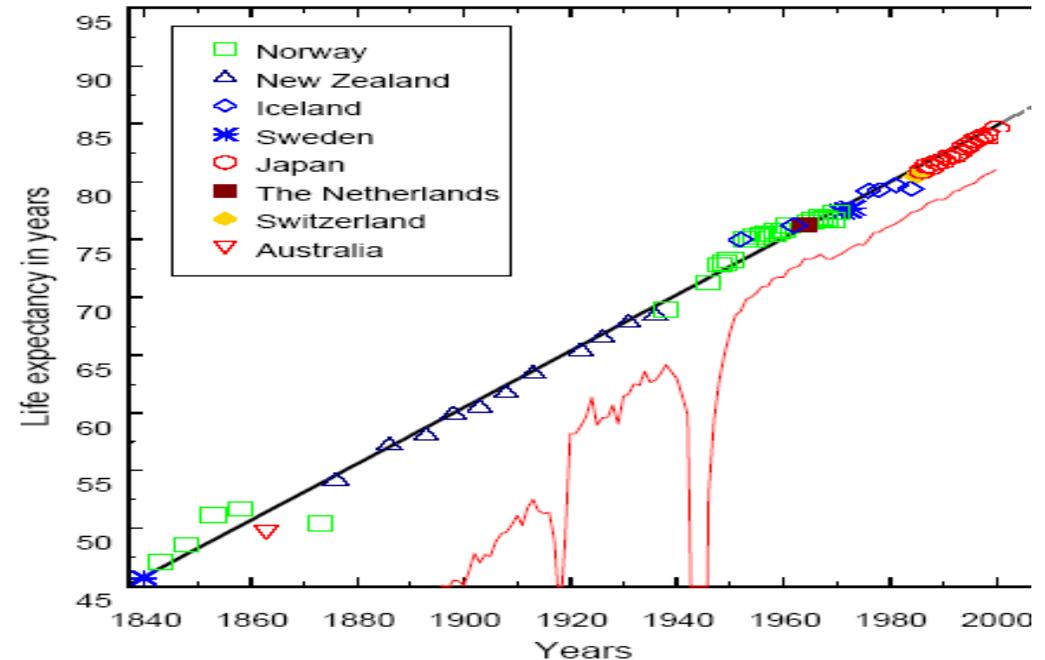


Introduction

Demographic trends – Increasing life expectancy and low fertility rates

- The proportion of seniors in the population will rise significantly
- Reasons
 - 1. Increasing life expectancy
 - 2. Low fertility rate
 - To keep the ratio of „old people“ to „young people“ constant, every woman would need to give birth to 2.1 children
 - e.g. Germany/Austria: 1.3 – 1.4 children per woman

- Breaking the limits – Record Life Expectancy
- Development of life expectancy in the "healthiest" country in the world



Source: Oppen and Vaupel (2002)

Introduction

Demographic trends – Consequences for products

Consequences (can be observed in many countries, although at different pace):

- Importance of pay-as-you-go systems will decrease.
- stronger focus on capital-funded systems
- (tax) incentives set by governments (but only for 'real' old-age provision products)
- Awareness of the population for certain risks will increase (financial risk to outlive your money).

This will change the product landscape:

- rather short-term contracts
- mostly lump sum payments
- low annuitization rates

Past

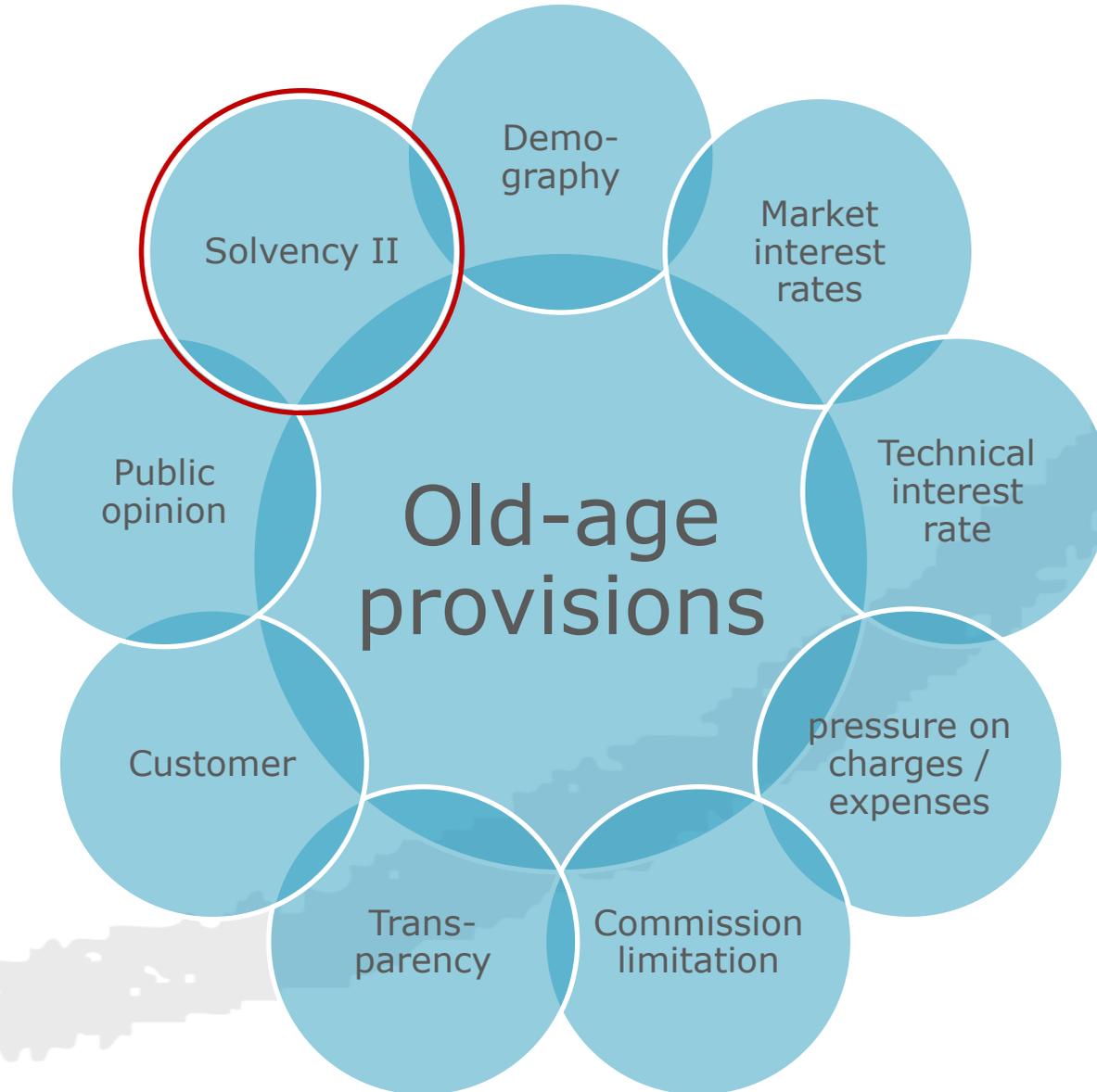


Future

- **long-term** contracts
- considerably higher **annuitization rates**
- **guarantees** are significantly more **risky** for insurers, especially longevity risk resulting from guaranteed annuity factors.

Introduction

Providers of old-age provision are facing a number of challenges



Introduction

Solvency II – The End of Traditional Guarantees?

Many people appear to think that products with traditional guarantees are not sustainable under Solvency II

- One example (Source: Morgan Stanley/Oliver Wyman 2010)

We expect required resources to increase and returns on capital to fall for participating products

Life Product	Total resource requirement ¹	Return on required capital
Traditional participating/with-profits	↑	↓
Unit-linked	↓	↑
Variable Annuities	→	→
Annuities	→	→
Risk	↓	↑

¹ Total resource requirements = technical provisions + solvency capital requirement

We have a different view:

- Profitability and capital requirements of almost all old-age provision products can be massively influenced by suitable product design.
- Therefore, statements by product category are over-simplifying.
- The question is: Which concrete product designs can...
 - conserve the features of traditional products that are important for the policyholder and
 - reduce the insurer's risk and hence capital requirement by eliminating "unnecessary" features?

Introduction

Solvency II – The End of Traditional Guarantees?

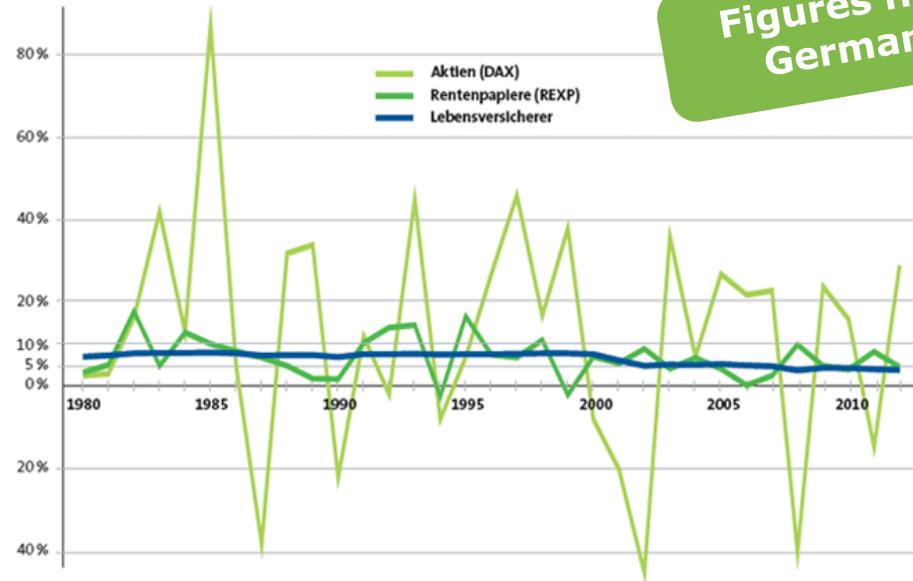
What is the most important feature for the policyholder?

Pooling of risks over different insureds and over time

Biometric risks

Market risks

Kapitalanlage der Lebensversicherer im Vergleich
Jahresrenditen von 1980 - 2012 in %



Figures from Germany

Quelle: Albrecht, P. (2010), GDV



Pooling of market risks also creates value for policyholders!
How can we keep this benefit – but without the typical risks for the insurer?
→ New traditional insurance products



Introduction

Slides 3-8

Product landscape - successes and failures

Slides 9-11

New Traditional Products

Slides 12-21

Alternatives to guarantees instead of alternative guarantees

Slides 22-26

Conclusion

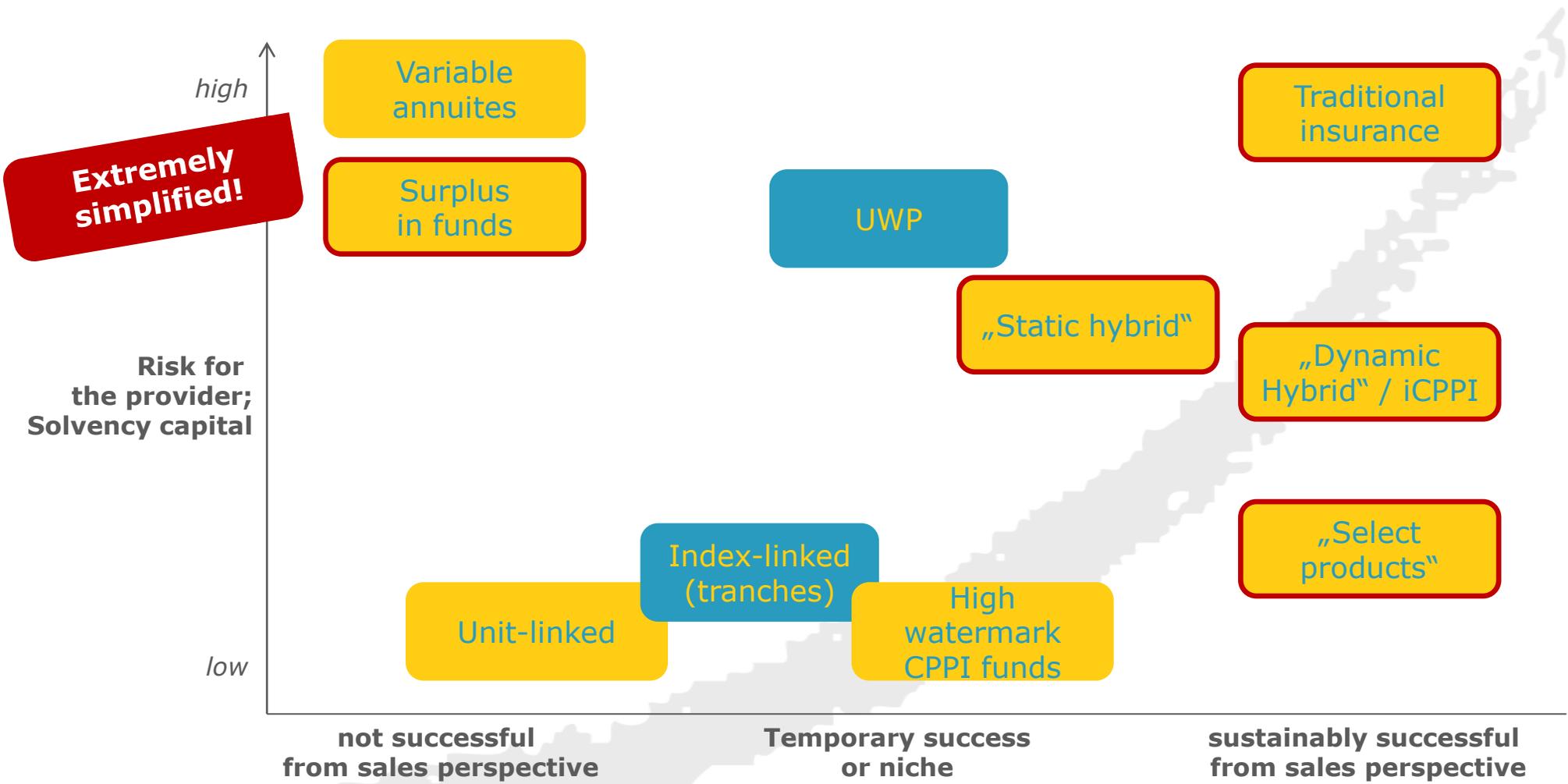
Slides 27-28

Product landscape - successes and failures

Extremely large product variety in German-speaking countries (here: only a selection)



= traditional cover fund required



Product landscape - successes and failures

Conclusion

Demand for unit-linked policies without guarantees is limited.

Sustainably successful products are based on a traditional "cover fund".

- However, in the current environment, traditional guarantees are risky and "expensive" for the provider under Solvency II .

Main question:

Which new approaches exist for sustainably successful and manageable products?

In our opinion, a very important constraint: Can risks from the existing book of business be reduced by "mixing" with new business?

- **Interactions with the existing portfolio** have to be considered.
- For most insurers, it would be a strategic mistake to discontinue sales of traditional products since this neglects the possibility to reduce existing risks by new business strategies.

Therefore, it is desirable (also from the policyholder's perspective) to develop **risk-reduced traditional products!**

Introduction

Slides 3-8

Product landscape - successes and failures

Slides 9-11

New Traditional Products

Slides 12-21

Alternatives to guarantees instead of alternative guarantees

Slides 22-26

Conclusion

Slides 27-28

New Traditional Products

Product example 1: „Select“ products – modern Products on a traditional basis

Case Study
from Germany

So called „Select“ products are capital efficient when designed right.

Policyholder's perspective

- Index-based insurance, but no tranche product
- Policyholder selects each year between
 - participation in an index (with a money back guarantee) and
 - participation in traditional surplus rates
- Plus: a guarantee upon maturity only from the insurer
- Different designs exist

Insurer's perspective

- technically: traditional insurance product with guaranteed interest rate of 0% (year to year)
 - additional guarantee at maturity only
- If index participation is selected, only surplus is invested in suitable options.
- Even if the policyholder always selects only the "traditional part", the risk of the insurer and the capital requirements are significantly lower than for a "normal" traditional product with the same maturity guarantee.
- Mostly, „yield requirement“ = 0%



„Select“ products are extremely successful in Germany.

(New business premiums for Allianz: 2011: 431,6 Mio €; 2010: 561,4 Mio)

Such products reduce existing risks from the traditional book of business!

New Traditional Products

Case study 1 for „Select“ products

Case Study
from Germany

Interactions with the portfolio – an example (anonymised figures from a consulting project)

- Consider two alternative products in new business
 - Product 1: „Select“ product
 - Product 2: Pure unit-linked product without guarantee

	Portfolio	Product 1 <i>stand-alone</i>	Product 2 <i>stand-alone</i>	Portf. + new bus Product 1	Portf. + new bus Product 2
Own funds	1.200	50	20	1.300	1.225
SCR	1.000	40	10	925	975
Solvency ratio	120%	125%	200%	141%	126%
„Buffer“	+200	+10	+10	+370	+250



→ Statements by product category are over-simplifying – the concrete product design has to be considered.
→ Interactions with the portfolio have to be considered.

New Traditional Products

Product example 2: Capital-efficient traditional products

Case Study
from CH

Many designs of a „**capital-efficient traditional product**“ are possible, e.g.

Policyholder's perspective

- Basically, **indistinguishable from the existing traditional product**:
 - At $t=0$: **same guaranteed maturity benefit, same projected maturity benefit and same guaranteed surrender values**
 - In all illustrated and almost all realistic scenarios also same performance during contract term
 - Only in very „bad years“ total return below technical interest rate possible

Insurer's perspective

- Intelligent decoupling of sum insured, technical interest rate, guaranteed interest rate und policy value
- Mostly, „**yield requirement**“ below technical interest rate, often even 0%
- Significantly lower capital requirement
- Reduction also of the risks resulting from the existing book of business



The policyholder can receive less than in today's product, but only in extremely bad years.

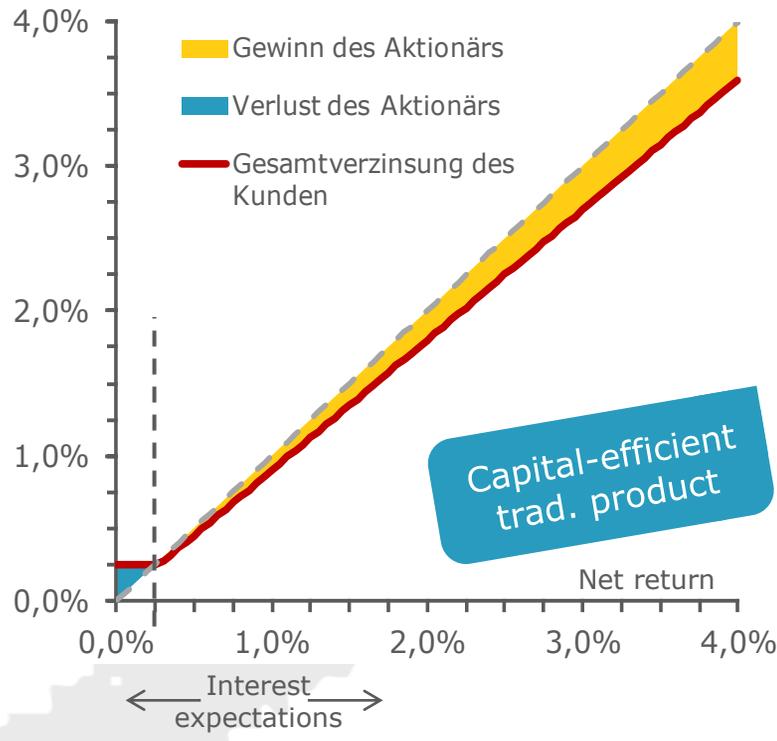
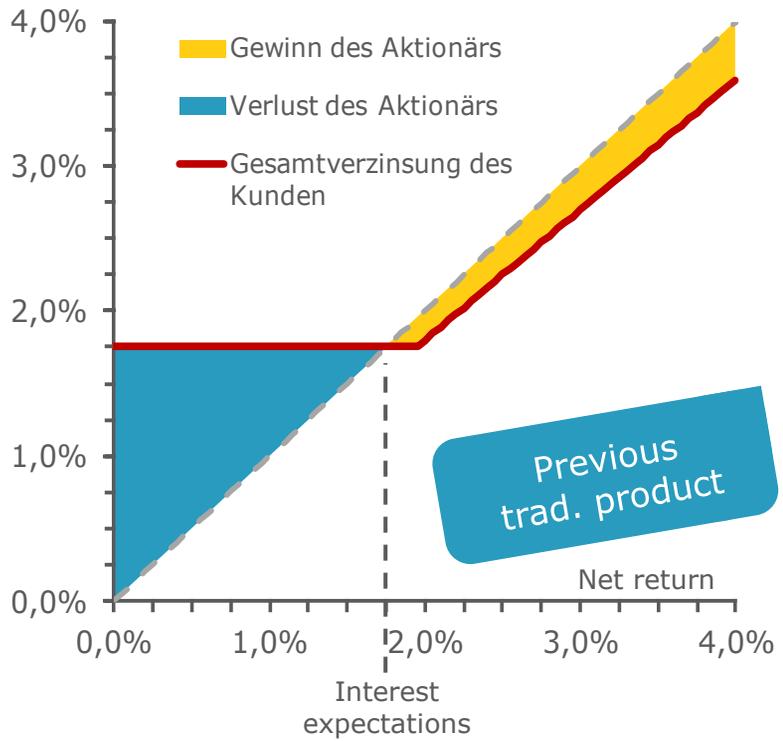
Since extreme scenarios drive the capital requirements under Solvency II / SST, this causes a **massive relief for the insurer**.

New Traditional Products

Case study 2 for capital-efficient traditional products

Case Study from CH

Lower yield requirement results in lower capital requirement.



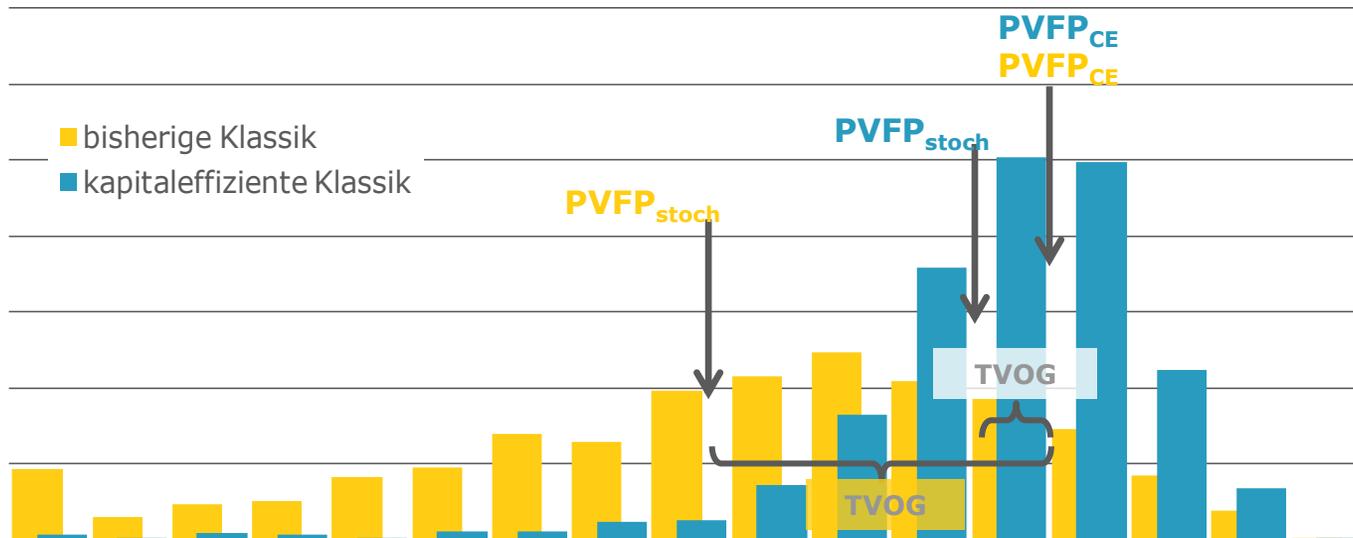
The well-known problem of the asymmetry is reduced, since this asymmetry exists "around the yield requirement".
Insurers will be rewarded for good years, since surpluses reduce the future yield requirement.

New Traditional Products

Case study 2 for capital-efficient traditional products

Case Study from CH

Distribution of present value of shareholder cash flows:



Significantly lower asymmetry for the capital-efficient classical product



TVOG: 80% lower than for the existing traditional product
PVFP increases by 115bp of single-premium.

increase of own funds and reduction of the solvency capital

New Traditional Products

Results from an Academic Paper

Academic Paper

We have analyzed the impact of product design on an insurer's risk situation and capital requirement in an academic paper:

- *Reuß, A., Ruß, J. und Wieland, J.: Participating Life Insurance Contracts under Risk Based Solvency Frameworks: How to increase Capital Efficiency by Product Design. Working Paper, Universität Ulm.*

Three versions of traditional products

- Traditional: Typical traditional product with cliquet, i.e. „year by year“ guaranteed rate = 1.75% as offered, e.g., in D/AT/CH
- Alternative 1: Same guaranteed maturity benefit but only „point to point“. Additionally: „year by year“ guaranteed rate = 0% (like „capital-efficient traditional product“ above)
- Alternative 2: Same guaranteed maturity benefit but only „point to point“. No „year by year“ guaranteed rate, i.e. account value may decrease.

stochastic stock and interest model; asset allocation in stocks and bonds

management rules for bonus declaration, managing hidden reserves, etc.

minimum participation of clients in profits according to German regulation is considered

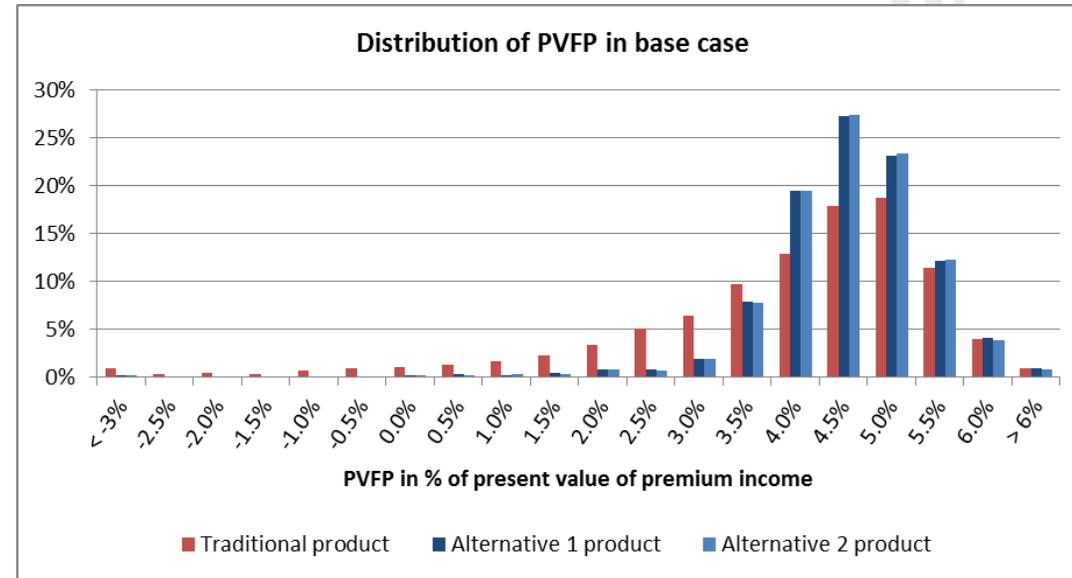
New Traditional Products

Results from an Academic Paper

Academic Paper

Selected results:

	Traditional product	Alternative 1	Alternative 2
<i>PVFP</i>	3.63%	4.24%	4.25%
<i>TVOG</i>	0.63%	0.02%	0.01%
<i>PVFP(stress)</i>	0.90%	2.58%	2.60%
$\Delta PVFP$	2.73%	1.66%	1.65%



- Alternative products: PVFP increased by 17%; TVOG reduced by > 90%.
- Distribution of PVFP more symmetric
- Reduction of PVFP in interest stress (i.e. SCR for interest risk) much smaller.

New Traditional Products

Results from an Academic Paper

Academic Paper

Selected results:

- Changing the type of guarantee (but not the guaranteed amount) has a similar effect as reducing the guaranteed rate from 1.75% to 0.9% within the cliquet product.
 - However, a change in the type of guarantee will probably be perceived as a smaller modification.
- Even if interest rates drop by up to 0.5%, the alternative products are more profitable than the traditional product under unstressed interest assumptions.

- We further carried out several sensitivity analyses, e.g.
 - reduction of interest level by 1%
 - double the stock portion
 - results on next slide

New Traditional Products

Results from an Academic Paper

Academic Paper

Selected results: Sensitivity Analyses

Base case	Traditional product	Alternative 1	Alternative 2
<i>PVFP</i>	3.63%	4.24%	4.25%
<i>TVOG</i>	0.63%	0.02%	0.01%
<i>PVFP(stress)</i>	0.90%	2.58%	2.60%
$\Delta PVFP$	2.73%	1.66%	1.65%
Interest rate sensitivity			
<i>PVFP</i>	0.90%	2.58%	2.60%
<i>TVOG</i>	2.13%	0.78%	0.76%
<i>PVFP(stress)</i>	-4.66%	-1.81%	-1.76%
$\Delta PVFP$	5.56%	4.39%	4.36%
Stock ratio sensitivity			
<i>PVFP</i>	1.80%	3.83%	3.99%
<i>TVOG</i>	2.45%	0.43%	0.26%
<i>PVFP(stress)</i>	-1.43%	1.65%	1.92%
$\Delta PVFP$	3.23%	2.18%	2.07%

Interest rate sensitivity:

- Now, also the alternative products come with a significant TVOG
- However, PVFP/TVOG changes are much less pronounced, i.e. alternative products still much more profitable and less volatile.
- SCR reduction compared to traditional product: > 1 percentage point

Stock ratio sensitivity:

- PVFP decreases /TVOG increases, but changes are stronger for traditional product
- Now differences between Alternative 1 and 2 increase → "year by year"-guarantee of 0% is more risky with higher volatility of asset returns

Introduction

Slides 3-8

Product landscape - successes and failures

Slides 9-11

New Traditional Products

Slides 12-21

Alternatives to guarantees instead of alternative guarantees

Slides 22-26

Conclusion

Slides 27-28

Outlook: Alternatives to guarantees instead of alternative guarantees

Introduction

Ideally, products with guaranteed benefits should not guarantee a certain nominal amount but rather a certain purchasing power.

However, a guarantee of real returns is probably not possible for regular premium contracts if the policyholder is allowed to surrender or stop paying premiums at any time and the insurer may not charge the policyholder if such policyholder actions cause losses.

Still, an interesting question is how products can be constructed where the maturity benefits are somewhat "linked" to inflation.

- assuming a liquid market for inflation linked bonds
- assuming such a market does not exist

Such analyses are performed in Graf, S., Härtel, L., Kling, A., and Ruß, J. (2014): The Impact of Inflation Risk on Financial Planning and Risk-Return Profiles, ASTIN Bulletin, Volume 44, Issue 02, 335-365.

Outlook: Alternatives to guarantees instead of alternative guarantees

Products under consideration

Academic Paper

„Standard“ products

- Products without nominal investment guarantees
 - Investment in equity fund
 - Investment in fixed income (modelled as zero-coupon bond)
- Different products with nominal guarantee
 - **OBPI**: Option based portfolio insurance
 - **CPPI**: Constant proportion portfolio insurance

“Modified” (inflation-linked) products

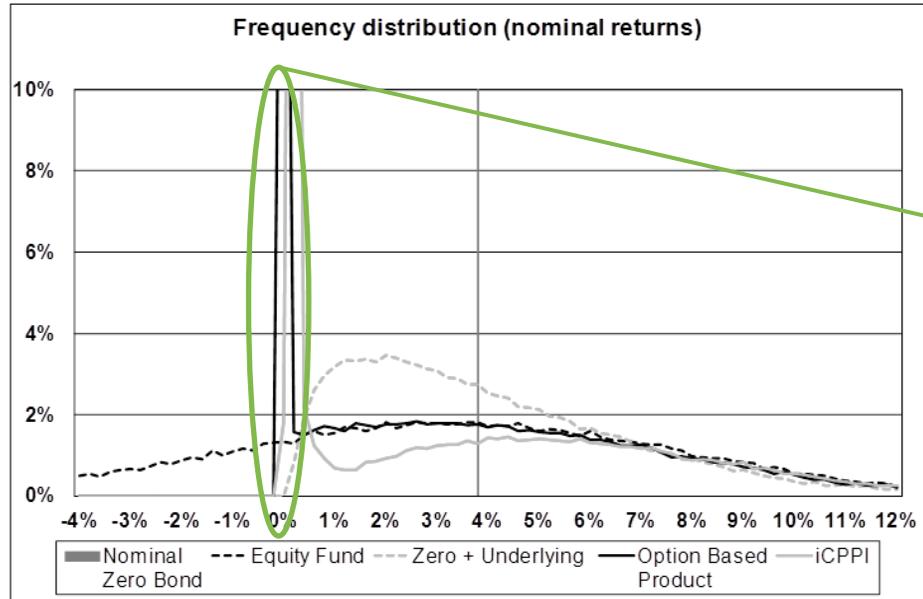
- “Fixed income”
 - Inflation-linked bond
- Modified versions of CPPI
 - Adjustment of floor based on realized inflation
 - Market based adjustment of floor
 - Inflation-linked bond as a safe asset

Outlook: Alternatives to guarantees instead of alternative guarantees

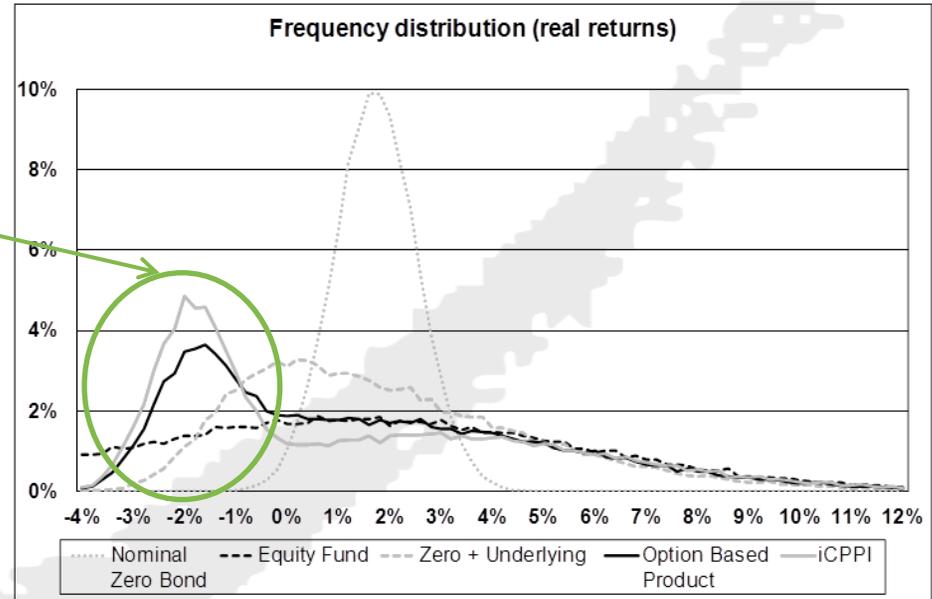
Results – Standard products

Academic Paper

Nominal returns



Real returns



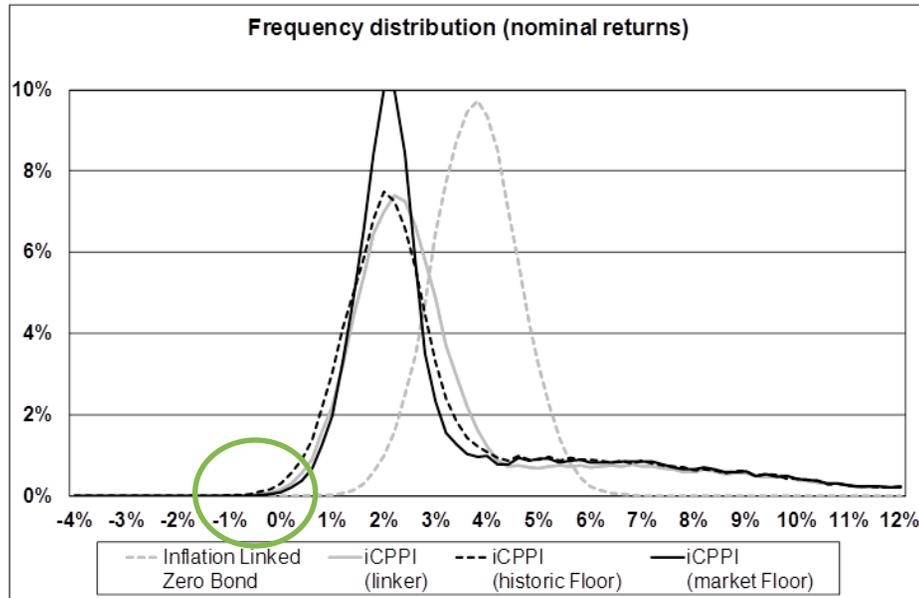
- Products that are considered as particularly „safe“ by the clients can bear a significant inflation risk.

Outlook: Alternatives to guarantees instead of alternative guarantees

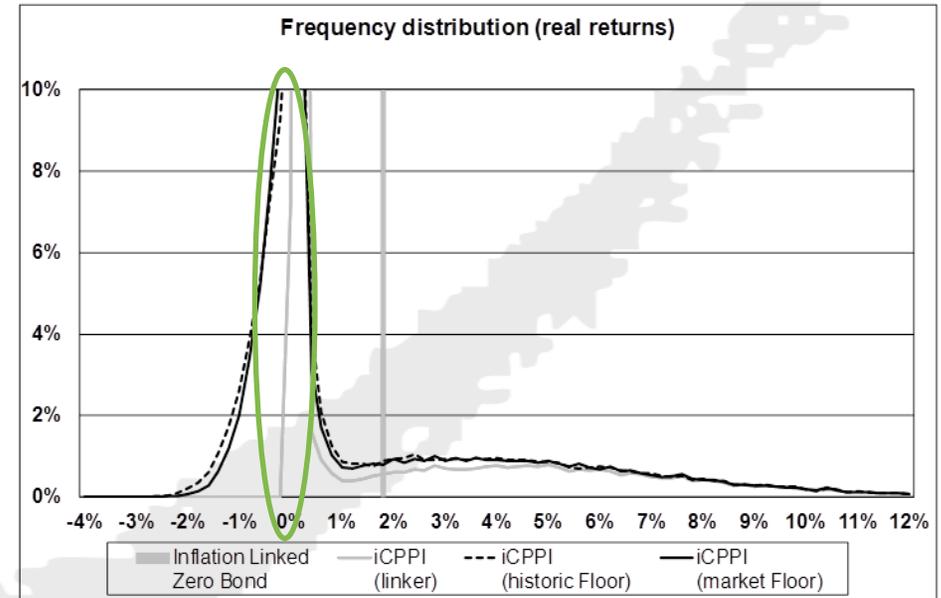
Results – Modified products

Academic Paper

Nominal returns



Real returns



- Inflation risk is significantly **reduced** when „nominal“ risk-free assets are applied.
- Inflation risk can be **eliminated** when inflation-linked risk-free assets exist.

Introduction

Slides 3-8

Product landscape - successes and failures

Slides 9-11

New Traditional Products

Slides 12-21

Alternatives to guarantees instead of alternative guarantees

Slides 22-26

Conclusion

Slides 27-28

Conclusion

- Currently, the insurance industry is facing massive challenges.
- Profitability and capital requirements of almost all old-age provision products can be heavily influenced by suitable product design.
- Sustainably successful products (also unit-linked products with guarantee!) usually need a traditional cover fund.
- Traditional insurance products should therefore not be abolished:
 - "Normal" traditional guarantees are currently risky and expensive under Solvency II.
 - But: Capital-efficient products using the traditional cover fund reduce the risks - also risks from the existing book of business.
- A product strategy should be based on a comprehensive strategic analysis considering interactions with the existing book of business.
- Modern versions of traditional products can be at the center of a product strategy.
- There are still many open questions for both, practitioners and academics!

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