



International Real Estate Business School
Universität Regensburg



Effects of Solvency II on Asset Allocation

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Agenda

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2. Facts on Solvency II Directive
3. Real Estate and Infrastructure in the Portfolio of Insurers
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5. Descriptive Statistics & Methodology
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1. Motivation and Research Objective

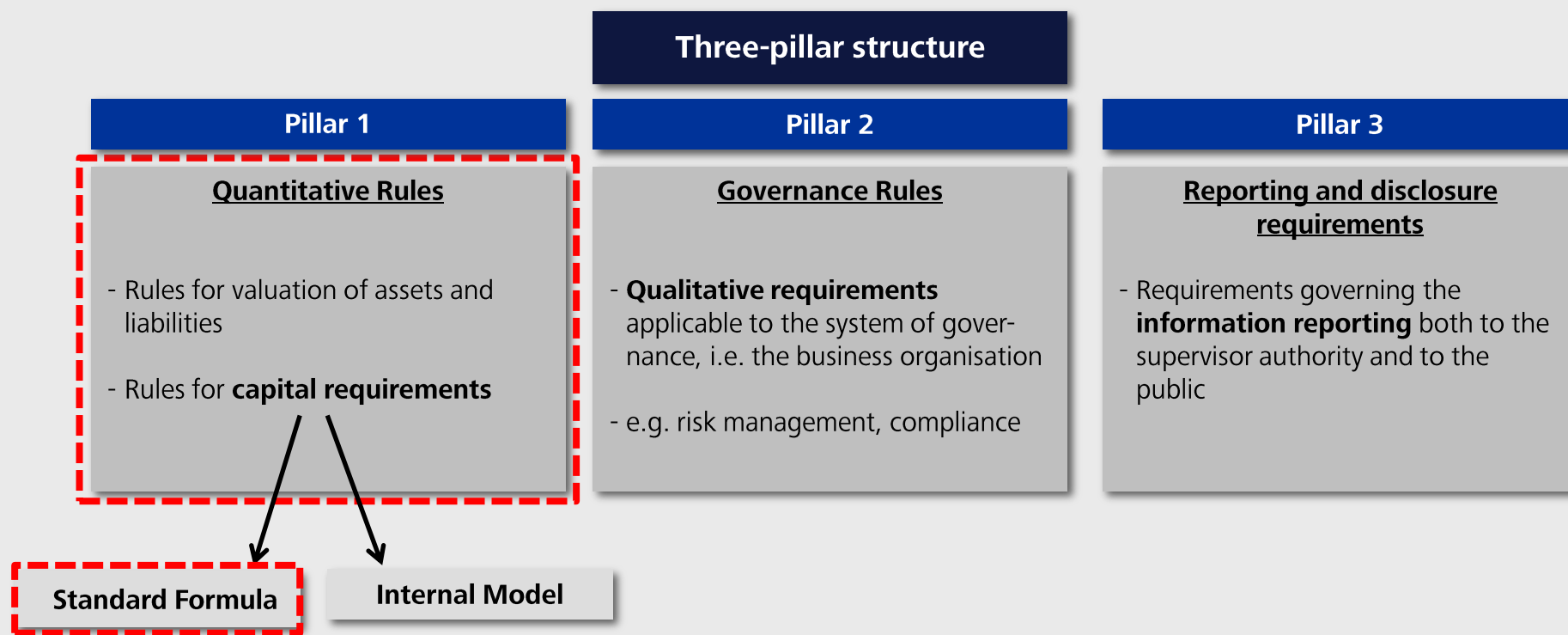
Solvency II may limit insurer's appetite to increase alternative assets' allocation

- **Insurers** hold broadly **diversified portfolios** in order to **meet the needs** created by their products (e.g. life-insurance contracts with **high interest rate guarantees**)
- The **current** structural **low-interest** environment encourages insurer to **rethink** their **asset allocation** and to **increase** their **exposure** to **alternative asset classes**, such as **real estate** and **infrastructure**
- However: **Solvency II could counteract** this scenario:
 - Solvency II introduces a **risk based** regulatory standard for European insurance companies, forcing insurers to hold more Economic Capital (i.e. **Solvency Capital Requirement - SCR**)
 - The regulator seems to **overstate** the risk and therefore the capital requirements for real estate and infrastructure investments, the regulator also tries to explain the risk of a variety of individual portfolios with one single figure (lump sum approach)
 - If insurers have to **minimize their SCR**, one possible field of action is therefore to reallocate their assets
 - Most likely, the “SCR-optimal” allocation will **not be in line with** the **conventional** optimal **asset allocation**, hence Solvency II will probably lead to **inefficient** capital allocation **in practice**
- **Research Gap:** only **few** empirical studies on portfolio effects, **no paper** with focus on **real estate** and **infrastructure**
- **Research Objective:** Will Solvency II affect the portfolio weights of direct real estate and infrastructure investments?

2. Facts on Solvency II Directive (1)

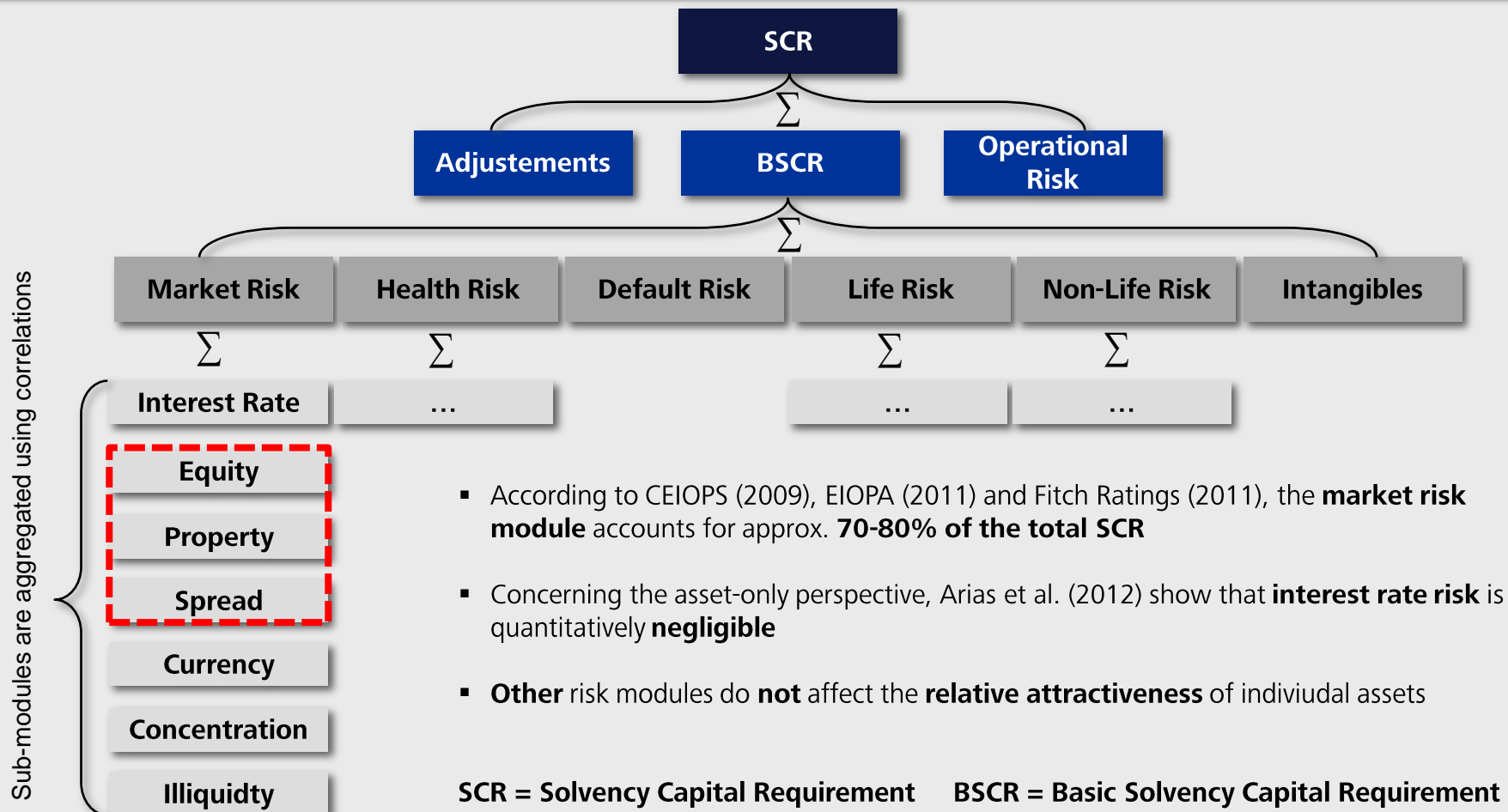
Solvency II Directive – Three Pillar Structure

- **Solvency II** defines **capital** and **risk management requirements** for European insurance companies (start date January 2016)
- **Main goal:** increase **protection** of policyholders by reducing the **probability** of insurers to become **insolvent**
- **Structure:**



2. Facts on Solvency II Directive (2)

Standard Formula - Overview



2. Facts on Solvency II Directive (3)

Standard Formula – Solvency Capital Requirements (SCR) by Asset Class

- **Solvency Capital Requirements (SCR)** are calculated by the regulator (**EIOPA**) for **individual** assets using **historical data**
- **Shock factors** reflect the **VaR** with a confidence interval of **99.5%** for a time horizon of **one year**
- While “**Property Risk**” is clustered in a separate sub-modul, **infrastructure risk** is part of the sub-modul “**Equity Risk**”
- **Equity Risk Module** is split in Type 1 and Type 2 equities, **correlation** between the two equity modules = **0.75**
 - **Type1** = equities listed in regulated markets (**EEA, OECD**), **-39%**
 - **Type 2** = others, e.g. hedge-funds, private equity, alternative investments (**infrastructure**), **-49%**

Risk Category	Equity	Property	Spread
SCR	-39% to -49%	-25%	tbc%
Correlations	Equity	Property	Spread
Equity	1		
Property	0.75	1	
Spread	0.75	0.5	1

Spread Risk		Duration						
		1Y	2Y	3Y	4Y	5Y	10Y	15Y
Credit Quality Step / S&P Rating	0 / AAA	0.90%	1.80%	2.70%	3.60%	4.50%	7.15%	9.65%
	1 / AA	1.10%	2.20%	3.30%	4.40%	5.50%	8.40%	10.90%
	2 / A	1.40%	2.80%	4.20%	5.60%	7.00%	10.50%	13.00%
	3 / BBB	2.50%	5.00%	7.50%	10.00%	12.50%	20.00%	25.00%
	4 / BB	4.50%	9.00%	13.50%	18.00%	22.50%	35.05%	44.05%
	5-6 / Lower BB	7.50%	15.00%	22.50%	30.00%	37.50%	58.50%	61.15%
	Unrated	3.00%	6.00%	9.00%	12.00%	15.00%	23.25%	25.90%

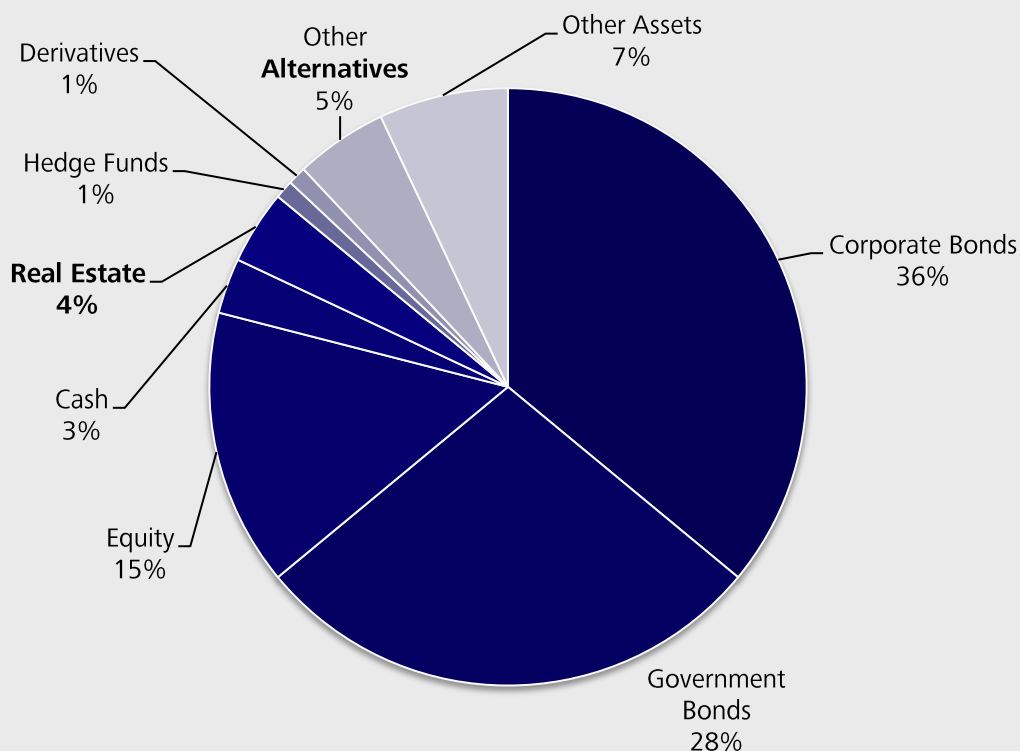
Source: EC (2010), CEIOPS (2010), EIOPA (2012)

Own calculations based on EIOPA (2012)

3. Real Estate and Infrastructure in the Portfolio of Insurers

Actual Portfolio Allocation of direct Real Estate and Infrastructure

European Insurer's Asset Allocation (2011)



- **Real estate** and **infrastructure** make up only a **small share** of the total portfolio
- **Insurers** have **increased real estate** and **infrastructure** allocations in the past years
- **Recent** survey and studies suggest the following **actual portfolio** allocations (Mercer, 2013; Steinbeis, 2012; Preqin, 2013; EY, 2014).
- Using the SII Standard Formula, a representative portfolio requires a **SCR of approx. 10,5%**

Real Estate
approx. 5%

Infrastructure
approx. 2%

Source: Insurance Europe and Oliver Wyman (2013)

4. Data Description

Quarterly Total Return Data – Q1 1993 to Q4 2013

Direct Real Estate

- IPD UK Total Return Index, unsmoothed (in EUR)

Listed Real Estate

- GPR 250 World Total Return Index

Infrastructure

- Transaction-based European direct Infrastructure Index, provided by CEPRES

Money Market

- JP Morgan Euro Cash Total Return Index (0.1Y)

Corporate Bonds

- Citi Group US Big Corporates A 7-10Y Total Return Index (in EUR)

Government Bonds

- REXP Performance Index (mixed German Bunds with 1-10Y)

Stocks

- MSCI EMU Total Return Index

5. Descriptive Statistics & Methodology

Markowitz-optimal Portfolios are calculated, both, with empirical covariances AND SII imposed covariances

Empirical Correlations	Direct Real Estate	Listed Real Estate	Infra-structure	Money Market	Corp. Bonds	Stocks (Europe)	Govt. Bonds
Direct Real Estate	1.00						
Listed Real Estate	0.56	1.00					
Infrastructure	0.26	0.14	1.00				
Money Market	-0.08	-0.07	0.37	1.00			
Corp. Bonds	-0.13	-0.02	-0.03	-0.05	1.00		
Stocks (Europe)	0.39	0.55	0.25	-0.05	-0.05	1.00	
Govt. Bonds	-0.18	-0.21	0.06	0.28	0.24	-0.33	1.00

Mean(Return):	2.19%	2.58%	1.47%	0.87%	1.93%	2.66%	1.42%
STD (Return):	5.61%	9.60%	0.90%	0.57%	5.62%	10.76%	1.91%

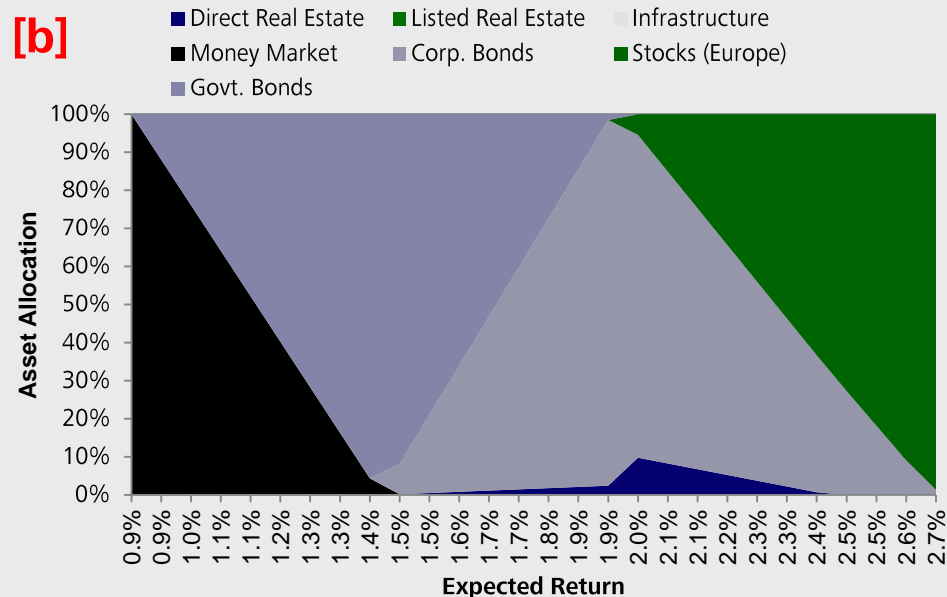
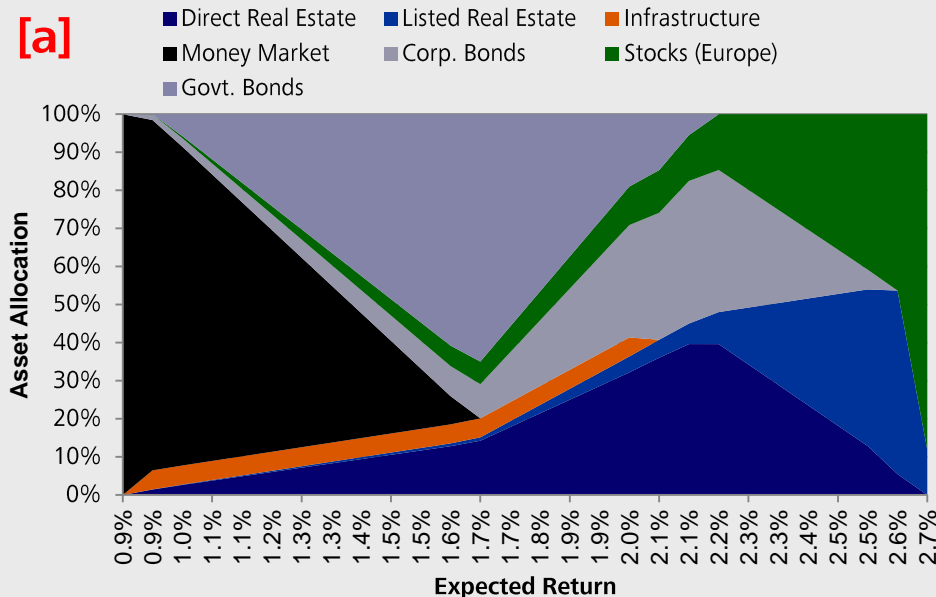
Solvency II Correlations	Direct Real Estate	Listed Real Estate	Infra-structure	Money Market	Corp. Bonds	Stocks (Europe)	Govt. Bonds
Direct Real Estate	1.00						
Listed Real Estate	0.75	1.00					
Infrastructure	0.75	1.00	1.00				
Money Market	0.50	0.75	0.75	1.00			
Corp. Bonds	0.50	0.75	0.75	1.00	1.00		
Stocks (Europe)	0.75	1.00	1.00	0.75	0.75	1.00	
Govt. Bonds	0.50	0.75	0.75	1.00	1.00	0.75	1.00

Mean(Return):	2.19%	2.58%	1.47%	0.87%	1.93%	2.66%	1.42%
SCR (Solvency II):	25.00%	39.00%	49.00%	0.09%	9.10%	39.00%	0.00%

- As mentioned before, SII imposes asset-class **individual capital requirements** (SCR) as well as **aggregations rules** (inter-asset correlations)
- We combine both figures to a **synthetic covariance matrix** in order to derive a counterpart to the **empirical covariance matrix**
- Both matrices are incorporated into a Markowitz Portfolio-optimization, first in separate steps (**[a]** min. STD **[b]** min. SCR) and finally simultaneously (**[c]** min. STD s.t.: SCR < c; with c as an upper boundary)
- To obtain realistic portfolio weights, we also set certain investment limits (i.e. infrastructure is capped at 5%)

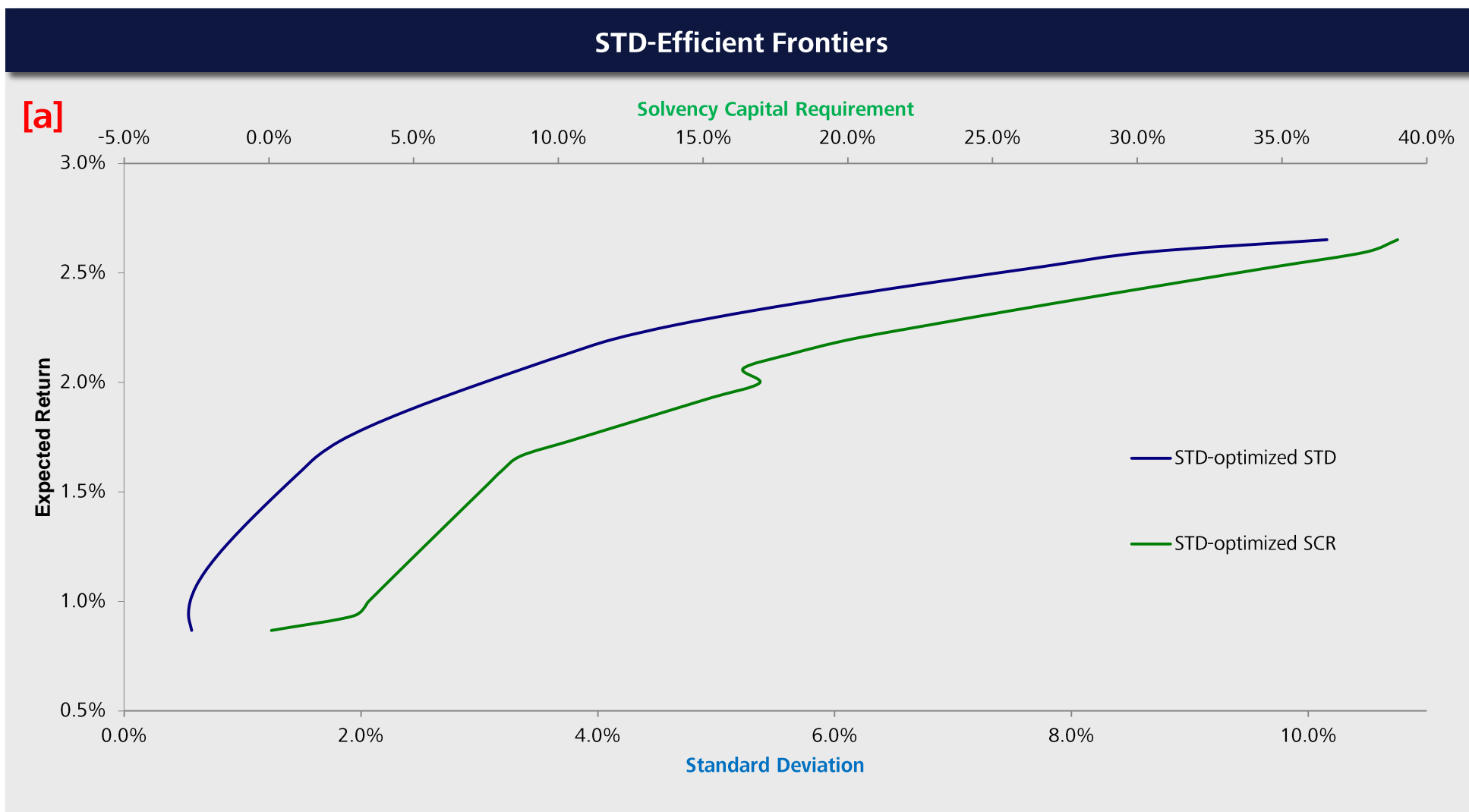
6. Results (1)

Resulting Portfolio Weights

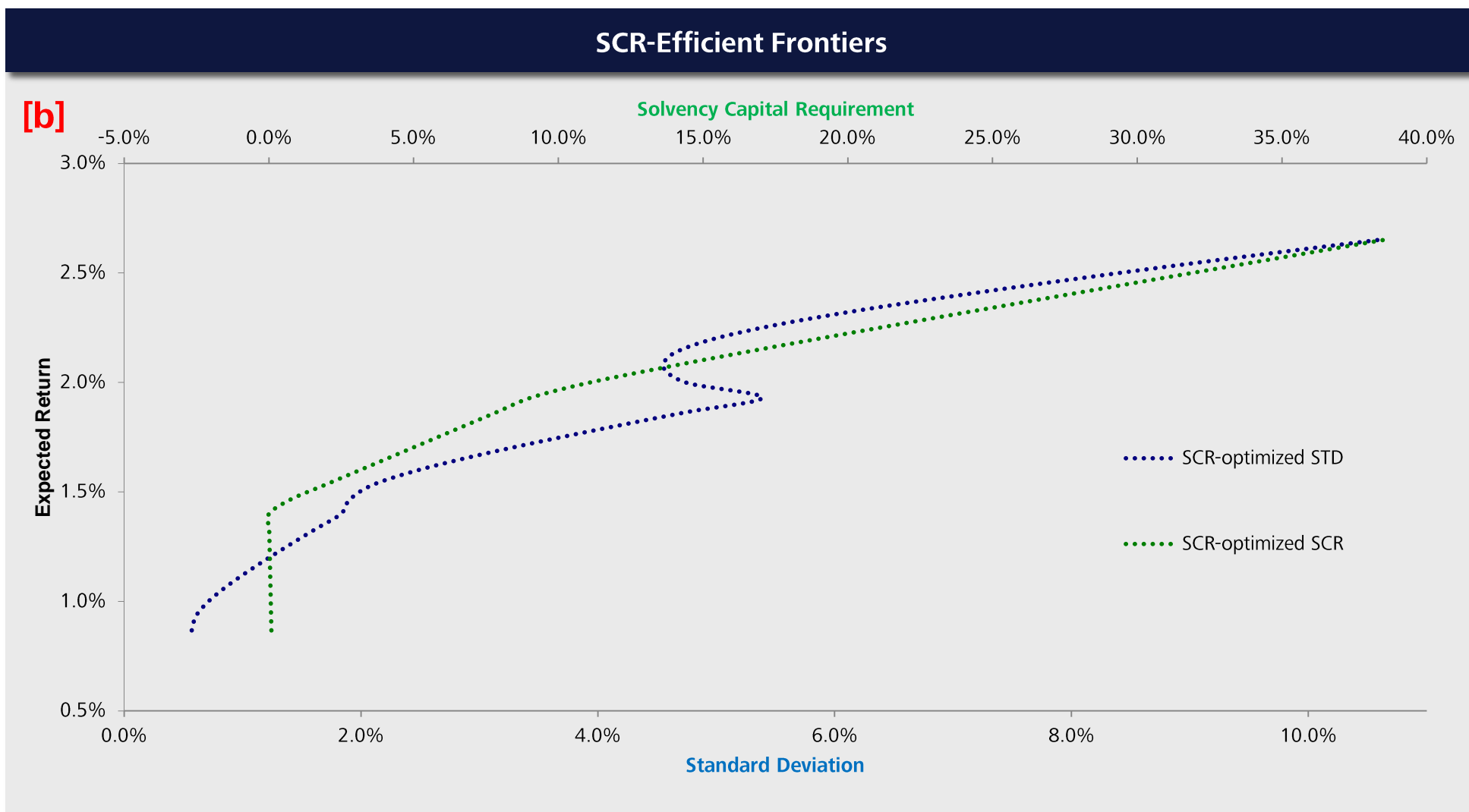


- As scenario **[a]** shows, efficient portfolios comprise real estate and infrastructure assets over almost the **whole spectrum of target returns**; both asset classes prove potential to diversify the portfolios and to deliver high risk adjusted returns
- In scenario **[b]**, real estate weights are **diminishing** and infrastructure is **completely taken out** of the allocation, due to high regulatory correlation figures and capital requirements
- This first result indicates the **incorrect parameterization** of the SII Standard Formula, which may lead to **inefficient portfolio allocation** and **increasing portfolio risk** – which contradicts the original purpose of the regulation

6. Results (2)

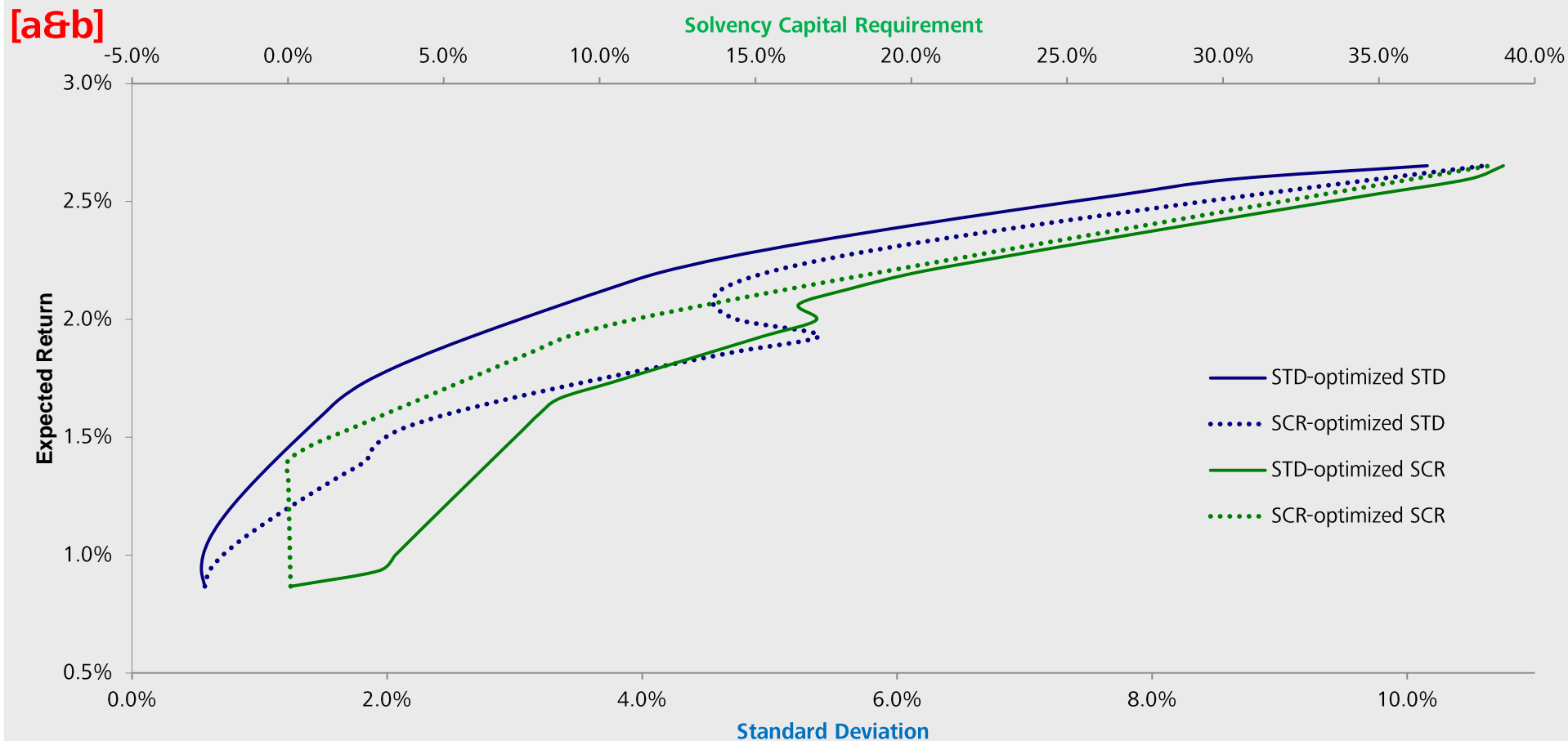


6. Results (3)



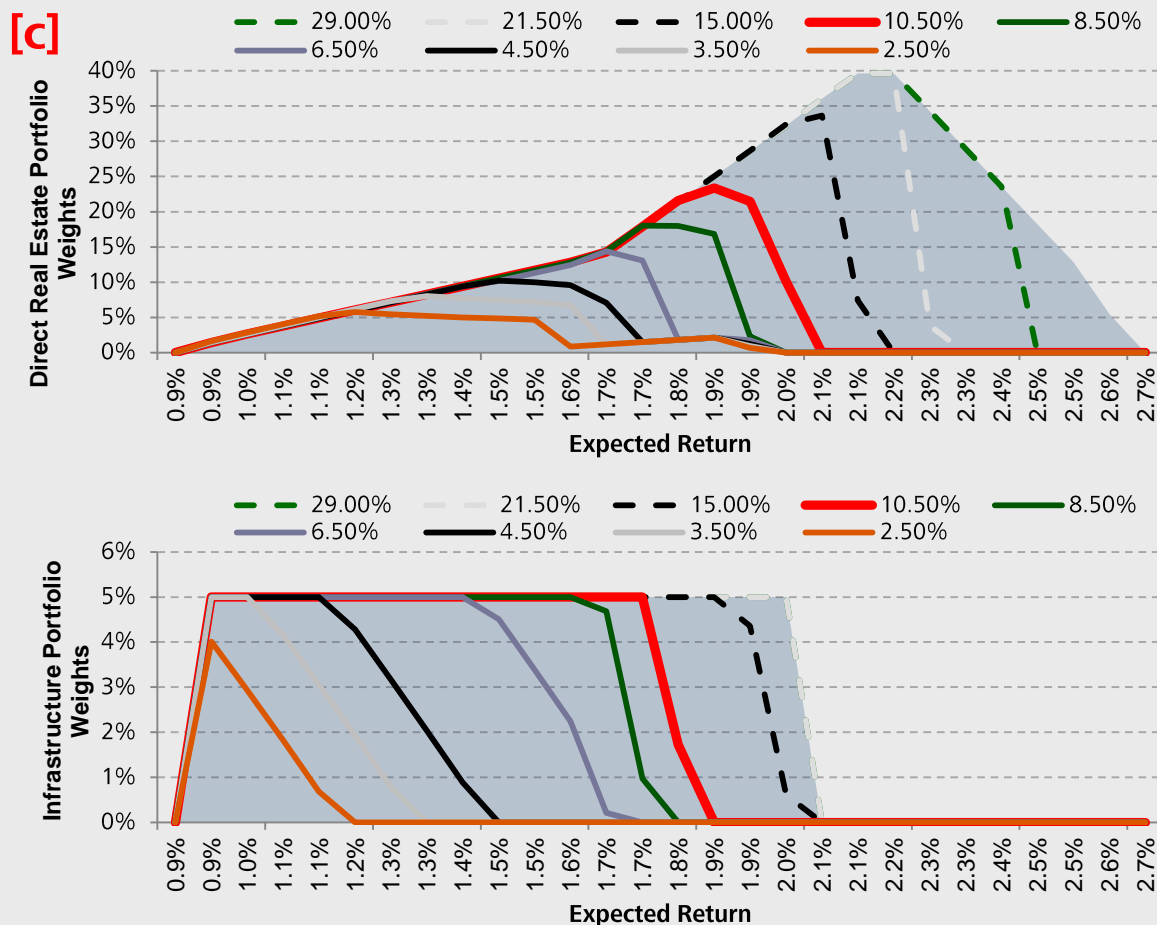
6. Results (4)

Efficient Frontiers – both worlds



6. Results (5)

STD-optimal Real Estate AND Infrastructure Weights – after Capital is restricted



- As mentioned before, the current portfolios allocation of European insurers requires an **SCR of approx. 10.5%** using the SII Standard Formula (red line)
- According to the regulatory authority (EIOPA), **15%** of all European insurers are currently under-capitalized, **further 20%** are at risk of being under-capitalized
- These companies are in need to reduce their **overall SCR**, for which an adjustment of the asset allocation could be a short term instrument
- Especially insurers with quarterly target returns **above 1.5%** and **low capital resources** are in need to reduce their real estate and infrastructure exposures massively, respectively are not able to increase allocations

7. Conclusion

Solvency II may (not) affect Real Estate and Infrastructure Portfolio Weights

- Concerning the capitalization, SII will most likely **not affect** the asset allocation of two thirds of the European insurers, however:
 - The whole insurance industry begins to perceive real estate and infrastructure as “risky” and expensive (from a RoRAC perspective) asset classes
 - In fact, **one third** of the industry **will** be forced to increase their company-wide economic capital OR **to reduce their capital requirements** (SCR), which will most likely **affect the asset allocations**
- Both effects will lead to lower real estate and infrastructure weights and therefore to **higher overall portfolio risk**
- The regulator should provide means to customize the Solvency II Standard Formula for the individual portfolios and investments-needs of the particular insurer (i.e. provide a cost efficient pre-audited **SII-internal model**)
- **Limitations & avenues for further research:**
 - As a residual of assets and liabilities, the Economic Capital should best be analyzed in an **ALM-context** (i.e. interest rate sensitivity on both balance sides must be incorporated [interest rate risk submodul])
 - This is especially important for **life insurance companies**, which exhibit high exposure to interest rate sensitive liabilities
 - However, this paper provides a **basic framework** for further analysis, e.g. **comparison with other risk-based regulatory and rating -regimes** (e.g. Swiss Solvency test, S&P) as well as a first attempt to derive and **test internal SII-models**
 - In this context, the interest rate sensitivity of real estate capital values is of high interest, since real estate **might** be able to hedge against fluctuations in the liability market values



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Thank you for your attention!