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Pension accounting: forecasts for the company's own balance sheet as well as profit and loss account positions based on nested stochastic modelling

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About the speaker



Urs Barmettler, Dr. math. ETHZ, Actuary, pension fund expert SKPE

- Partner allea Ltd.
- Expert Mandates for Swiss Pension Funds



Company/Institution

- Comprehensive Actuarial and Pension Fund Consulting
- International Accounting
- Pension Fund Administration

Objectives of this study

In relation to International Accounting Standards
IFRS, US GAAP and IPSAS

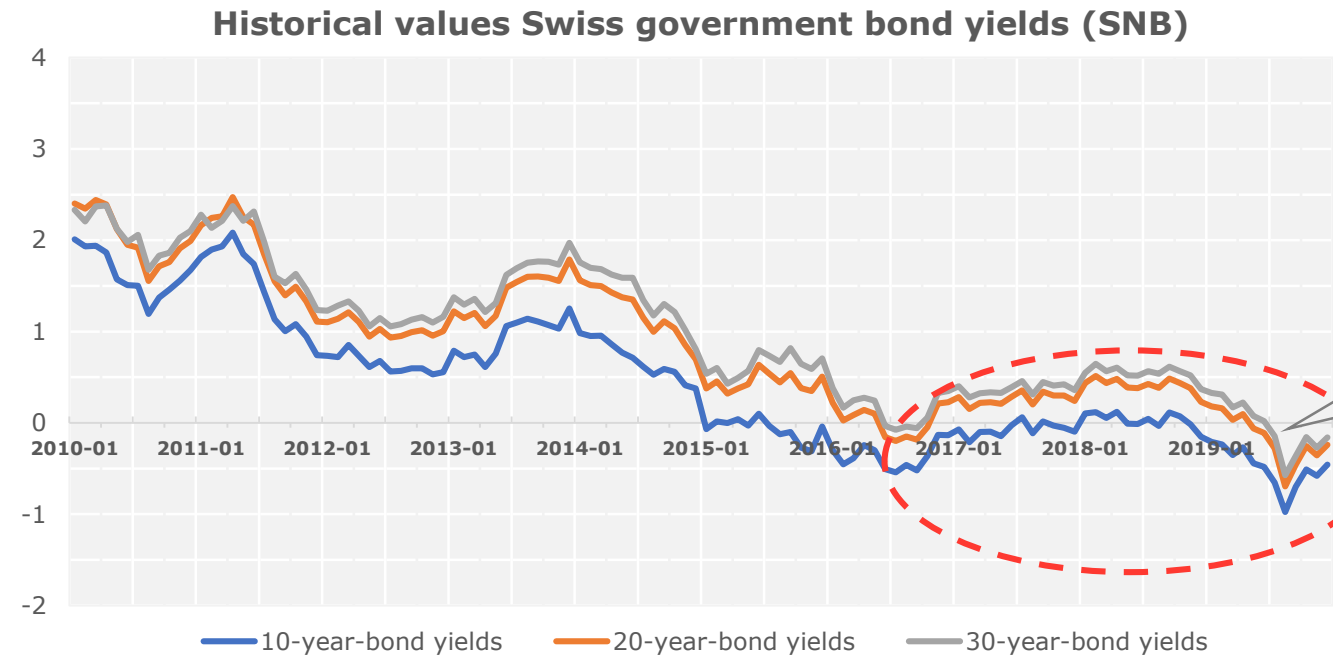
Objectives

- Under IFRS, US GAAP and IPSAS accounting standards, employers must disclose
 - The gap between their plan assets and liabilities on the company's own balance sheet
 - The corresponding impact on the company's profit and loss (P&L) account
 - Defined Benefit Cost recognised in OCI
- To support companies in planning for the financial year-end and preparing budgets for the next years, it is worth:
 - Estimating the company's booking entries over the next 2-3 years
 - The distribution of the company's own balance sheet as well as P&L account positions over the next 2-3 years will help companies prepare their budgets in advance

Reason for a stochastic approach

- The pension liabilities depend on a discount rate based on:
 - IFRS & US GAAP: The AA corporate bond yield of a pension fund specific liability duration – *for private pension funds*
 - IPSAS : The government bond yield of a pension fund specific liability duration – *for public pension funds*
- Swiss corporate bond yields were very volatile during the years 2019 and 2020:
 - Substantially decreased to their historical lows
 - In August 2019 discount rates based on corporate bond yields (17-20 years as duration) were negative
- The approach should use a stochastic term-structure model for setting up the pension fund specific discount rate for future years
 - Next slides with bond yield historical values give deeper insights in this reason

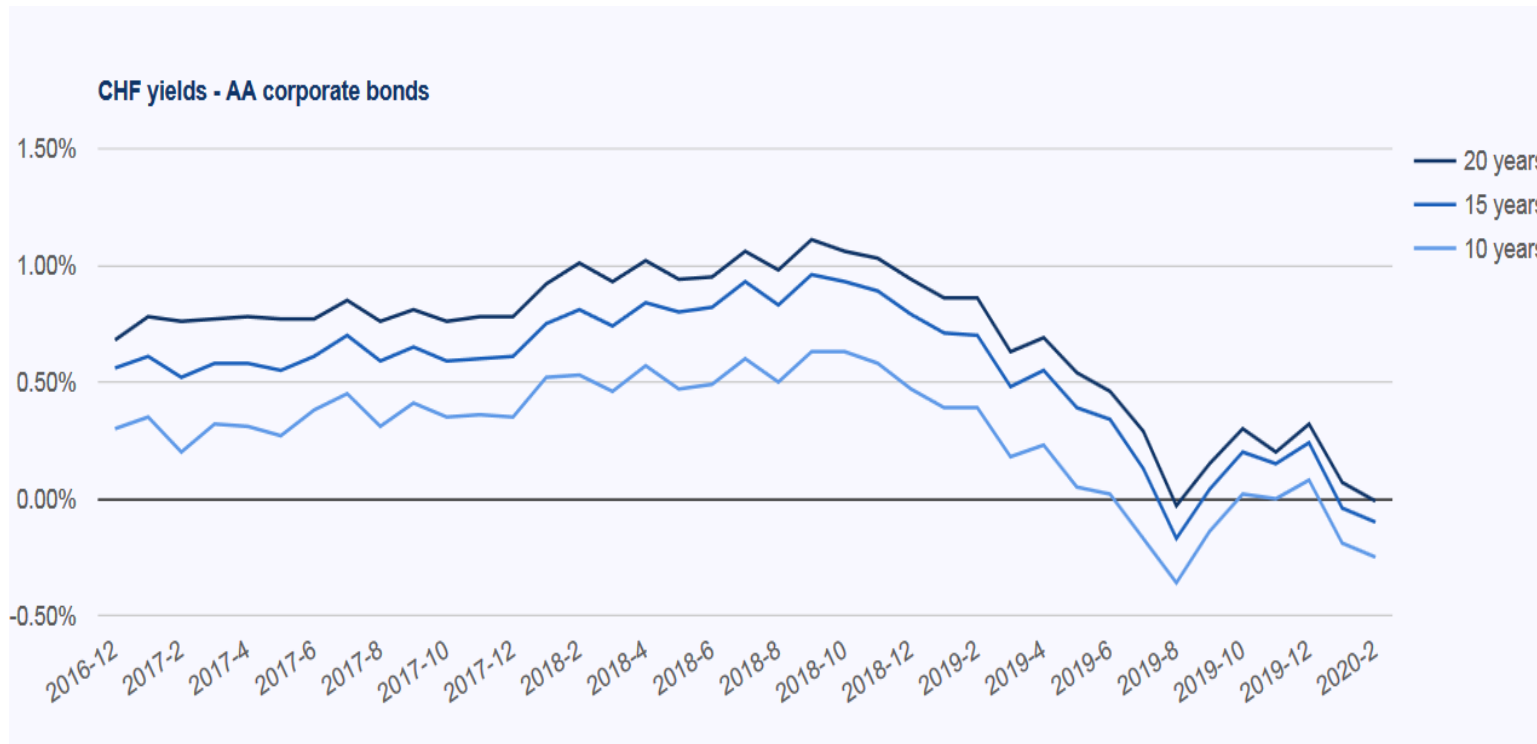
Discount rate for IPSAS Based on Government bond yields



Starting from 2016 the relevant bond yields were below 0.5% and in 2019-2020 even negative

- Discount rate is set up based on the liability duration
- The total liability duration of a pension fund is normally between 15 and 20 years (if no pension indexation implemented)

IFRS: Swiss discount rates used since Dec 2016



- Swiss IFRS discount rates are very low compared to the discount rates in the local accounting (Swiss FER 26, the upper limit is 2.13% per 31.12.2019)

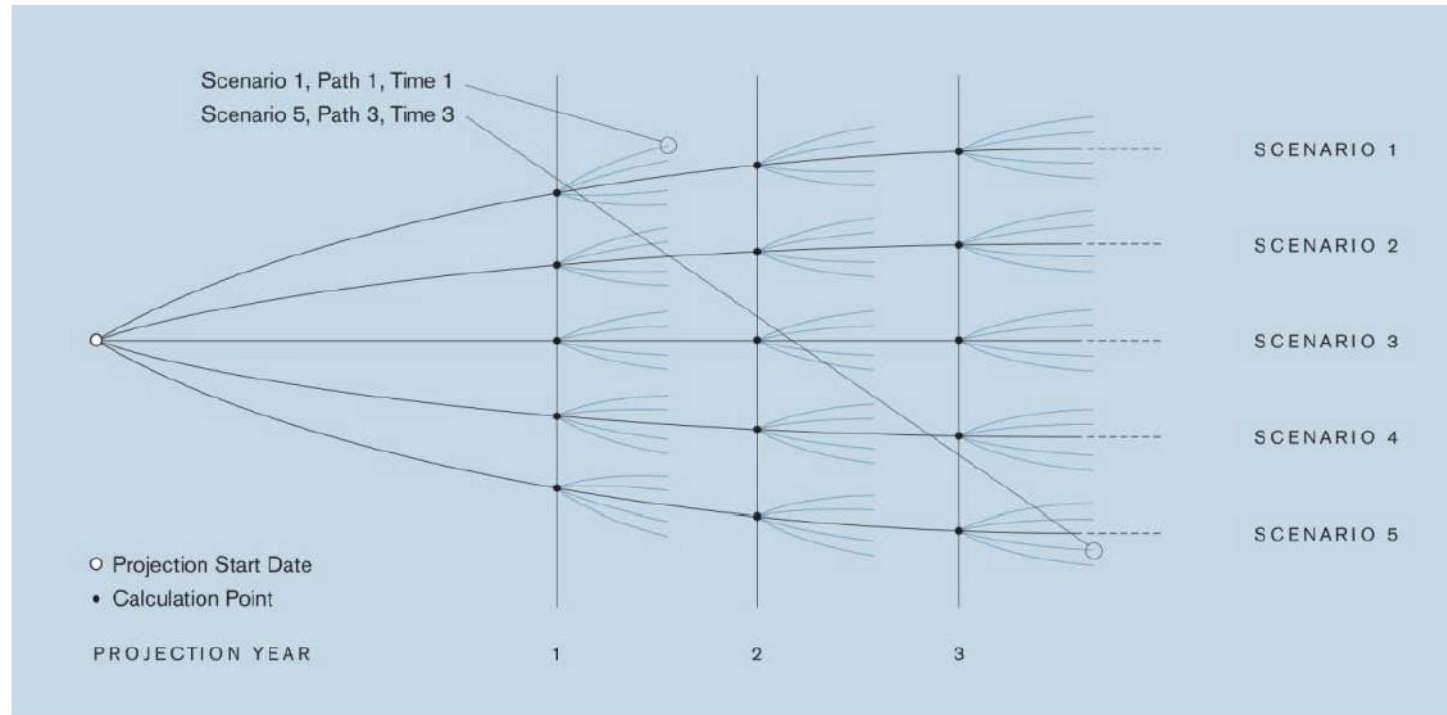
Our Approach

Nested stochastic simulations of pension fund membership mutations

Our stochastic approach implemented

- Our approach implements the nested stochastic modelling for pension fund membership, liabilities and cash flows
 - Pension fund membership mutations impact the experience gain & loss (belongs to OCI position)
- The future discount rates are based on a stochastic affine term-structure model for bond yields
- The duration of pension fund liabilities impacts the choice of the bond maturity
 - The higher the duration – the stronger the impact of discount rate changes
 - The higher the maturity – in general the higher the bond yield

Liability Stochastic Simulations based on Nested Stochastic Projections



Excerpted from "The Future of Capital Modeling," by Pat Renzi, Milliman Insight, Issue 2, 2006.

- Book „Stochastic Modeling: Theory and Reality from an Actuarial Perspective“, ISBN 978-0-9813968-2-8, www.actuaries.org (Milliman)

Fund population impact and its development

- Modelling of active membership
 - Stochastic simulations of leavers, death and disability cases, retirement and new enters
 - The impact of stable and growing population is investigated

- Modelling of pensioner population
 - The pensioner population is open due to the fact that every year new potential retirees, spouses and disabled could enter into the pensioner population
 - Only in case of death all kind of pensioners will quit from the pensioner population
 - Disability annuity is paid up to the retirement age and after the retirement age the disabled will be converted into the retiree state

- Child pensions (orphan, child pension for disabled and child pension for retiree if child younger than 25) will be modelled as a capital payment

Results

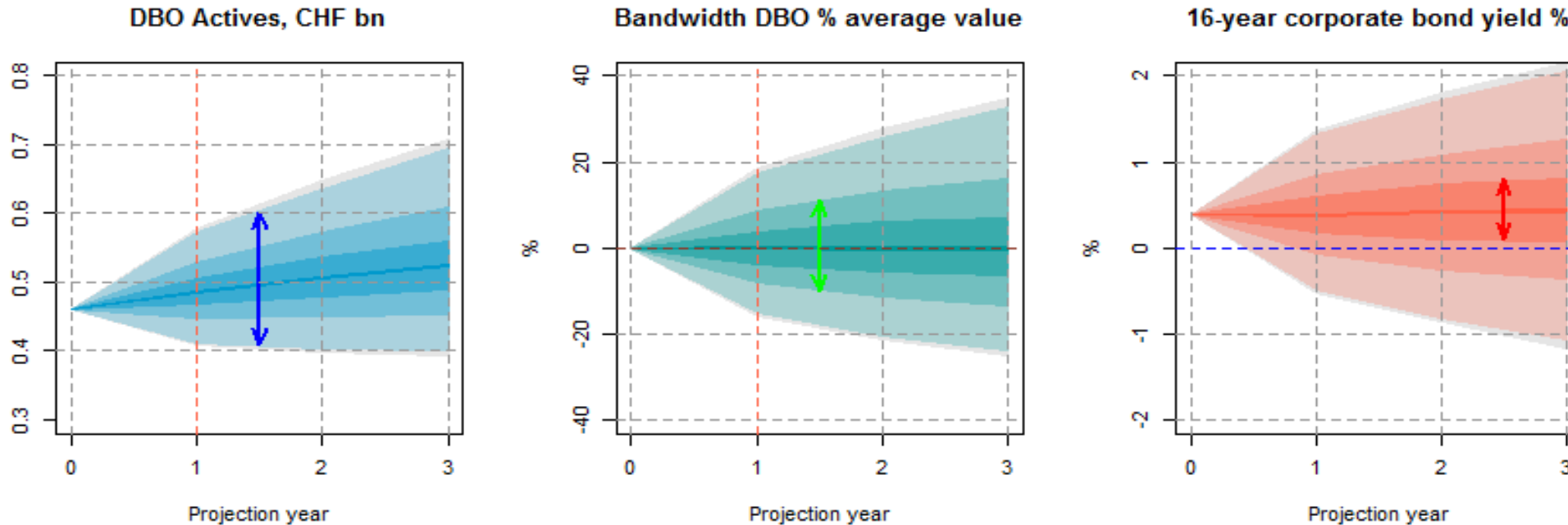
Medium Pension Fund

Big Pension Fund

Examples with Pension Funds

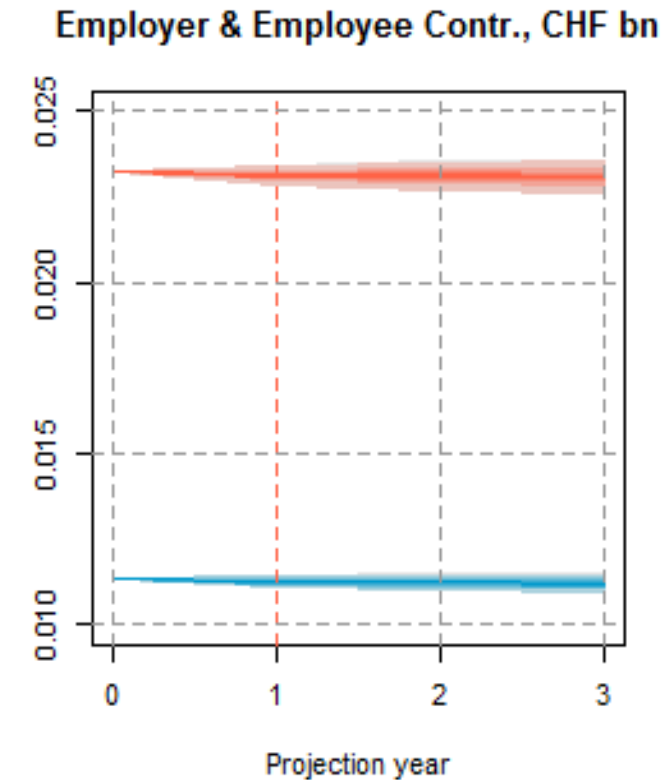
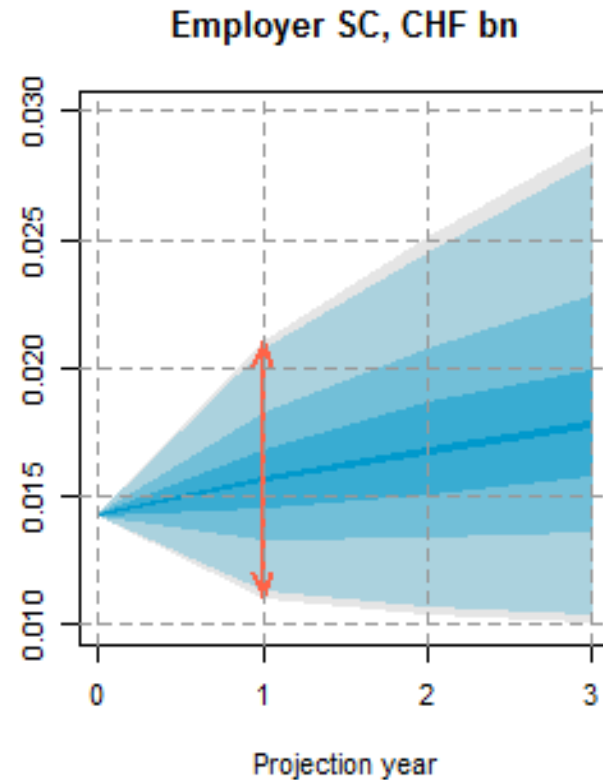
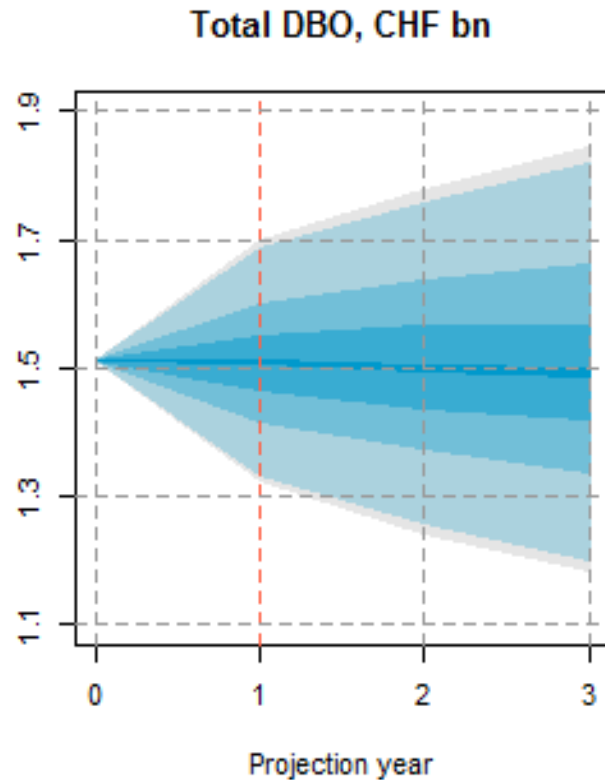
Key metrics	Big pension fund PF1	Medium pension fund PF2
Total head count	ca. 4'500	Ca. 1'500
% head count active membership	82%	49.5%
% pensioner liability % total liability	1/3	2/3
<u>Benefit plan:</u> <ul style="list-style-type: none"> ▪ Saving policy for retirement ▪ Risk benefits (Death & Disability) 	Cash Balance Plan (IC 1.5%) Defined Benefit	The same plan The same plan
Gross Salary development <i>(for development of the active membership)</i>	ca. 4%	ca. 1%
Growth rate active membership <i>(for development of the active membership)</i>	Head count growth rate ca. 1.4%	Head count constant (i.e. growth rate 0%)
Local funding ratio	100%	110%

PF2: Forecast DBO Active Membership



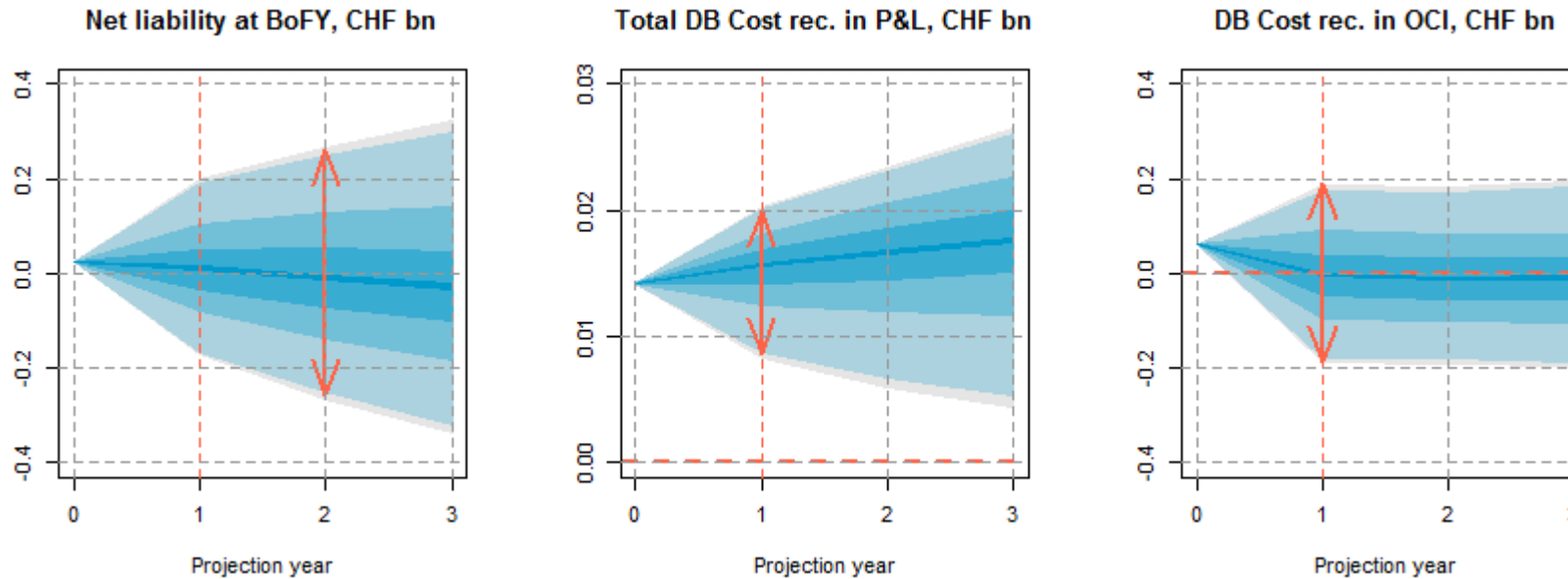
- **PF2:** Swiss medium pension fund (fully autonomous)
- **The position „0“ corresponds to the last valuation per 31.12.2019**
- The liability duration at start (Valuation per 31.12.2019) is 16 years
 - That is why the 16-year corporate bond yield used to determine the discount rate (for IAS19)
- The **blue** bandwidth represent 90% of all results, **green** – 60% and **red** – 30% of all results
 - The darkest lines represent the median (*here between 49 and 51 percentiles*)

PF2: Forecast DBO & Employer SC



- **PF2:** Swiss medium pension fund (fully autonomous)
- It is expected that pension fund active membership does not grow

PF2: Forecast Net Liabilities and DB Cost

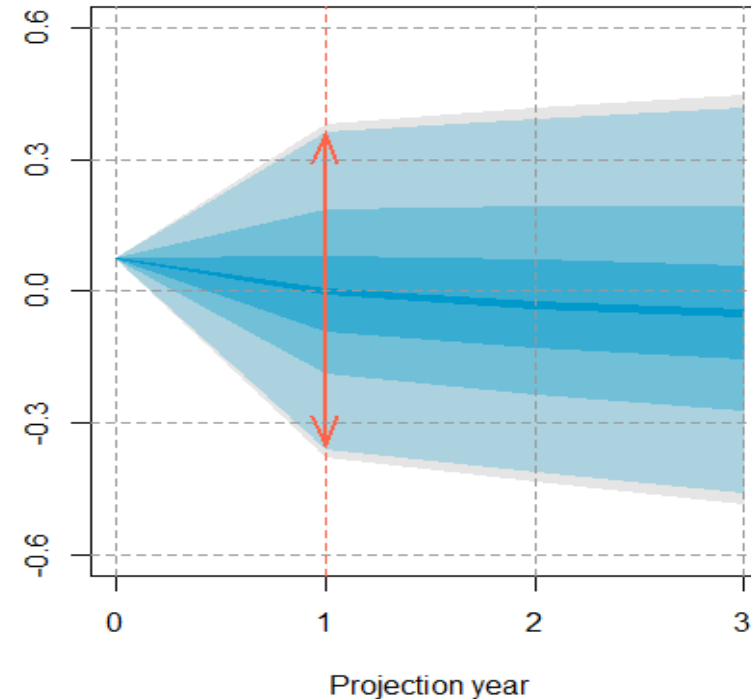


- **PF2:** Swiss medium pension fund (fully autonomous)
- DB Cost – Defined Benefit Cost recognised in P&L and in OCI
- Pension fund assets development (in this example) was implemented with a constant return
 - To get the insight into the impact of pension fund population mutations and stochastic discount rate
 - In a client specific consulting for such forecasts it is worth in a second step to show the impact of a stochastic portfolio return on results

PF2: Booking Entries

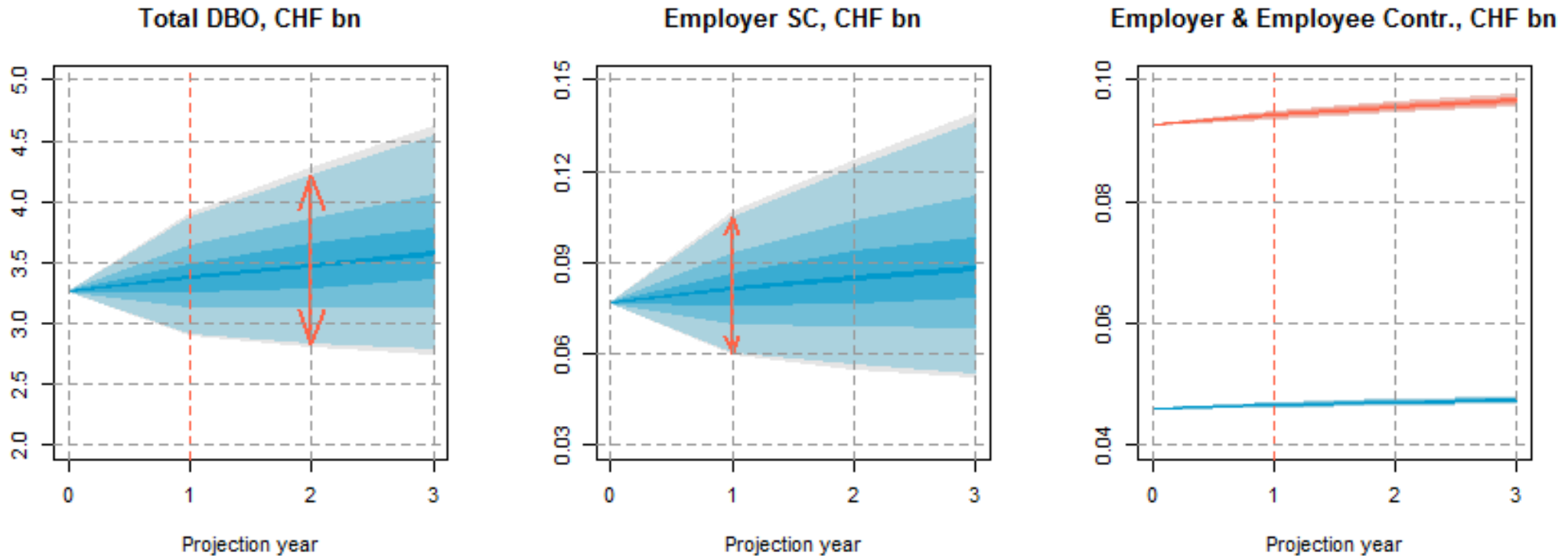
Summary of Booking Entries under IAS19		
1.	Net liability at the beginning of the fiscal year	B/S
2.	Personal & Financial expense during the fiscal year	P/L
3.	Total defined benefit cost recognized in OCI	OCI
4.	Employer contributions / Payments	B/S
5.	Exchange rate differences	OCI
6.	Total	

Total Booking Entries under IAS19, CHF bn



- **PF2:** Swiss medium pension fund (fully autonomous) without growth
- The most important key metrics from the IAS19 Disclosure for the employer

PF1: Forecast DBO & Employer SC



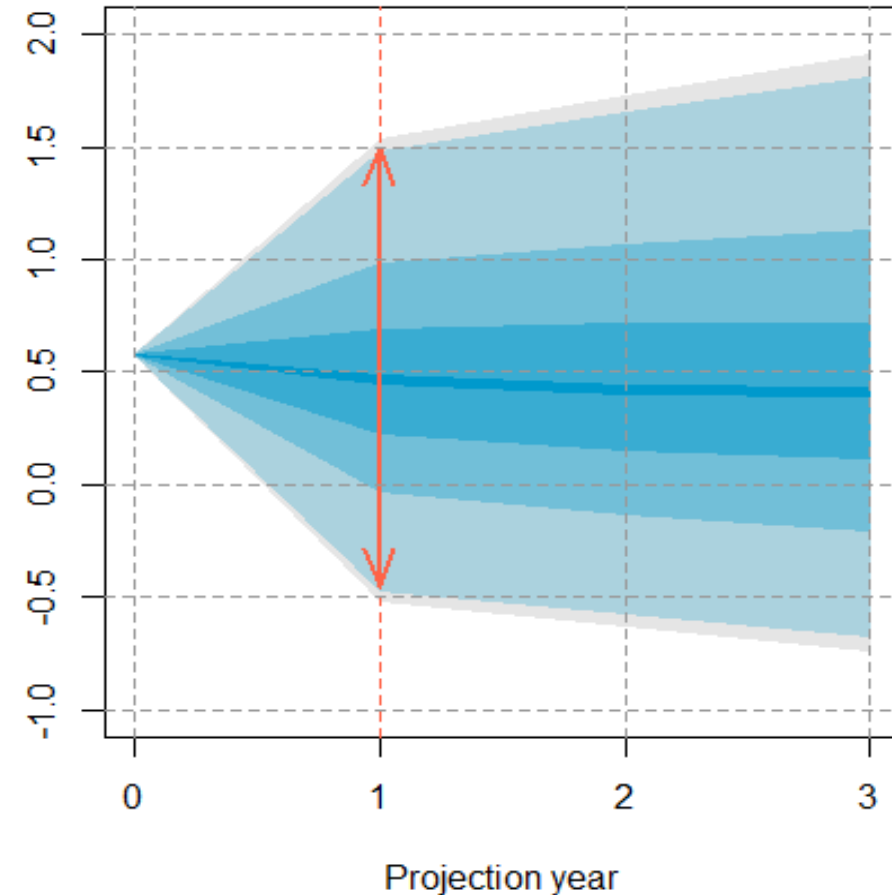
- **PF1:** Swiss big pension fund (fully autonomous) with growth
- The DBO median as well as the Employer SC median have a stronger growth compared to the PF2

PF1: Booking Entries

Summary of Booking Entries under IAS19

1.	Net liability at the beginning of the fiscal year	B/S
2.	Personal & Financial expense during the fiscal year	P/L
3.	Total defined benefit cost recognized in OCI	OCI
4.	Employer contributions / Payments	B/S
5.	Exchange rate differences	OCI
6.	Total	

Total Booking Entries under IAS19, CHF bn



- **PF1:** Swiss big pension fund (fully autonomous) with growth

Summary: value added by this approach

- The nested stochastic projections of liabilities produce more realistic forecast of different key metrics for the local and international accounting standards
- The results are pension fund specific and depend on the size of active membership and pensioner population, on development scenarios, on the benefit plan scope as well as level of the funding ratio (available assets)
- Due to very low (even negative) discount rates it is worth making forecasts of the IFRS/ US GAAP important key metrics (P&L, OCI and other Booking Entities) for the next 1-3 year to let employer be prepared for potential costs
- Due to the fact that the results very pension fund specific – they cannot be used for other pension funds

Thank you for your attention



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