

  
**AFIR**  **MUNICH**  
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**Solvency requirements for Swiss pension funds  
and how to ensure the guarantee of benefit payments at any time**

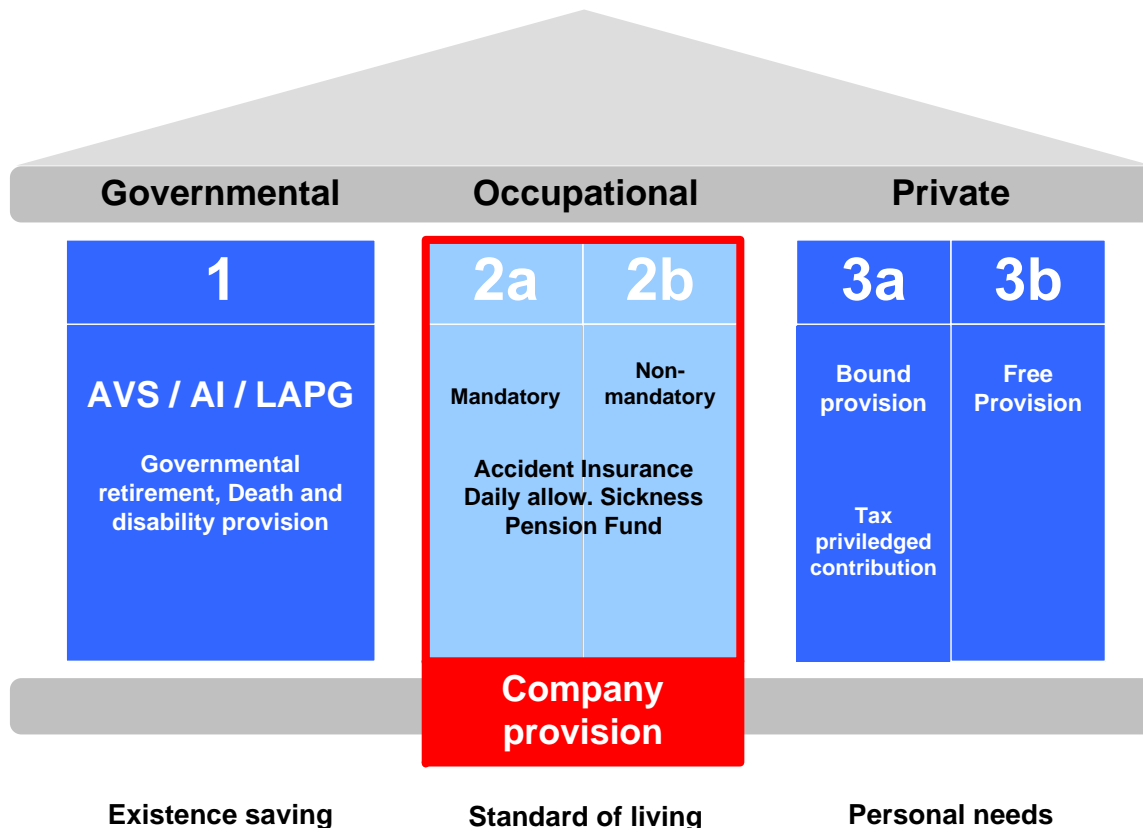
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## Agenda

- Experience from the financial crisis 2007-2008
- Swiss pension legislation (BVG/ LPP) and occupational provisions
- Solvency requirements for Swiss pension funds
- Risk based supervision: capital requirements
- Definition of target value of investment fluctuation reserves
- Cornish-Fisher VaR and investment fluctuation reserves based on Pictet BVG/ LPP Indices
- Target values for investment fluctuation reserves with different risk measures
- Conclusions

# Social security system in Switzerland: 3 pillar system



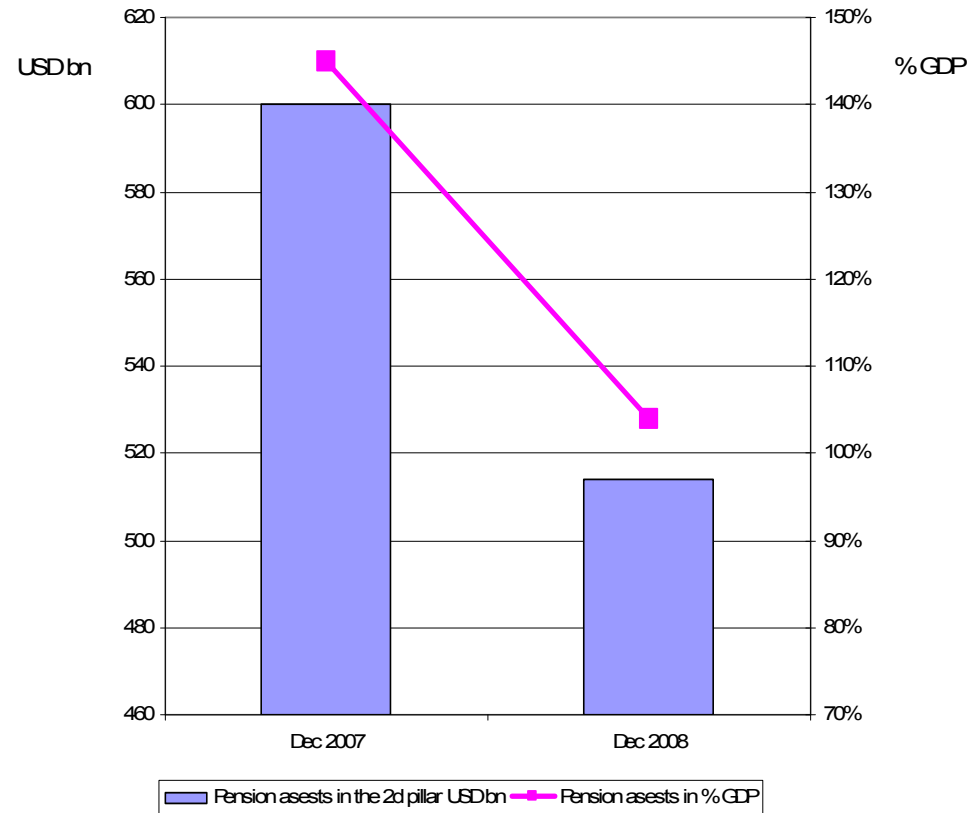
Occupational provisions offered by employers in Switzerland belong to the second pillar

## Types of funding vehicles in the Swiss 2nd pillar

- Company specific pension funds
  - Autonomous pension funds offering saving for retirement and death & disability benefits
  - Pension funds with a congruent risk insurance coverage for death & disability benefits
- Independent collective foundation with multi-employer plans
  - Industry-wide pension funds or
  - Pension funds open for all employees
- Insurance companies offering group life insurance contract with full guarantees of benefits and investment return (very expensive solutions)
- Pension fund's board of trustees is in charge of all decisions and can not transfer its fiduciary responsibility. Approval of funding strategies and reserving belong to their responsibility as well.

## Experience from the financial crisis 2007-2008

- At least 57% of Swiss pension funds might be underfunded per 31.12.2008
- Investment performance of -13% in 2008 (compared to -8% in 2002) on average
- For the first time several examples of reductions in benefits due to underfunding



Source: Watson Wyatt Worldwide „2009 Global Pension Asset Study“ and „2008 Global Pension Asset Study“

## Swiss pension legislation (BVG/ LPP)

- **Swiss pension legislation stipulates only a mandatory level of occupational provisions of a Cash Balance (CB) type**
  - *Employers have to offer only mandatory level of occupational provisions to its employees*
  - *Employers have to pay at least 50% of the total annual contribution necessary to fund occupational provisions (defined in the plan rules of the pension fund)*
  - *The total contribution consists of saving, risk and administration contributions*
- **Each pension or saving account is split into the mandatory and over-mandatory parts**
  - *Legal guarantees of the BVG-minimum interest credit rate and the BVG-conversion rate are applicable only to the mandatory part*
  - *The BVG minimum interest rate is confirmed each year by the Federal Office (for 2009: 2%, before 2003: 4%)*
  - *The BVG-conversion rate for retirement pensions will likely be reduced to 6.4% (date not yet known) (compared to 6.8% now from 2014 on and 7.2% earlier)*
  - *Many employers grant much higher benefits than the mandatory level*



## Swiss pension legislation (BVG/ LPP)

- **1st Revision of the Swiss pension legislation 2004-2006**
  - *Accounting standards Swiss GAAP FER 26*
  - *Additional actuarial provisions should be set up based on actuarial risks borne by a pension fund*
  - *Target values of investment fluctuation reserves (IFR) should be defined and available IFR should be disclosed in the plan's financial statements*
  - *Definition of "free reserves" which could be used for contribution holiday or distributed among members (50% possible employer portion)*
  
- **Definition of funding ratio  $FR = A/L$** 
  - *A = available pension assets without any possible short term liabilities and employer contribution reserves*
  - *L = gross liabilities consisting of net liabilities plus additional actuarial provisions*
  - *There is neither a minimum nor maximum level of additional actuarial provisions*
  - *In practice, additional actuarial provisions amount to 3% - 30% of net liabilities*

## Solvency requirements & measures

- **FR = 100% is required**
- **IFR could be disclosed if the  $FR > 100\%$**
- **A pension fund can be temporarily underfunded ( $FR < 100\%$ ) if it can pay benefits and takes measures to eliminate this underfunding**
- **Any underfunding should generally be eliminated within 5 to 7 year period, but no longer than 10 years**
- **As a consequence of underfunding:**
  - **General reduction of prospective benefits (like conversion ratio) and increase of regular contributions**
- **Possible measures to eliminate underfunding**
  - **Reduction in benefits (lower interest credit or 0% interest credit)**
  - **Employer contribution reserves with a pledge (could be used later for employer contributions again)**
  - **Additional contributions to be paid by employer and employees**
  - **Reduction of pensions in payment (if some conditions are fulfilled)**



## Risk based supervision

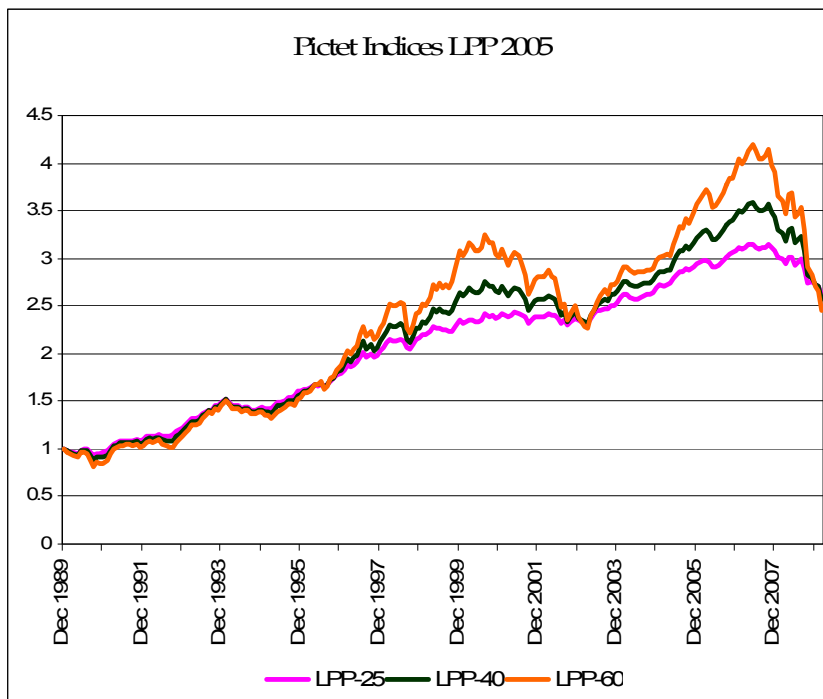
- **Approach for assessing the financial position of pension funds as an integral part of pension fund's risk management**
  - Concerns about the capacity of new CB plans with flexible interest credits to produce an adequate level of retirement income lead to a need for better risk management
- **A risk based solvency system comprises three fundamental issues:**
  - The valuation of assets and liabilities
  - The risk margin for uncertainty in assets and liabilities
  - The risk measures and their modelling
- **One of the main objectives of risk based supervision – sound risk management procedures and an appropriate level of capital**
  - For pension funds – strengthen financial stability and ensure more efficient outcomes for pensioners and actives

## Investment fluctuation reserves (IFR)

- There are no exact requirements in Swiss pension legislation as to how to calculate the target value for IFR
- Some pension funds still use “rules of thumb” or so-called “practical methods”, other use Value-at-Risk approach
- The financial crisis 2007-2008 shown that many pension funds underestimated target values
- Parameters needed for calculating a target value of IFR
  - Max( pension assets, gross liabilities)
  - A necessary minimum expected return to fund liabilities
  - A time period
  - A desirable confidence level

# Pictet BVG 2005 Indices

	LPP-25	LPP-40	LPP-60
<b>Bonds</b>	<b>65.0%</b>	<b>50.0%</b>	<b>30.0%</b>
Swiss	40.0%	30.0%	15.0%
Foreign	25.0%	20.0%	15.0%
<b>Equities</b>	<b>20.0%</b>	<b>30.0%</b>	<b>45.0%</b>
Swiss	7.5%	10.0%	15.0%
Foreign	12.5%	20.0%	30.0%
<b>Real Estate</b>	<b>10.0%</b>	<b>10.0%</b>	<b>10.0%</b>
Swiss	7.5%	5.0%	2.5%
Foreign	2.5%	5.0%	7.5%
<b>Hedge funds</b>	<b>2.5%</b>	<b>5.0%</b>	<b>7.5%</b>
<b>Private equity</b>	<b>2.5%</b>	<b>5.0%</b>	<b>7.5%</b>
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>



The Pictet BVG/LPP 2005 Indices reflect common asset allocations used by Swiss pension funds. Pictet Bank publishes three indices denoted 25, 40 and 60 where the number represents the sum of the allocations to equities, hedge funds and private equity.

## Parameters of BVG/LPP 2005 Indices and VaR and CVaR Values

	LPP-25	LPP-40	LPP-60
Mean return, $\mu$	5.17%	5.20%	5.29%
Standard deviation, $\sigma$	5.13%	7.45%	10.72%
Skewness	-0.56	-0.68	-0.73
Kurtosis	1.15	1.12	0.99

Assumptions:

Delta-Normal VaR is calculated with  $\mu$  and  $\sigma$ , estimated based for Pictet Indices (Jan 1990 – March 2009)

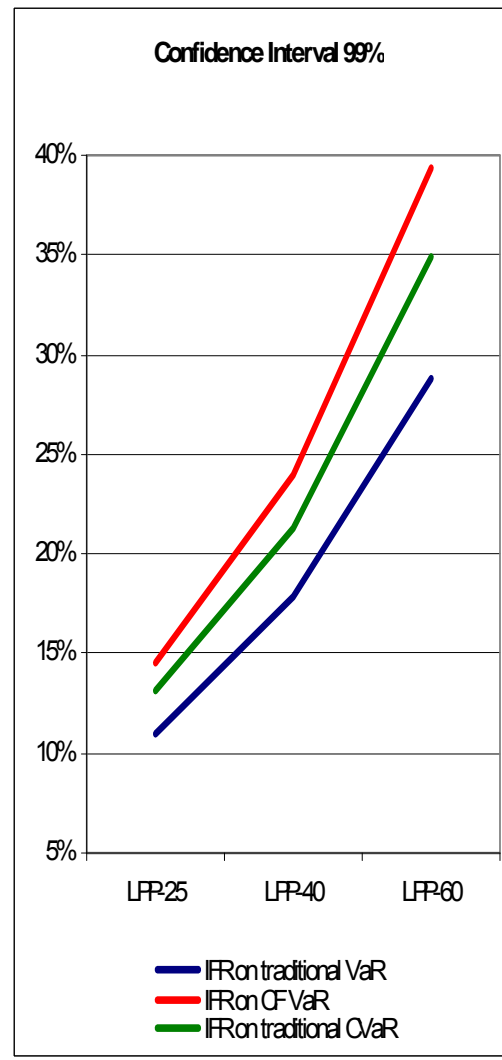
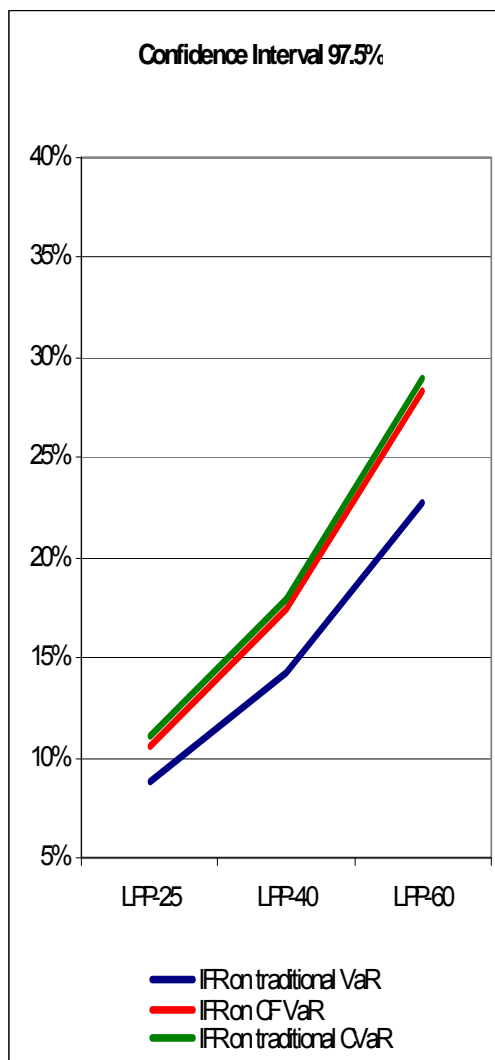
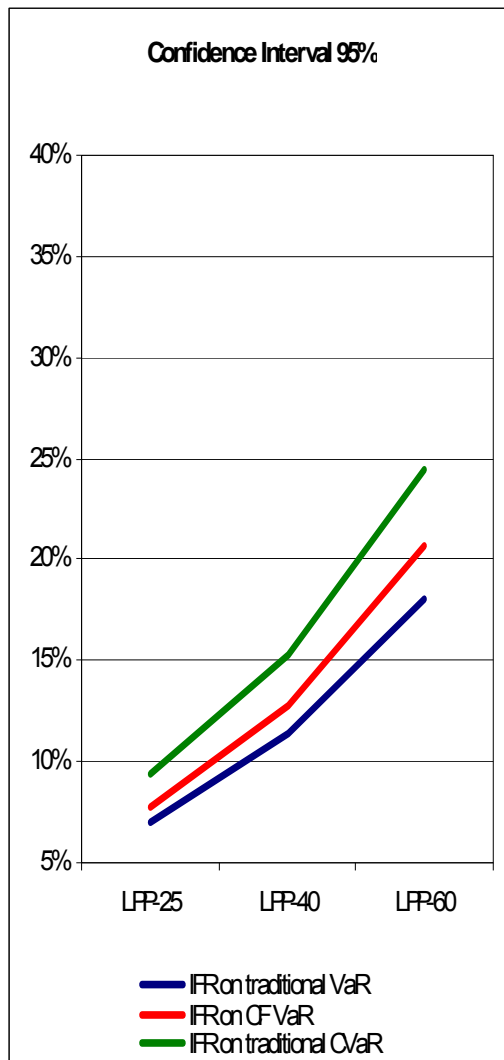
<b>Delta-Normal VaR</b>			
Confidence Interval	LPP-25	LPP-40	LPP-60
95.00%	-3.26%	-7.06%	-12.35%
97.50%	-4.87%	-9.41%	-15.73%
99.00%	-6.75%	-12.14%	-19.65%
<b>Cornish-Fisher VaR</b>			
Confidence Interval	LPP-25	LPP-40	LPP-60
95.00%	-3.93%	-8.27%	-14.24%
97.50%	-6.41%	-11.89%	-19.32%
99.00%	-9.65%	-16.53%	-25.74%
<b>Delta-Normal CVaR</b>			
Confidence Interval	LPP-25	LPP-40	LPP-60
95.00%	-5.40%	-10.18%	-16.83%
97.50%	-6.81%	-12.23%	-19.78%
99.00%	-8.49%	-14.67%	-23.29%

## Investment Fluctuation Reserves (IFR) with VaR (Delta-Normal and Cornish-Fisher) and CVaR

	Minimum return 3.5%	LPP-25	LPP-40	LPP-60		LPP-25	LPP-40	LPP-60		LPP-25	LPP-40	LPP-60
	Confidence interval	95.0%				97.5%				99.0%		
1	Traditional VaR (VaR)	-3.26%	-7.06%	-12.35%		-4.87%	-9.41%	-15.73%		-6.75%	-12.14%	-19.65%
2	Cornish-Fisher VaR (CF VaR)	-3.93%	-8.27%	-14.24%		-6.41%	-11.89%	-19.32%		-9.65%	-16.53%	-25.74%
3	Traditional CVaR (CVaR)	-5.40%	-10.18%	-16.83%		-6.81%	-12.23%	-19.78%		-8.49%	-14.67%	-23.29%
4	IFR on traditional VaR	6.99%	11.36%	18.08%		8.80%	14.25%	22.81%		10.99%	17.80%	28.82%
5	IFR on CF VaR	7.73%	12.84%	20.68%		10.59%	17.46%	28.28%		14.55%	23.99%	39.37%
6	IFR on traditional CVaR	9.41%	15.22%	24.44%		11.06%	17.92%	29.02%		13.10%	21.29%	34.92%
7	IFR(CF VaR) - IFR(VaR)	0.75%	1.47%	2.60%		1.79%	3.21%	5.46%		3.56%	6.19%	10.55%
8	IFR(CVaR) - IFR(VaR)	2.42%	3.86%	6.36%		2.26%	3.67%	6.20%		2.11%	3.49%	6.10%
9	IFR(CVaR) - IFR(CF VaR)	1.67%	2.39%	3.76%		0.47%	0.46%	0.74%		-1.45%	-2.70%	-4.45%

Assumption: necessary minimum return on investment to fund liabilities is 3.5%

## Target values for IFR



## Conclusions (1)

- Target values for IFR calculated with Delta-Normal VaR are lower than those calculated based on historical observations with the Cornish-Fisher approach
- These differences are explained by the negative skewness and positive excess kurtosis found in the historical returns, meaning that extreme negative returns happen more often than predicted by the normal distribution hypothesis.
- Comparison between values for the 97.5% confidence level shows that IFR(VaR) should be multiplied by 1.20-1.24 to reach the level of IFR(CF VaR) calculated with Cornish-Fisher approximation depending on index.
- The higher the confidence interval is, the higher the multiplier for target values calculated by Delta-Normal VaR are (multipliers are around 1.12 for 95% and 1.35 for 99%).



## Conclusions (2)

- The higher the equity proportion in the index, the bigger the difference between Delta-Normal CVaR and VaR.
  - The absolute difference between Delta-Normal CVaR and VaR is around 2% for LPP-25 and around 4% for LPP-60
- The higher the confidence interval, the lower the absolute difference between Delta-Normal CVaR and VaR for each index but the absolute value for Delta-Normal CVaR is larger with a higher confidence interval
- This could be intuitively understood as: the lower the confidence interval, the bigger the possible loss underestimation even with the normal distribution assumption.

## Conclusions (3)

- Pension funds with a moderate level of risky investments can have IFR funded to the level of a target value calculated with Delta-Normal VaR.
- Pension funds with a substantial proportion of risky investments like LPP-40 or more could fund the target value of IFR calculated with traditional VaR but should choose a higher level of confidence interval (97.5% or even higher) and verify additionally with other risk measures (like CVaR) and stress testing/ sensitivity analysis the risk taken.

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