

# Technical interest rate for determining the pension conversion rate concerning non-mandatory occupational pension plans

03.11.2003 /FOPI, Life section

## I. Summary

The pension conversion rate depends in essence on two influencing factors: the so-called technical interest rate and the future life expectancy of the pensioners. The following explanations concern the technical interest rate. It is important to understand how it is defined, how its level can be determined appropriately, and how it affects the calculation of the pension conversion rate.

The technical interest rate is the interest rate on the pension capital of pensioners.

Private life insurance companies guarantee the technical interest rate for the entire term of the pension payments. It is, however, extremely difficult to project the interest rate development in advance over such extended time horizons. The technical interest rate must therefore be fixed very cautiously.

As long as a private life insurance company attains a high yield with its investment strategy, it can fulfil its obligations toward the insured persons and even achieve surpluses. Higher returns on investment are, however, only possible through higher capital investment risks. Since the benefits must be rendered with an absolute guarantee, it is appropriate to keep the capital investment risk low and to gear the level of the technical interest rate to low-risk capital investments. Bonds of the Federal Government with ten-year terms to maturity are considered very low-risk and secure investments. As at the end of July, the spot interest rate on Federal bonds with ten-year terms to maturity was 2.67%.

The extended time horizons to which the interest rate guarantee applies, as a consequence of the still expected remaining lifespan of the insured pensioner, creates a not insignificant reinvestment risk for the life insurance company. The EU directives therefore provide that the technical interest rate must be fixed at no

more than 85% of the average return on government bonds; in Switzerland, this corresponds to a maximum of 2.27% as at the end of July 2003.

The cautious approach in fixing a guaranteed technical interest rate is justified actuarially, recognised internationally, and has been successfully practiced by the Swiss private insurance industry for decades. The capital investment returns attained over and above the technical insurance rate are, to a large extent, paid out to pensioners as surplus pensions (capital bonuses). Surplus pensions are smoothed out using actuarial methods to stabilise the pensions, thereby securing a regular additional income to pensioners.

The new transparency requirements for occupational pension plans ensure that a very high minimum share of any surplus returns attained are paid out to the pensioner in a pension amount smoothed out over time. This approach makes social sense and keeps the system of occupational pensions plans stable.

If the investment returns generally fall below the technical interest rate, however, the following measures, in sequence, cannot be avoided: redistribution from employed insured persons to pensioners, reduction of solvency reserves, and finally emergency measures executed by the supervisory authority.



## II. Function of the technical interest rate

The amount of the pension is determined at the time of retirement by the conversion rate. The annual pension is equal to the conversion rate multiplied by the saved pension capital. For example, a conversion rate of 7.2% on a balance of CHF 100'000 generates an annual pension of CHF 7'200.

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how it affects the calculation of the pension conversion rate.

The technical interest rate is the interest rate on the pension capital of pensioners.

An increase or a decrease of the technical interest rate results in an increase or a decrease, respectively, of the pension conversion rate. This dependence is illustrated with the following table, which was calculated on the basis of the joint mortality table of the Swiss Insurance Association for the measurement period from 1996 to 2000:

Pension conversion rates in %		Interest rate in %					
Life expectancy	Mortality trend	4.0	3.5	3.0	2.5	2.0	1.5
16.9	without inclusion of trend	6.78	6.44	6.10	5.77	5.45	5.13
18.6	trend I	6.48	6.14	5.81	5.49	5.17	4.86
20.5	trend II	6.18	5.84	5.50	5.17	4.84	4.52

Each row in the table uses the same observed mortality probabilities, but with different mortality trends. Trend I is based on the improvement of mortality over the last 40 years observed in the population mortality tables; trend II is based on the improvement of mortality over the last 40 years observed in the joint mortality tables of the Swiss Insurance Association. Independent of which assumption is made with respect to the improvement of mortality, the rows in the table indicate **that a change in the technical interest rate of one half percentage point results in an average change in the pension conversion rate of 0.33 percentage points.**

As these explanations show, the technical interest rate is therefore indivisibly linked with the pension conversion rate. The higher the conversion rate, the higher the technical interest rate must also be. Since the mandatory insurance benefits do not permit life insurance companies to determine the pension conversion rate on the basis of their own actuarial data, the automatic consequence is that life insurance companies must **guarantee** the resulting technical interest rate.

## III. Interest rate guarantee

Private life insurance companies guarantee the technical interest rate for the entire term of the pension payments.

In order to avoid a redistribution from employed insured persons to pensioners, each group of pensioners born in the same year must finance its pensions with its saved pension capital. This pension capital is managed and invested by private life insurance companies. The life insurance company must generate at least enough return on the investment of the pension capital to pay out the technical interest rate on the pension capital.

It is, however, extremely difficult to project the interest rate development in advance over such extended time horizons. The technical interest rate must therefore be fixed very cautiously. In particular, the **capital investment risk** must be estimated and included in the determination of the technical interest rate.

#### IV. Basic principles of capital investment risk

Every capital investment is subject to the risk of fluctuations in value. The return on Federal bonds is generally considered risk-free. Higher rates of return than this risk-free interest rate can only be attained by accepting higher investment risks, i.e., fluctuations in the value of the assets.

Investment risks are manifold: exchange, credit, and illiquidity risks in the case of securities and shares, interest rate risks in the case of fixed interest investments, liquidation risks in the case of real estate investments, and many others. In general, however, the risk consists in the fact that the investor does not know the value of the investment at the time the money is needed. The life insurance company finds itself in this uncertain position of the capital investor as soon as it must pay pensions on pension capital.

As long as a private life insurance company attains a high return on its investment, it can fulfil its obligations towards the insured persons and even achieve surpluses.

Higher returns on investment are, however, only possible through higher capital investment risks. The level of the technical interest rate therefore determines the minimum investment risk the insurance company must assume. In order to bear the investment risk, the insurance company requires equalisation funds. This requirement entails that the capital bonus must

be reduced to feed the equalisation funds. If such equalisation funds must be obtained from the capital market in the form of risk capital, the quite considerable risk-capital costs must be met.

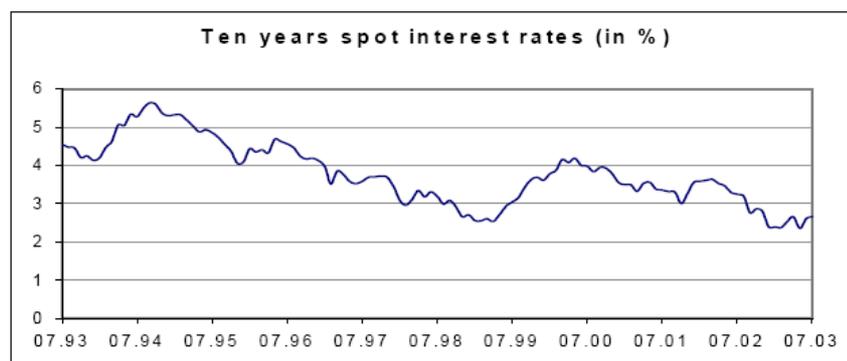
There are hence good reasons to gear the level of the technical interest rate to the return on **low-risk** portfolios.

#### V. Low-risk capital investments, low-risk interest rate

Federal bonds deliver a fixed nominal rate of return and are therefore fundamentally more secure than stocks and real estate investments. The return on Federal bonds includes an inflation premium, which represents compensation for the devaluation of the nominal value and the interest payments (coupons) expected by the financial markets.

On a daily basis, the Swiss National Bank calculates the spot interest rates for various terms. Returns on (fictitious) bonds without coupons are called spot interest rates. The ten-year spot interest rate for Federal bonds is considered a reliable guide for low-risk investments and can easily also be used as an approximation for even longer terms.

The following graph shows the development of the ten-year spot interest rate for Federal bonds over the last ten years (Source: *Swiss National Bank, Statistical Monthly Bulletin August 2003, E3 yields on bonds*).



Since the end of 2002, this spot interest rate has been below 3%. The minimum so far was reached in May 2003 at 2.36%. The higher rates in the early 90's also reflect, to some

extent, the higher inflation premiums, which over the past 15 years have tended to decrease in parallel with inflation.

A rolling multi-year average of the ten-year spot interest rate for Federal bonds generally constitutes a useful approach to fixing the level of the technical interest rate.

When fixing the pension conversion rate at 7.2% in 1985, a technical interest rate of 3.5% for men (and about 4.2% for women) was assumed. Since the low-risk interest rate level has dropped appreciably since then, a technical interest rate at that level should be reduced. It would be dangerous, however, to conclude our consideration of the technical interest rate at this point, since a problematic element has not yet been taken into account.

## VI. A further risk

The duration of the interest rate guarantee extends over the entire remaining life expectancy of an insured pensioner, often 15 years or more. The long duration of the guarantee is only mitigated by the fact that the pension capital of a pensioner is continually being reduced over the duration of the pension payments. Nevertheless, a considerable Macaulay duration<sup>1</sup> of 7 to 10 years still remains.

Over such long investment horizons, attention must be paid to further risks: the interest rate risk and the reinvestment risk. Due to the fact that the pension capital is reduced continually and systematically, matching of maturities can be optimised through an appropriate management of assets and liabilities, thereby minimising the interest rate risk. Reinvestment of the remaining pension capital after expiry of long-term fixed interest investments becomes problematic, however. It is not at all certain that the rates of return relevant to the interest rate guarantee at the beginning of the term can be renewed at the end of the term. In order to counter this risk, the EU directives, for instance, require that the technical interest rate be fixed at no more than 85% of the average rate of return on government bonds. Spot interest rates, not multi-year rolling averages, are determinant, since, in contrast to the gradual accrual of capital during the employment phase<sup>2</sup>, the one-off investment of saved pension capital must be undertaken or restructured immediately upon retirement, before the

gradual depletion of capital during the pension phase begins.

Selected spot interest rates on Federal bonds with 10-year terms to maturity:

	Spot interest rate in %	85% thereof
As at the end of 1993:	4.14	3.52
As at the end of 1996:	4.13	3.51
As at the end of 1999:	3.62	3.08
As at the end of 2001:	3.56	3.03
As at the end of December 2002:	2.40	2.04
As at the end of April 2003:	2.66	2.26
As at the end of May 2003:	2.36	2.01
As at the end of July 2003:	2.67	2.27

If the EU rule and the long-term falling tendency evident from this table are taken into account, the technical interest rate should not exceed the threshold of 2.5% and should be chosen in the vicinity of 2.25%.

These considerations are primarily applicable to the non-mandatory sector, since life insurance companies may adjust the pension conversion rate and therefore the technical interest rate in this sector according to market conditions. In the mandatory sector, however, there is the added risk that the pension conversion rate will be prescribed by law, making it impossible to fix the technical interest rate in line with market requirements.

The consequence of linking the technical interest rate to the spot interest rates of Federal bonds is that the pension conversion rate is automatically exposed to more frequent and greater fluctuations. Confidence in the second pillar can only be maintained, however, if the pensions are paid in a continuous manner that makes sense to the insured person. The capital bonus is the appropriate instrument to achieve such continuity.

<sup>1</sup> i.e., the duration of the interest payments weighted by the cash flows

<sup>2</sup> During the saving process in the employment phase, it makes sense to rely on multi-year rolling averages, since the assets to be invested are constantly being accrued. During this phase, the interest rate risk merits particular attention. The interest rate risk may be guarded against through interest rate risk deductions in the case of early withdrawal of the saved capital or through application of the 60% rule provided for by the EU for interest rate guarantees.

## **VII. The capital bonus compensates for the cautiously chosen guaranteed technical interest rate and smoothes out its fluctuations**

The cautious approach in fixing a guaranteed technical interest rate is justified actuarially, recognised internationally, and has been successfully practiced by the Swiss private insurance industry for decades. The capital investment returns attained over and above the technical insurance rate are, to a large extent, paid out to pensioners as surplus pensions (capital bonuses). An important function of surplus pensions is to smooth out pension payments over the years, in order to secure regular income to pensioners.

The new transparency requirements for occupational pension plans require that private life insurance companies pass on a minimum share of any attained surplus returns as a capital bonus to the insured persons (legal quote). In addition, the mechanism used to smooth out the payments should be in accordance with recognised actuarial methods, thereby stabilising pension payments.

The supervisory authority verifies the models used by private life insurance companies to establish and distribute surpluses before they are used for the first time. The supervisory authority ensures that the transparency requirements are met for the benefit of the insured persons and that the solvency of private life insurance companies is safeguarded. This dual strategy, with a minimum level of returns sustainable over the long term and a fair distribution of surpluses as monitored by the authorities in accordance with the law, can be regarded as a solution that makes social sense and that keeps the occupational pension system stable.

If, however, the rates of return on capital investments generally fall below the technical interest rate, a redistribution from employed insured persons to pensioners and a reduction of the solvency reserves cannot be avoided. If these measures are exhausted, the private life insurance company faces the execution of emergency measures that the supervisory authority provides for such a scenario.