

9. Ultimate Forward Rate

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Article 76 **General provision**

1. Member States shall ensure that insurance and reinsurance undertakings establish technical provisions with respect to all of their insurance and reinsurance obligations towards policy holders and beneficiaries of insurance or reinsurance contracts.
2. The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to another insurance or reinsurance undertaking.
3. **The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and generally available data on underwriting risks (market consistency).**
4. Technical provisions shall be calculated in a prudent, reliable and objective manner.
5. ...

Article 77:

The determination of the relevant risk-free interest rate term structure referred to in Article 77(2) shall make use of, and be consistent with, information derived from relevant financial instruments. That determination shall take into account relevant financial instruments of those maturities where the markets for those financial instruments as well as for bonds are deep, liquid and transparent. For maturities where the markets for the relevant financial instruments or for bonds are no longer deep, liquid and transparent, the relevant risk-free interest rate term structure shall be extrapolated.

The extrapolated part of the relevant risk-free interest rate term structure shall be **based on forward rates converging smoothly from one or a set of forward rates in relation to the longest maturities for which the relevant financial instrument and the bonds can be observed in a deep, liquid and transparent market to an ultimate forward rate.**

Citation 32, 33, 34)

32. ‘deep market’ means a market where transactions involving a large quantity of financial instruments can take place without significantly affecting the price of the instruments.

33. ‘liquid market’ means a market where financial instruments can readily be converted through an act of buying or selling without causing a significant movement in the price.

34. ‘transparent market’ means a market where current trade and price information is readily available to the public, in particular to the insurance or reinsurance undertakings.

Market consistent valuation requires Deep, liquid, transparent markets



SECTION 4

Relevant risk-free interest rate term structure

Article 43 General provisions

The rates of the basic risk-free interest rate term structure shall meet all of the following criteria:

- (a) insurance and reinsurance undertakings are able to earn the rates in a risk-free manner in practice;
- (b) the rates are reliably determined based on financial instruments traded in a deep, liquid and transparent financial market.**

The rates of the relevant risk-free interest rate term structure shall be calculated separately for each currency and maturity, based on all information and data relevant for that currency and that maturity. They shall be determined in a transparent, prudent, reliable and objective manner that is consistent over time.

Market consistent valuation required in Directive

Valuation of technical provision requires discounting of cash flows with risk-free interest rate term structure.

Insurance obligations endowed with (very) long term guarantees.

Deep, liquid, transparent markets offer only limited durations (example: EURO).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	>30
Duration																															
DLT	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0

Risk-free rate has to be modeled to allow compliance with Directive.

- 1) DLT assessment: as long as DLT – markets are existent risk-free rate is based on market information
- 2) Assessment of an ultimate rate required (UFR)
- 3) Convergence period has to be defined
- 4) Extrapolation method and convergence quality have to be fixed

Directive 2009/138/EC and the Delegated Regulations set out for the determination of the LLP, the application of DLT requirements and for the Euro a specific recital regarding the residual volume of bonds meeting DLT requirements (aka the '*residual volume criteria*'). For the Euro, the method is precise except for the very specific market data to be used as input.

Subsection 2

Basic risk free interest rate term structure

Article 44 **Relevant financial instruments to derive the basic risk-free interest rates**

1. For each currency and maturity, the basic risk-free interest rates shall be derived on the basis of interest rate swap rates for interest rates of that currency, adjusted to take account of credit risk.

2. For each currency, for maturities where interest rate swap rates are not available from deep, liquid and transparent financial markets the rates of government bonds issued in that currency, adjusted to take account of the credit risk of the government bonds, shall be used to derive the basic risk free-interest rates, provided that, such government bond rates are available from deep, liquid and transparent financial markets.

Methods for the assessment of deep, liquid and transparent financial markets (DLT assessment)

16. Based on academic literature and the methods applied by practitioners EIOPA has analysed the metrics and criteria commonly used for assessments of market liquidity and assessed their applicability for the purposes of setting a conceptual framework for the DLT assessment.

17. Having in mind that the National Competent Authorities have better knowledge of the financial markets of each currency, the DLT assessment of EEA currencies has been made by each National Competent Authority. All National Authorities applied the same methodology and reported their findings in a common template. Three main findings may be extracted from the set of lessons learnt:

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- a) The application of the common conceptual framework should not rely on hard thresholds and should not disregard qualitative information. In particular, a number of criteria are inter-linked and the markets for the same financial instruments for different currencies may present different features.
- b) The DLT assessment is a demanding exercise and therefore the frequency of updating the assessment should be carefully considered.
- c) Furthermore, with the exception of crisis situations, frequent violent changes in the outputs of the DLT assessment do not seem plausible. Rather, a plausible future trend will be the development of financial markets and the extension of the market interest rates meeting DLT requirements (i.e. the use of market consistent information).

Recital 21 of the Delegated Regulation defines the residual volume criterion to calculate the LLP.

The residual volume criterion is used to derive the LLP for the euro only. For that currency, it leads to a LLP of 20 years.

The '**residual volume criterion**' considers all bonds in the market, including corporate bonds. Having computed the outstanding bond volume for each maturity, the sum of the outstanding bond volumes for all maturities $\geq M$ is computed.

The smallest maturity M for which that sum drops below 6% is considered to no longer meet the DLT criteria. For the Euro, the resulting LLP is 20 years.

14.F. Annex to subsection 7.C: Rationale for the UFR calibration

372. **The most important economic factors explaining the long-term forward rate are long-term expected inflation and expected real interest rates.** Two other components that can be seen to influence the long-term forward rate are the expected long-term nominal term premium and the long-term nominal convexity effect.

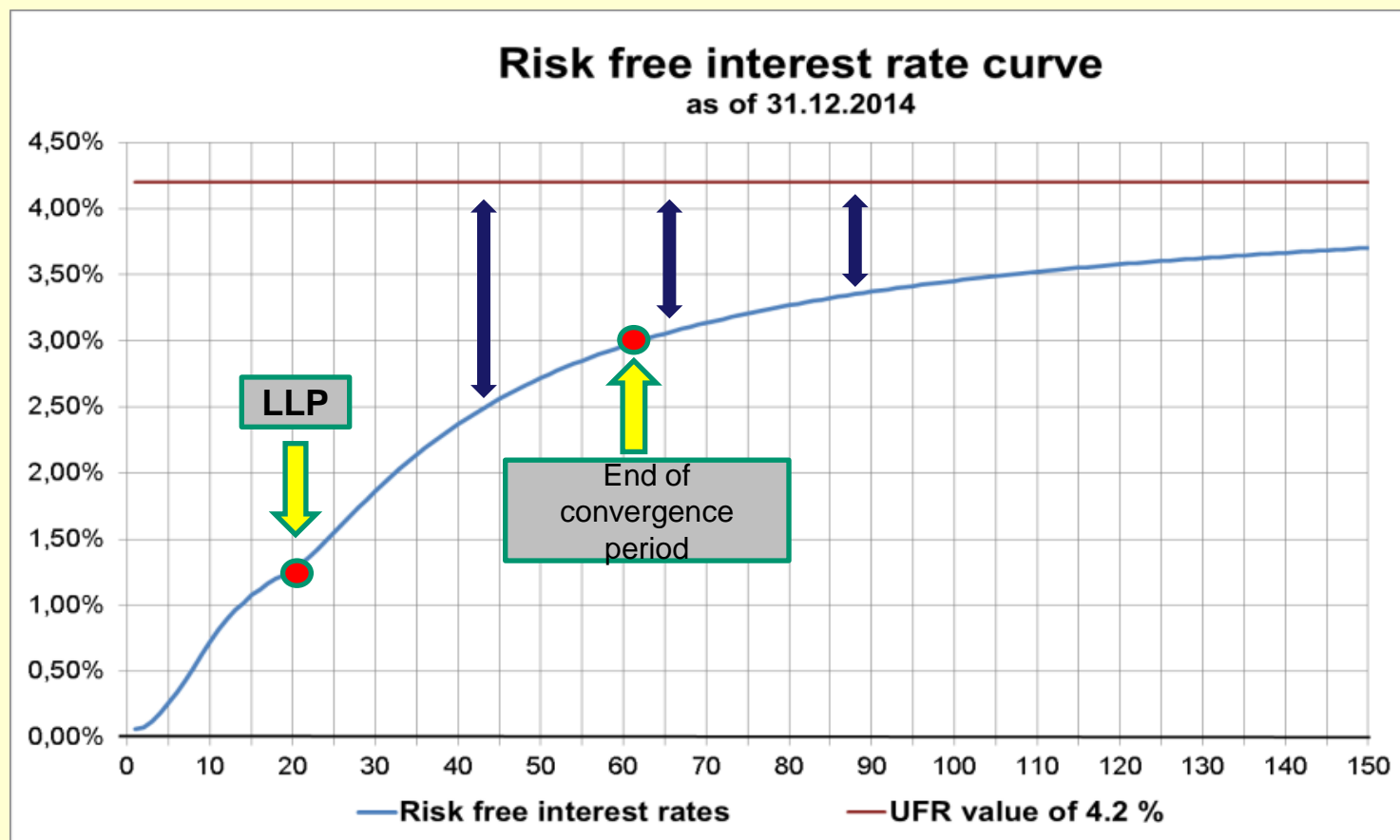
373. However, in order to have a robust and credible estimate for the UFR, the assessment shall be based only on the estimate of the expected inflation and the estimate of the expected short term real rate, the two components that are deemed to be most relevant, most stable and most reliable.

374. The term premium represents the additional return an investor may expect on risk-free long dated bonds relative to short dated bonds, as compensation for the longer term investment. This factor can have both a positive and a negative value, as it depends on liquidity considerations and on preferred investor habitats.

375. The convexity effect arises due to the non-linear (convex) relationship between interest rates and the bond prices used to estimate the interest rates. This is a purely technical effect and always results in a negative component.

376. **Both the term premium and the convexity premium can only be estimated from unobservable data in the extrapolated part of the curve. They would introduce a strong element of unpredictability in the estimation of the ultimate forward rate, and shall therefore be excluded from the UFR.**

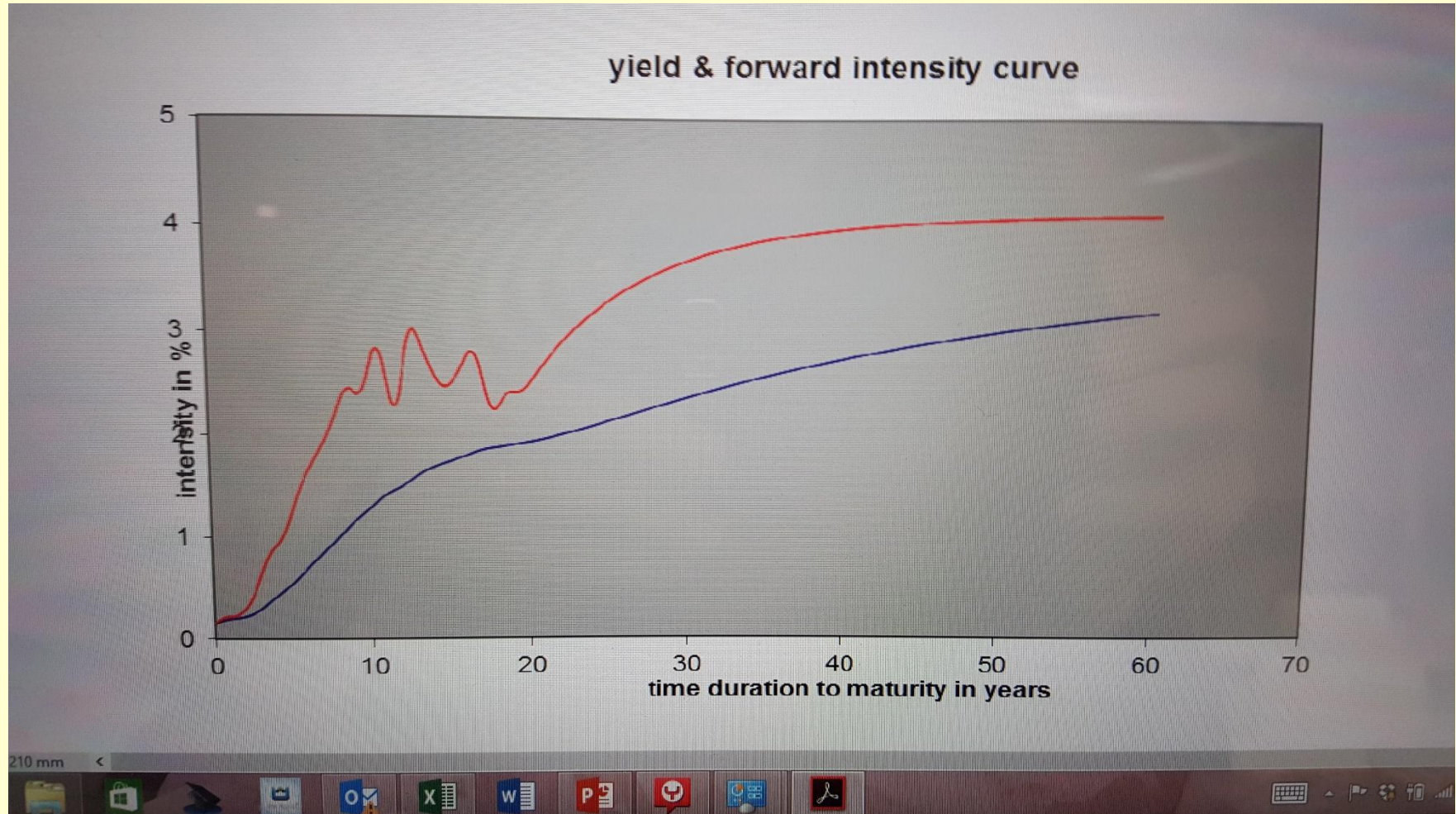
UFR: Value of 4.2 % does not mean that liabilities are discounted with 4.2 %



Source: EIOPA

Forward rate vs. discount rate

Yield and forward intensity curve



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Last liquid point (LLP)

For all other currencies, the LLP has been chosen according to the results of the DLT assessment. It is the longest maturity for which risk-free interest rates can be derived from DLT markets.

The LLP is considered to be generally stable over time, which means that once the first full DLT assessment is done, it is not necessary to pursue a continuous repetition of the full assessment, but, rather an appropriate monitoring of financial markets. **It is thus expected that the update of the LLP will be carried out at a lower frequency than the publication of RFR curves (e.g. yearly basis).**

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Delegated Regulation (EU) 2015/35 Of 10 October 2014

Article 46 Extrapolation

1. The principles applied when extrapolating the relevant risk free interest rate term structure shall be the same for all currencies. This shall also apply as regards the determination of the longest maturities for which interest rates can be observed in a deep, liquid and transparent market and the mechanism to ensure a smooth convergence to the ultimate forward rate.

27. The Omnibus II Directive explicitly reflects for the euro a convergence period of 40 years and a LLP of 20 years, which is equivalent to assuming that the forward rate will be close to its ultimate level from $20+40=60$ years maturity onwards.

28. For currencies other than the euro, the convergence point is the maximum of (LLP+40 years) and 60 years. This method is considered as the most stable, least influenced by expert judgement and also the one with lowest impact on the level playing field between market participants.

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128. The parameters used for the extrapolation, except for the financial market data itself, will be assumed to be stable. This includes

- the ultimate forward rate (UFR),
- the convergence tolerance, the convergence period,
- the last liquid point (LLP), and
- the support of the selected extrapolation method, i.e. the maturities considered to meet the DLT requirements.

Changes in the DLT assessment measures will not necessarily translate into changes in the parameters used for extrapolation, the LLP or the support of the selected extrapolation method. Therefore, the DLT assessment will be less frequent than the publication of the risk free interest rate term structures.

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24. The interpolation, where necessary, and extrapolation of interest rates has been developed applying the Smith Wilson method.

25. This method is of course **not the only one for the extrapolation of the interest rates**. In the same manner other methods have their pros and cons, the Smith Wilson method also has its own features.

26. The Smith Wilson method has been applied during the last years of the development of the Solvency II framework, and in particular in the Fifth Quantitative Impact Study (QIS5) and in the Long Term Guarantees Assessment (LTGA) that has underpinned the political agreement of the Omnibus II Directive.

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6.E. Convergence point

140. The convergence point is the maximum of (LLP+40) and 60 years.

141. The parameter alpha that controls the convergence speed, is set as the lowest value that produces a curve reaching the convergence tolerance of the UFR by the convergence point. **The convergence tolerance is set as 1 bp.**

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Article 47 Ultimate forward rate

1. For each currency, the ultimate forward rate referred to in paragraph 1 of Article 46 shall be stable over time and shall only change as a result of changes in long-term expectations. The methodology to derive the ultimate forward rate shall be clearly specified in order to ensure the performance of scenario calculations by insurance and reinsurance undertakings. It shall be determined in a transparent, prudent, reliable and objective manner that is consistent over time.

2. For each currency the ultimate forward rate shall take account of expectations of the long-term real interest rate and of expected inflation, provided those expectations can be determined for that currency in a reliable manner. The ultimate forward rate shall not include a term premium to reflect the additional risk of holding long-term investments.

Article 77 (5) of the Directive has defined the Cost-of-Capital rate as the rate used in the determination of the cost of providing the amount of eligible own funds equal to the Solvency Capital Requirement necessary to support the insurance and reinsurance obligations over the lifetime thereof (the risk margin).

The Cost-of-Capital rate used shall be equal to the **additional rate, above the relevant risk-free interest rate**, that an insurance or reinsurance undertaking would incur holding an amount of eligible own funds, equal to the Solvency Capital Requirement necessary to support insurance and reinsurance obligations over the lifetime of those obligations.

According to Article 39 of the Delegated Regulation, the Cost-of-Capital shall be assumed to be equal to 6 %.

How was the cost of capital of 6% determined?

The risk measure of the SST (Swiss Solvency Test) is expected shortfall on a 99% level of confidence. This corresponds approximately to a 99.6% to 99.8% Value at Risk which implies a strong BBB- rating. For A or AA rated companies, cost of capital is in the range of 3% to 4.5% over risk-free.

For a BBB company, the cost is slightly higher, so that 6% over risk-free was chosen.