EIOPA-BoS-17/072
30 March 2017

Risk-free interest rate term structures

Specification of the methodology to derive the UFR

1. Introduction

This note sets out the methodology to derive the ultimate forward rate (UFR) and its implementation as decided by EIOPA at the end of March 2017. The UFR is applied in the calculation of EIOPA's relevant risk-free interest rate term structures for Solvency II.

The methodology is in accordance with Article 47 of the Delegated Regulation on Solvency II[1] which requires in particular that such a methodology shall be clearly specified in order to ensure the performance of scenario calculations by insurance and reinsurance undertakings.

2. Methodology to derive the UFR

Update of the UFRs

1. EIOPA will annually calculate the UFRs and, where they are sufficiently different according to the methodology from the then applicable UFRs, update them at the beginning of the next year. The updated UFRs will be announced every year by the end of March. Nine months after the announcement of the updated UFRs, EIOPA will use them to calculate the risk-free interest rate term structures for the term structures of 1 January of the following year.

[1] Commission Delegated Regulation (EU) No 2015/35 of 10 October 2014 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 12, 17.01.2015, p. 1)

Calculation of the UFRs

2. For each currency the change of the UFR is limited in such a way that it increases or decreases by 15 bps or remains unchanged in accordance with the following rule:

$$UFR_t^L = \begin{cases} UFR_{t-1}^L + 15\ bps & if\ \ UFR_t \geq UFR_{t-1}^L + 15\ bps \\ UFR_{t-1}^L - 15\ bps & if\ \ UFR_t \leq UFR_{t-1}^L - 15\ bps \\ UFR_{t-1}^L & otherwise \end{cases}$$

where:

- UFR_t^L denotes the UFR of year *t*, after limitation of the annual change,
- UFR_{t-1}^L denotes the UFR of year *t*+1 , after limitation of the annual change,
- UFR_t denotes the UFR of year *t*, before limitation of the annual change.

3. For each currency the UFR before limitation of the annual change is the sum of an expected real rate and an expected inflation rate. The expected real rate is the same for each currency. The expected inflation rate is currency-specific.

Calculation of the expected real rate

4. The expected real rate is the simple arithmetic mean of annual real rates from 1961 to the year before the recalculation of the UFRs according to the following formula:

$$R = \frac{1}{n}\sum_{i=1}^{n} r_{1960+i}$$

where:

- *R* is the expected real rate,
- *n* is the number of years since end of 1960,
- r_i is the annual real rate for the year 1960+*i*,

5. For each of the years since 1961 the annual real rate is derived as the simple arithmetic mean of the annual real rates of Belgium, Germany, France, Italy, the Netherlands, the United Kingdom and the United States.

6. For each of those years and each country the annual real rate is calculated as follows:

real rate = (*short-term nominal rate – inflation rate*)/(1 + *inflation rate*).

7. The short-term nominal rates are taken from the annual macro-economic database of the European Commission (AMECO database).[2] The inflation rates are taken from the Main Economic Indicators database of the OECD.[3]

8. The expected real rate is rounded to full five basis points as follows:

   - When the unrounded rate is lower than the rounded rate of the previous year, the rate is rounded upwards.
   - When the unrounded rate is higher than the rounded rate of the previous year, the rate is rounded downwards.

Calculation of the expected inflation rate

9. For currencies where the central bank has announced an inflation target, the expected inflation is based on that inflation target according to the following rules:

   - The expected inflation rate is:
     - 1%, where the inflation target is lower than or equal to 1%,
     - 2%, where the inflation target is higher than 1% and lower than 3%,
     - 3%, where the inflation target is higher or equal to 3% and lower than 4%,
     - 4%, where the inflation target is 4% or higher.

   - Where a central bank is not targeting a specific inflation figure but tries to keep the inflation in a specified corridor, the midpoint of that corridor is relevant for the allocation to the four inflation rate buckets.

10. For currencies where the central bank has not announced an inflation target, the expected inflation rate is 2% by default. However, where past inflation experience and projection of inflations both clearly indicate that the inflation of a currency is expected in the long-term to be at least 1 percentage point higher or lower than 2%, the expected inflation rate will be chosen in accordance with those indications. The expected inflation rate will be rounded downwards to full percentage points.

11. The past inflation experience will be assessed against the average of 10 years annual inflation rates. The projection of inflation rates will be derived on the basis of an autoregressive–moving-average model.

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[2] Short-term nominal rates used for deriving the expected real rate can be found in the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs, "AMECO". On AMECO online, select 13-Monetary variables, select Interest Rates and then tick the box Short-term nominal (ISN). (http://ec.europa.eu/economy_finance/ameco/user/serie/ResultSerie.cfm)

[3] Inflation rates used for deriving the expected real rate can be found on the website of the Organisation for Economic Co-operation and Development (OECD): go to the OECD Main Economic Indicators (MEI) and select consumer price indices. When accessing the database, choose consumer prices – all items for the subject, percentage change on the same period of the previous year for the measure and percentage for the unit. (http://stats.oecd.org/Index.aspx?DataSetCode=MEI_PRICES). OECD data used in this document were accessed in March 2016.

3. Implementation of the methodology

12. The methodology to derive the UFR should be implemented in 2018. The first UFRs calculated according to the methodology should be announced at the beginning of April 2017. Those UFRs should be applied for the first time to calculate the risk-free interest rate term structures for 1 January 2018.

13. The initial application of the methodology in 2018 should be based on the following additional specification:

    - The UFR of 2017, denoted UFR_{t-1}^{L} in paragraph 2, is:
        - 3.2% for the Swiss franc and the Japanese yen,
        - 5.2% for the Brazilian real, the Indian rupee, the Mexican peso, the Turkish lira and the South African rand,
        - 4.2% for all other relevant currencies.

    - The rounded expected real rate of the previous year referred to in paragraph 8 is equal to 2.2%.