PRIIPs – Flow diagram for the risk and reward calculations in the PRIIPs KID

1. Introduction

The diagrams below set out the calculation steps for the Summary Risk Indicator (market risk and credit risk assessment) and Performance Scenario calculations described in Commission Delegated Regulation (EU) 2017/653.

They are being published as part of the Question and Answer (Q&A) material developed by the European Supervisory Authorities (ESAs) on the application of the requirements for the PRIIPs KID as practical convergence tools used to promote common supervisory approaches and practices in accordance with Article 29(2) of the ESA Regulations.

The diagrams are of a non-binding nature and do not constitute professional or legal advice. The legal requirements that need to be complied with are those in Commission Delegated Regulation (EU) 2017/653 and not the text included in these diagrams. Please also be aware that the ESAs could adopt a formal position, which is different from the one expressed in this document.

All article references are to Commission Delegated Regulation (EU) 2017/653 unless otherwise stated.

The ESAs will review this document periodically or based on questions or comments from external stakeholders and updates are expected over time. In particular, please note that this document does not reflect the amendments to the requirements for the Summary Risk Indicator and Performance scenarios in Commission Delegated Regulation (EU) 2021/2268 that are applicable from 1 January 2023. The ESAs are currently working on an updated version of this document that will be published in due course.
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3. Acronyms used

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CQS</td>
<td>Credit Quality Step</td>
</tr>
<tr>
<td>CRM</td>
<td>Credit Risk Measure</td>
</tr>
<tr>
<td>ECAI</td>
<td>External Credit Assessment Institution</td>
</tr>
<tr>
<td>ESAs</td>
<td>European Supervisory Authorities</td>
</tr>
<tr>
<td>EXP</td>
<td>Exponential</td>
</tr>
<tr>
<td>KID</td>
<td>Key Information Document</td>
</tr>
<tr>
<td>MRM</td>
<td>Market Risk Measure</td>
</tr>
<tr>
<td>OTC</td>
<td>Over The Counter</td>
</tr>
<tr>
<td>PCA</td>
<td>Principal Component Analysis</td>
</tr>
<tr>
<td>PRIIP</td>
<td>Package Retail and Insurance-based Investment Product</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>Question and Answer</td>
</tr>
<tr>
<td>RHP</td>
<td>Recommended Holding Period</td>
</tr>
<tr>
<td>SRI</td>
<td>Summary Risk Indicator</td>
</tr>
<tr>
<td>VaR</td>
<td>Value-at-risk</td>
</tr>
<tr>
<td>VEV</td>
<td>VaR-Equivalent Volatility</td>
</tr>
</tbody>
</table>
4. Flow Diagrams
   
   A. Summary Risk Indicator (SRI)

Section 1: Calculating the Summary Risk Indicator

Calculate the Market risk measure (MRM)
Go to Section 2

Calculate the Credit risk measure (CRM)
Go to Section 3

Aggregate MRM and CRM into an SRI according to the table below in point 52 of Annex II, part 3

<table>
<thead>
<tr>
<th>CRM class</th>
<th>MR1</th>
<th>MR2</th>
<th>MR3</th>
<th>MR4</th>
<th>MR5</th>
<th>MR6</th>
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<td>CR5</td>
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<td>CR6</td>
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<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Section 2: Market Risk Measure

Part 1: Determine the PRIIP Category to select the applicable methodology

**Question 1**
Is the PRIIP a derivative and/or can the investor lose more than the invested amount?
For example futures, options, contracts for difference etc. (See items 4 to 10 of Section C of Annex I of Directive 2014/65/EU).

- **YES**
  - The PRIIP is Category 1.
  - The MRM class is 7

- **NO**

**Question 2**
Does the PRIIP performance depend in part on factors not observed in the market or to some extent under the control of the PRIIP manufacturer?

- **YES**
  - The PRIIP is Category 4
  - Go to Part 4 to determine the level of Market Risk

- **NO**

**Question 3**
Does the PRIIP offer an unconditional capital guarantee?

- **YES**
  - Your PRIIP is Category 3
  - Go to Part 3 to determine the level of Market Risk

- **NO**

**Question 4**
Does the PRIIP meet the minimum data requirements?
- Daily prices; 2 years
- Weekly prices; 4 years
- Bi-monthly prices (every 2 weeks); 5 years
- Monthly prices; 5 years

- **YES**
  - Go to Part 2 to determine the level of Market Risk

- **NO**

**Question 5**
Is the PRIIP linear?
Does the value of the PRIIP develop as a constant multiple of the prices of underlying investments? For example the pay-off equally rises or falls with an index and there are no caps, floors, etc.

- **YES**
  - Your PRIIP is Category 2
  - Go to Part 2 to determine the level of Market Risk

- **NO**
  - Your PRIIP is Category 3
  - Go to Part 3 to determine the level of Market Risk

**Question 6**
Are representative benchmarks or proxies available allowing the PRIIP to meet the minimum data requirements?

- **YES**
  - Your PRIIP is Category 3
  - Go to Part 3 to determine the level of Market Risk

- **NO**

The PRIIP is Category 1.
The MRM class is 6
Part 2: Category 2 (linear) PRIIPs

**Question 1**
Are 5 years of historical prices of the PRIIP available on:
- A daily basis?
- A weekly basis?
- A bi-monthly basis?
- A monthly basis?

If **YES**, use the full data set. Go to Step 1 below.

If **NO**, go to **Question 2**.

**Question 2**
Is the minimum requirement available for:
- Daily prices; 2 years
- Weekly prices; 4 years
- Bi-monthly prices; 5 years
- Monthly prices; 5 years

If **YES**, the available price data shall be concatenated with the data of the representative benchmark to meet the minimum data requirements. Go to Step 1 below.

If **NO**, go to **Question 3**.

**Question 3**
Are representative benchmarks or proxies available allowing the PRIIP to meet the minimum data requirements?

If **YES**, The PRIIP is Category 1. The MRM class is 6.

If **NO**, use what is available with a minimum of:
- 2 years for daily prices
- 4 years for weekly prices
- 5 years for bi-monthly prices
- 5 years for monthly prices
All data exceeding the minimum until 5 years should be included in the calculation.
**Step 1**

To calculate the VaR Return Space using the Cornish Fisher expansion, you need the history of observed returns of the PRIIP. The returns are calculated by taking the natural logarithm of the price at the end of the current period divided by the price at the end of the previous period.

Zeroeth Moment ($M_0$): This is the number of observed returns.

First Moment ($M_1$): This is the average of the observed returns.

Second Moment ($M_2$): This is the average of the square of each return less $M_1$. It summarises the variance or width of the distribution of the returns.

The standard deviation ($\sigma$) is the square root of $M_2$.

Third Moment ($M_3$): This is the average of the cube of each return less $M_1$. It summarises the asymmetry or skewness of the distribution of the returns.

The skew ($\mu_1$) is $M_3$ divided by the cube of the standard deviation.

Fourth Moment ($M_4$): This is the average of the fourth power of each return less $M_1$. It summarises the extent of wider tails or kurtosis of the distribution of the returns.

The excess kurtosis ($\mu_2$) is $M_4$ divided by the fourth power of the standard deviation less 3.

**Step 2**

Now the formula can be applied to the data:

$$\text{VaR}_{\text{RETURN SPACE}} = \sigma \sqrt{N} \times \left( -1.96 + 0.474 \times \frac{\mu_1}{\sqrt{N}} - 0.0687 \times \frac{\mu_2}{N} + 0.146 \times \frac{\mu_1^2}{N} - 0.5 \sigma^2 \right)$$

where $N$ represents the number of trading periods in the recommended holding period.

**Question 4**

Is the PRIIP managed according to investment policies and/or strategies according to point 14 of Annex I, Part 1?

**Question 5**

Has a revision of the policy taken place within the period over which the price data is used?

**Question 6**

Is the calculation based on monthly price data?

**Step 3**

After determining the VaR in Return space, now the VEV should be determined. This can be done by the following formula:

$$\text{VEV} = \sqrt{3.842 - 2 \times \text{VaR}_{\text{RETURN SPACE}}^2 - 1.96} / \sqrt{T}$$

where $T$ is the length of the recommended holding period in years.

The MRM class is assigned based on the table to the right in point 2 of Annex II, Part 1.

<table>
<thead>
<tr>
<th>MRM class</th>
<th>Annualised volatility (VEV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>2</td>
<td>≥0.5 % and &lt;5.0 %</td>
</tr>
<tr>
<td>3</td>
<td>≥5.0 % and &lt;12 %</td>
</tr>
<tr>
<td>4</td>
<td>≥12 % and &lt;20 %</td>
</tr>
<tr>
<td>5</td>
<td>≥20 % and &lt;30 %</td>
</tr>
<tr>
<td>6</td>
<td>≥30 % and &lt;80 %</td>
</tr>
<tr>
<td>7</td>
<td>≥80 %</td>
</tr>
</tbody>
</table>
Calculation Example Category 2 PRIIPs

Trading days per year 256
M0 (under paragraph 10 of Annex II) 1280
M1 0.0003389

M2 0.000149905 Second Moment $M_2 = \frac{1}{n} \sum_{i=1}^{n} (r_i - M_1)^2$ Volatility $\sigma = \sqrt{M_2}$

M3 -6.44479E-07 Third Moment $M_3 = \frac{1}{n} \sum_{i=1}^{n} (r_i - M_1)^3$ Skew $\mu_1 = M_3 / M_2^{1.5}$

M4 1.46705E-07 Fourth Moment $M_4 = \frac{1}{n} \sum_{i=1}^{n} (r_i - M_1)^4$ Excess Kurtosis $\mu_2 = (M_4 / M_2^2) - 3$

Daily $\sigma$ 0.01224357
Confidence level 2.50%

Annualized Volatility (1Y) $\sigma \sqrt{N}$
$z \approx$ 1.96
$z^2 \approx 3.84$ 19.59%

Polynomial $z^2$ $z^3$ $z^4$
Divisor

RHP (Recommended Holding Period expressed in years)

<table>
<thead>
<tr>
<th>Number of Days</th>
<th>VaR (Return Space)</th>
<th>VEV Return Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.4053</td>
<td>0.1969</td>
</tr>
<tr>
<td>3</td>
<td>-0.7247</td>
<td>0.1964</td>
</tr>
<tr>
<td>5</td>
<td>-0.9566</td>
<td>0.1963</td>
</tr>
<tr>
<td>10</td>
<td>-1.4081</td>
<td>0.1962</td>
</tr>
<tr>
<td>20</td>
<td>-2.1029</td>
<td>0.1961</td>
</tr>
<tr>
<td>50</td>
<td>-3.6764</td>
<td>0.1960</td>
</tr>
</tbody>
</table>

VEV Return Space MRM class VaR-equivalent volatility (VEV)

<table>
<thead>
<tr>
<th>VEV Return Space</th>
<th>MRM class</th>
<th>VaR-equivalent volatility (VEV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1969</td>
<td>1</td>
<td>&lt;0.3%</td>
</tr>
<tr>
<td>0.1964</td>
<td>2</td>
<td>0.5%–5.0%</td>
</tr>
<tr>
<td>0.1963</td>
<td>3</td>
<td>5.0%–12%</td>
</tr>
<tr>
<td>0.1962</td>
<td>4</td>
<td>12%–20%</td>
</tr>
<tr>
<td>0.1961</td>
<td>5</td>
<td>20%–30%</td>
</tr>
<tr>
<td>0.1960</td>
<td>6</td>
<td>30%–80%</td>
</tr>
<tr>
<td>0.1960</td>
<td>7</td>
<td>&gt;80%</td>
</tr>
</tbody>
</table>
Part 3: Category 3 PRIIPs (non-linear products)

**Question 1**
Does the PRIIP offer an unconditional capital guarantee?

**YES**

You may apply the following (Point 24, Annex II, Part 1): For the part where the PRIIP offers an unconditional guarantee, you may assume the VaR at 97.5% (regardless of whether the PRIIP meets the minimum data requirements or not) to be the value of the guarantee at the recommended holding period, discounted for the expected risk free factor. For the risk free rate of a Euro currency for example, take it from a Eurozone interest rate curve with a comparable term as the recommended holding period of the PRIIP. For the part where the PRIIP does not offer an unconditional guarantee, or for the PRIIP as a whole if you do not wish to apply this option, please go to question 2.

**NO**

**Question 2**
Are 5 years of historical prices of the underlying available on;
- A daily basis?
- A weekly basis?
- A bi-monthly basis?
- A monthly basis?

**YES**

Use the full data set. Go to question 5.

**NO**

**Question 3**
Is the minimum requirement available? For:
- Daily prices; 2 years
- Weekly prices; 4 years
- Bi-monthly prices; 5 years
- Monthly prices; 5 years

**YES**

The available price data shall be concatenated with the data of the representative benchmark to meet the minimum data requirements. Go to question 5.

**NO**

**Question 4**
Are representative benchmarks or proxies available allowing the PRIIP to meet the minimum data requirements?

**YES**

The PRIIP is Category 1. The MRM class is 6

**NO**

Use what is available with a minimum of;
- 2 years for daily prices
- 4 years for weekly prices
- 5 years for bi-monthly prices
- 5 years for monthly prices
All data exceeding the minimum up to 5 years should be included in the calculation. Go to question 5.
Question 5
Does the pay-off of the product directly depend on curves (e.g. a Libor or Euribor short term rate)

YES
Perform a principal component analysis (PCA) to ensure that the simulation results in a consistent curve.

Simulate each tenor point of each underlying curve as it is now until the end of the recommended holding period at least 10,000 times.

NO

Step 1: Calculate VaR using simulation.
Simulate the price or prices which determine the value of the PRIIP at the end of the recommended holding period. The simulation is based on bootstrapping the expected distribution of prices or price levels for the PRIIP's underlying contracts from the observed distribution of returns for these contracts with replacement. Go to step 2.

Step 2: Take the sample of historical prices and calculate the return for each observed period by taking the logarithm of the price at the end of that period divided by the price at the end of the previous period.

Step 3: For each simulation of a spot price (or level) the manufacturer shall, for each simulated period in the recommended holding period (N), randomly select one observed period (historical sample) which identifies the return for all underlying contracts.

Step 4: For each contract perform the following steps:
- Sum the returns from the selected simulated periods in the recommended holding period (N)
- Calculate the risk-free return over the recommended holding period
- Calculate the mean return over the observed period and multiply it by N
- Add the risk-free return to the sum of simulated returns and subtract the mean of the observed returns (multiplied by N)
- Subtract the amount 0.5 \( \sigma^2 N \) where \( \sigma \) is the standard deviation of the observed historical returns

Step 5: Compute the value of the underlying at the recommended holding period by taking the exponential of the corrected (and possibly adjusted) return.

Step 6: For each set of simulated curves and spot prices, compute the value of the product and sort the resulting 10,000 values. Go to next box.

Step 5: Compute the value of the underlying at the recommended holding period by taking the exponential of the corrected (and possibly adjusted) return.

Step 6: For each set of simulated curves and spot prices, compute the value of the product and sort the resulting 10,000 values. Go to next box.

Question 6
Is the underlying denominated in the same currency as the product?

YES

NO

Adjust for the Quanto effect using the following term:

\[ \rho \sigma \sigma_{ccy} N \]

Step 5
Compute the value of the underlying at the recommended holding period by taking the exponential of the corrected (and possibly adjusted) return.

REPEAT AT LEAST 9999 TIMES

AFTER 10,000 REPEATS

Step 6
For each set of simulated curves and spot prices, compute the value of the product and sort the resulting 10,000 values. Go to next box.

Step 5
Compute the value of the underlying at the recommended holding period by taking the exponential of the corrected (and possibly adjusted) return.

Step 6
For each set of simulated curves and spot prices, compute the value of the product and sort the resulting 10,000 values. Go to next box.
Question 8
Is the calculation based on monthly price data?

NO

The MRM class is assigned based on the table below (Point 2, Annex II, Part 1).

YES

The MRM class is assigned based on the table below and increased with one MRM class (Point 18, Annex II, Part 1).

<table>
<thead>
<tr>
<th>MRM class</th>
<th>Annualised volatility (VEV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>2</td>
<td>≥0.5 % and &lt;5.0 %</td>
</tr>
<tr>
<td>3</td>
<td>≥5.0 % and &lt;12 %</td>
</tr>
<tr>
<td>4</td>
<td>≥12 % and &lt;20 %</td>
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<tr>
<td>5</td>
<td>≥20 % and &lt;30 %</td>
</tr>
<tr>
<td>6</td>
<td>≥30 % and &lt;80 %</td>
</tr>
<tr>
<td>7</td>
<td>≥80 %</td>
</tr>
</tbody>
</table>

Step 7 - Calculate VEV and MRM Class

The VEV is given by:

\[
VEV = \frac{\sqrt{3.842 - 2 \cdot \ln(\text{Var}_\text{PRICE SPACE})} - 1.96}{\sqrt{T}}
\]

Where \( T \) is the length of the recommended holding period in years (Point 17, Annex II, Part 1).

Only in cases where the product is called or cancelled before the end of the recommended holding period according to the simulation, the period in years until the call or cancellation is used.
Calculation Example Category 3 PRIIPs

**Steps 1-6:** 12 days RHP, 20 simulations, 1280 observed daily prices (5 years – Euro Stoxx 50 – from 01.05.12 to 28.04.17)

**Example Simulation 1**

<table>
<thead>
<tr>
<th>SIMULATION</th>
<th>RANK</th>
<th>VALUE</th>
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<td>1</td>
<td>0,003144319</td>
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<td>2</td>
<td>2</td>
<td>0,000786848</td>
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<tr>
<td>3</td>
<td>3</td>
<td>-0,034100705</td>
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<td>4</td>
<td>4</td>
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<td>11</td>
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</tr>
<tr>
<td>12</td>
<td>12</td>
<td>0,00477314</td>
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</tbody>
</table>

Return = \( E[\text{Return}_\text{risk-neutral}] - E[\text{Return}_\text{measured}] - 0,5 \sigma^2 N \), where \( \sigma^2 N \) is the normal distribution.

- \( E[\text{Return}_\text{risk-neutral}] = \text{Risk free return} + \text{Sum of simulated returns} \)

**Distribution of Simulations**

<table>
<thead>
<tr>
<th>SIMULATIONS</th>
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<th>VALUE</th>
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<td>1</td>
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<td>3</td>
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</tr>
<tr>
<td>16</td>
<td>7</td>
<td>0,98975916</td>
</tr>
<tr>
<td>17</td>
<td>20</td>
<td>0,90900029</td>
</tr>
<tr>
<td>18</td>
<td>11</td>
<td>0,94922586</td>
</tr>
<tr>
<td>19</td>
<td>13</td>
<td>0,93321018</td>
</tr>
<tr>
<td>20</td>
<td>16</td>
<td>0,92273156</td>
</tr>
</tbody>
</table>

**Step 7:** RHP = 1 AND 3 YEARS, 1000 simulations, 1280 observed daily prices (5 years – Euro Stoxx 50 – from 01.05.12 to 28.04.17)

**AVG RETURN (OBSERVED):** 0,000338931
**DEVIATION STANDARD OF RETURNS (OBSERVED):** 0,01224357
**DATA COUNT (5 years of daily prices):** 1280

**Risk Free Rate (%/yr):** 1,2
**MRM PERCENTILE:** 2,5
**TRADING DAYS PER YEAR:** 256
**INV NORMAL:** -1,95996398
**USED RANK MRM:** 975

**Recommended holding period expressed in years (T)**

<table>
<thead>
<tr>
<th>YEARS</th>
<th>VaR (price space)</th>
<th>VEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0,6832</td>
<td>0,1856</td>
</tr>
<tr>
<td>3</td>
<td>0,4957</td>
<td>0,1907</td>
</tr>
</tbody>
</table>
Part 4: Category 4 PRIIPs

**Question 1**
Does the PRIIP offer an unconditional protection of capital?

**YES**

**You may apply** the approach described in Point 29, Annex II, Part 1. The approach is the same as for Category 3 products as set out in Part 3 above. To calculate the VaR for the remaining part of the PRIIP which is not characterized by an unconditional protection of capital, or if you do not wish to apply this option for the PRIIP as a whole, please go to the next box.

**NO**

Identify the different components of the PRIIP that contribute to its performance. Distinguish between:
- components that are not wholly or partly dependent on factor(s) that are unobserved in the market;
- components that are wholly or partly dependent on factor(s) that are unobserved in the market.

**OBSERVED FACTOR(S)**

For components that are dependent on factor(s) that are observed in the market, apply the relevant methods depending on whether the component(s) falls into category 1, 2 or 3 (See Parts 1, 2 and 3 above for the relevant calculation methods).

**UNOBSERVED FACTOR(S)**

For component(s) of the PRIIP that depend on a factor or factors that are unobserved in the market, follow robust and well recognised industry and regulatory standards for determining relevant expectations as to the future contribution of these factors and the uncertainty that may exist in respect of this contribution. (Point 27, Annex II, Part 1)

Calculate a VaR-equivalent volatility for each of the components

Weight proportionally the VaR-equivalent volatility of each component of the PRIIP in order to get the overall VaR-equivalent volatility of the PRIIP. When weighting the components, product features shall be taken into account. Where relevant, product algorithms mitigating the market risk as well as specificities of the with-profit component shall be considered. (Point 28, Annex II, Part 1).

OBSERVED FACTOR(S)

UNOBSERVED FACTOR(S)
Section 3: Credit Risk Measure

Part 1: Should credit risk be assessed and if so how

Question 1
Is the Market Risk Class of the PRIIP??

NO

Question 2
Does the return of the PRIIP depend on the creditworthiness of the obligors or the underlying investments or exposures?

NO

Question 3a
Is there an entity that directly engages to pay the return to the investor? (Point 31, Annex II, Part 2)

NO

Question 3b
Does the PRIIP invest in or is exposed to underlyings or techniques that entail credit risk (Point 33, Annex II, Part 2) and is this exposure relevant because the following criteria are met?
- it is more than 10% of the total assets or value of the PRIIP (Point 35, Annex II, Part 2)
- it is not an exchange traded derivative or cleared OTC derivative (Point 36, Annex II, Part 2)

YES

(1) Go to Part 2 and perform the assessment of the credit risk of the PRIIP or obligor(s) (Point 31, Annex II, Part 2)

(2) Then determine the weighted average credit quality step of the underlyings (Point 40, Annex II, Part 2).

Then take the highest credit quality step from (1) and (2) above (point 41, Annex II, Part 2)

NO credit risk assessment of the PRIIP (Point 30, Annex II, Part 2)

Only 3a is met: DIRECT ASSESSMENT

Only 3b is met: LOOK-THROUGH ASSESSMENT

Both 3a and 3b are met: CASCADE ASSESSMENT

Neither 3a or 3b is met: NO CREDIT RISK ASSESSMENT

Go to Part 2 and perform the assessment of the credit risk for each relevant underlying.

Then determine the weighted average credit quality step (Point 40, Annex II, Part 2)

(1) Go to Part 2 and perform the assessment of the credit risk separately for the obligor(s) and each relevant underlying.

(2) Then determine the weighted average credit quality step of the underlyings (Point 40, Annex II, Part 2).
Part 2 Assessment of credit risk

Step 1: Check if credit risk mitigation factors apply

Question 1 Is the relevant credit risk appropriately collateralized or backed by assets in segregated accounts not available to other creditors as described in point 46, Annex II, Part 2?

YES ➔ CRM = 1
(Point 46, Annex II, Part 2)

NO ➔ Question 2

Question 2 Is the relevant credit risk appropriately collateralized or backed by assets in accounts or registers on which retail investors to the PRIIP have priority over other creditors as described in point 47, Annex II, Part 2?

YES ➔ CRM = 2
(Point 47, Annex II, Part 2)

NO ➔ Step 2: Identify the relevant credit quality step

Question 3 Is the PRIIP rated by an ECAI?

YES ➔ CRM = 2
(Point 47, Annex II, Part 2)

NO ➔ Question 4

Question 4 Is there a rating of an ECAI for the relevant obligor? If payments are unconditionally guaranteed by another entity, apply the assessment to the guarantor if more favourable.

YES ➔ Question 5

Are multiple ECAI ratings available?

YES ➔ Step 3: Pick the median of the ratings by the pre-selected ECAIs, defaulting to the lower of the two middle values for an even number of assessments (Point 37, Annex II, Part 2).

NO ➔ CQS = 5


CQS = 5 ➔ Go to step 5.

NO ➔ CQS = 3

NO ➔ Step 5: Go to step 5.

Question 5 Are multiple ECAI ratings available?

YES ➔ CQS = 5

NO ➔ CQS = 3

Question 6 Is the obligor regulated as a credit institution or insurance undertaking under applicable EU regulation and would the Member state where the institution is domiciled be allocated to CQS 3 or lower? (Point 43(a), Annex II, Part 2)

YES ➔ CQS = 3

NO ➔ CQS = 5

Step 5: Go to step 5.
Step 5: Allocation of credit assessment corresponding to the credit quality steps

Adjust the CQS depending on the term of the PRIIP according to the table below in point 42, Annex II, Part 2 unless the credit assessment assigned reflects the term of the PRIIP.

### Credit quality step pursuant to point 38 of this Annex

<table>
<thead>
<tr>
<th>Adjusted credit quality step, in the case where the maturity of the PRIIP, or its recommended holding period where a PRIIP does not have a maturity, is up to one year</th>
<th>Adjusted credit quality step, in the case where the maturity of the PRIIP, or its recommended holding period where a PRIIP does not have a maturity, ranges from one year up to twelve years</th>
<th>Adjusted credit quality step, in the case where the maturity of the PRIIP, or its recommended holding period where a PRIIP does not have a maturity, exceeds twelve years</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Step 6
Convert the CQS into a CRM measure according to the table below in point 45, Annex II, Part 2

### Adjusted credit quality step | Credit risk measure
---|---
0 | 1
1 | 1
2 | 2
3 | 3
4 | 4
5 | 5
6 | 6

Question 7: Is there any other relevant credit risk to assess?

- **YES**: Go to the start of Part 2 and repeat assessment for the other relevant credit risks
- **NO**: Go to Part 3
Part 3: Mitigating or escalating factors

Question 1
Does the PRIIP or underlying investment meet the mitigating factor described in Point 49? (prioritisation of claims)

Question 2
Does the PRIIP or underlying investment meet the escalating factor described in Point 50? (subordination of claims)

Question 3
Does the PRIIP or underlying investment meet the escalating factor described in Point 51? (Is the PRIIP a part of the own funds of the PRIIP obligor?)

Decrease the CRM by 1

Increase the CRM by 2

Increase the CRM by 3

CRM is unchanged

YES

YES

YES

NO

NO

NO
B. Performance Scenarios

Part 1: Determining the holding periods that need to be shown

**Question 1:** Is the recommended holding period 3 years or more?
- **YES**: Performance values need to be shown at 3 moments in time: at 1 year, at half the recommended holding period, and at the recommended holding period.
- **NO**: The recommended holding period is shorter than 1 year: no intermediate periods need to be shown. Only the values at the recommended holding period, (Points 19-21 of Annex IV).

**Question 2:** Is the recommended holding period between 1 and 3 years?
- **YES**: Performance values need to be shown at 2 moments in time: at 1 year and at the end of the recommended holding period.
- **NO**: Performance values need to be shown at 2 moments in time: at 1 year and at the end of the recommended holding period.
Part 2: Determining calculation amounts and applicable methodology

**Step 1**
Determine the calculation amount that shall be used for the performance scenarios: 10.000€ or 1.000€/year for regular premiums or a similar amount cleanly divisible by 1.000 if the PRIIP is denominated in another currency (Points 90 and 91 of Annex VI)

**Step 2**
The performance scenarios will be expressed in both monetary and percentage terms.

**Question 1**
Does the PRIIP require an initial investment?

- **YES**
  - The percentage terms correspond to the average annualized return of the investment which shall be calculated using net performance as a numerator and the initial investment amount or price paid as denominator.

- **NO**
  - The percentage terms shall be calculated considering the nominal value of the contract and a footnote added to explain this.

**Question 2**
What is your PRIIP Category?
Determining your PRIIP Category is explained in the Market Risk Measure section of the diagram.

- **Category 1 PRIIPs**
  - Go to Part 3 Determining performance scenarios for Category 1 PRIIPs

- **Category 2 PRIIPs**
  - Go to Part 4 Determining performance scenarios for Category 2 PRIIPs

- **Category 3 PRIIPs**
  - Go to Part 5 Determining performance scenarios for Category 3 PRIIPs

- **Category 4 PRIIPs**
  - Calculate the performance scenarios in accordance with point 15 of Annex IV
Part 3: Determining Performance Scenarios for Category 1 PRIIPs

Question 1
Is the PRIIP a derivative traded on a regulated market or third country equivalent?

Question 2
Is it an option or future?

Question 3
Is the PRIIP a Category 1 product due to insufficient data for calculating performance, and are there no relevant available proxies or benchmarks (Point 4(c), Annex II, Part 3)?

YES

YES

You may use a pay off graph with on the horizontal axis a series of possible prices of the underlying and on the vertical axis the accompanying profit or loss (Point 17 of Annex IV).

For these PRIIPs a reasonable and conservative best estimate should be given on performance values (Point 18 of Annex IV).

NO

NO

NO

For these 1 PRIIPs (such as OTC derivatives or PRIIPs where you can lose more than the capital invested): Go to Part 5: Determining Performance Scenarios for Category 3 PRIIPs.
Part 4: Determining Performance Scenarios for Category 2 PRIIPs

a) Performance calculations for the unfavourable, moderate and favourable scenarios

The items listed below are needed in order to calculate the performance values for the relevant holding period. Most values are known already from the calculation for MRM, except for N.

The values for the recommended holding period and the intermediate holding periods are calculated by the same formulas as displayed below, changing only N which is different at the recommended holding period compared to the intermediate holding periods.

- N - is the number of trading days, weeks or months within the holding period. So for a Recommended Holding Period of 5 years and if there is daily price data N= 5*252 = 1260;
- Exp - the exponential of;
- M1 - the mean of the distribution of all the observed returns in the historical period;
  - σ - standard deviation or volatility of the distribution;
  - μ1 - skew of the distribution;
  - μ2 - the excess kurtosis of the distribution.

Unfavourable scenario:
\[ \text{Exp} \left[ M_1 \cdot N + \sigma \cdot \sqrt{N} \cdot \left( -1.28 + 0.107 \cdot \mu_1 / \sqrt{N} + 0.0724 \cdot \mu_2 / N - 0.0611 \cdot \mu_1^2 / N - 0.5\sigma^2 N \right) \right] \]

Moderate scenario:
\[ \text{Exp} \left[ M_1 \cdot N - \sigma \cdot \mu_1 / 6 - 0.5\sigma^2 N \right] \]

Favourable scenario:
\[ \text{Exp} \left[ M_1 \cdot N + \sigma \cdot \sqrt{N} \cdot \left( 1.28 + 0.107 \cdot \mu_1 / \sqrt{N} - 0.0724 \cdot \mu_2 / N + 0.0611 \cdot \mu_1^2 / N - 0.5\sigma^2 N \right) \right] \]
Calculation Example Category 2 PRIIPs unfavourable, moderate and favourable scenarios

5 years of observed daily prices (Euro Stoxx 50 – from 01.05.12 to 25.05.17), RHP 1, 3 and 5 years, examples considering an investment amount of 1 €

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Critical values</th>
<th>$\alpha$</th>
<th>$z_a$</th>
<th>$(z_a^2 - 1)/6$</th>
<th>$(z_a^3 - 3z_a)/24$</th>
<th>$(2z_a^3 - 5z_a)/36$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavorable Scenario</td>
<td>10%</td>
<td>-1,281551566</td>
<td>0,107062403</td>
<td>0,072494466</td>
<td>0,061060634</td>
<td></td>
</tr>
<tr>
<td>Moderate Scenario</td>
<td>50%</td>
<td>0</td>
<td>-0,166666667</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Favorable Scenario</td>
<td>90%</td>
<td>1,281551566</td>
<td>0,107062403</td>
<td>-0,072494466</td>
<td>-0,061060634</td>
<td></td>
</tr>
</tbody>
</table>

**Standard Performance Scenarios**

Point 9 - letters (a), (b), (c) - Annex IV

<table>
<thead>
<tr>
<th>RHP</th>
<th>5 years</th>
<th>1 year</th>
<th>3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1280</td>
<td>0,438039282</td>
<td>0,195897122</td>
<td>0,339303769</td>
</tr>
<tr>
<td>256</td>
<td>0,792589109</td>
<td>0,832148758</td>
<td>0,792589109</td>
</tr>
<tr>
<td>768</td>
<td>1,402994819</td>
<td>1,070681172</td>
<td>1,225626426</td>
</tr>
</tbody>
</table>

$\sigma \sqrt{N}$

Unfavorable scenario

Moderate scenario

Favorable scenario

N is the number of trading periods in the recommended holding period

σ is the standard deviation of the daily price changes.
b) Performance calculations for the stress scenario

**Step 1:** Identify a sub interval of length \( w \) which corresponds to the following intervals:

- 1 year > 1 year
- Daily prices 21 63
- Weekly prices 8 16
- Monthly prices 6 12

**Step 2:** Identify for each sub interval of length \( w \) the historical lognormal returns \( r_t \), where \( t = t_0, t_1, t_2, ..., t_N \).

**Step 3:** Measure the volatility based on the formula below starting from \( t = t_i \) rolling until \( t = t(N-w) \)

\[
\sigma_{W} = \sqrt{\frac{\sum_{i=1}^{N} (r_{t_i} - \mu_{W})^2}{M_w}}
\]

Where \( M_w \) is the count of number of observations in the sub interval and \( \mu_{W} \) is the mean of all the historical lognormal returns in the corresponding sub interval.

**Question 1:** Is the holding period longer than 1 year?

- NO
- YES

In the formula below use the extreme percentile \( z_{0.5} \) that corresponds to 1% which is equal to -2.32

In the formula below use the extreme percentile \( z_{0.5} \) that corresponds to 5% which is equal to -1.64

Use the following formula to calculate the expected values at the end of the relevant holding period:

\[
Scenario_{STRESS} = \exp\left[ w_{0.5} \sqrt{\frac{\sum_{i=1}^{N} (r_{t_i} - \mu_{W})^2}{M_w}} \right] \left( 1 + \left[ \frac{w^2}{6} + \frac{(w^2 - 3w_{a})}{24} \right] \mu_{W} \left( \frac{2w^2 - 5w}{36} \right) \right) - 0.5w_{0.5}N
\]
Calculation Example Category 2 PRIIPs stress scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>α</th>
<th>$x_0$</th>
<th>$(x_0^2 - 1)/6$</th>
<th>$(x_0^2 - 3x_0)/24$</th>
<th>$(2x_0^2 - 5x_0)/36$</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHP 1 YEAR - Annex IV, point 11</td>
<td>1%</td>
<td>-2.326347874</td>
<td>0.735315739</td>
<td>-0.233787728</td>
<td>-0.376337746</td>
</tr>
<tr>
<td>RHP OTHER HOLDING PERIODS - Annex IV, point 11</td>
<td>5%</td>
<td>-1.644853627</td>
<td>0.284257242</td>
<td>0.020180747</td>
<td>-0.018792716</td>
</tr>
<tr>
<td>Stressed volatility 1 year - Annex IV, point 10(d)</td>
<td><strong>0.02576278</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stressed volatility 3 years - Annex IV, point 10(d)</td>
<td><strong>0.017657123</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stressed volatility 5 years - Annex IV, point 10(d)</td>
<td><strong>0.017152366</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N$ is the number of trading periods in the recommended holding period

$W_0 \sqrt{\bar{N}}$

<table>
<thead>
<tr>
<th>RHP</th>
<th>1 year</th>
<th>3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.612661699</td>
<td>0.412276441</td>
<td>0.489328534</td>
</tr>
<tr>
<td>0.301389802</td>
<td>0.349241623</td>
<td>0.396012057</td>
</tr>
</tbody>
</table>

STRESSED SCENARIO

<table>
<thead>
<tr>
<th>RHP</th>
<th>1 year</th>
<th>3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.612661699</td>
<td>0.412276441</td>
<td>0.489328534</td>
</tr>
<tr>
<td>0.301389802</td>
<td>0.349241623</td>
<td>0.396012057</td>
</tr>
</tbody>
</table>
Part 5: Determining Performance Scenarios for Category 3 PRIIPs

Please note that the performance scenarios hinge on the same simulated data as the MRM calculations, hence manufacturers are not required to make a new simulation when switching from the MRM to the Performance Scenarios calculations. However, the complete process for the performance scenarios is described in this Part for the sake of clarity.

a) Performance calculations for the unfavourable, moderate and favourable scenarios

Question 1
Does the pay-off of the product directly depend on curves (e.g. a Libor or Euribor short term rate)?

YES

Perform a principal component analysis (PCA) to ensure that the simulation results in a consistent curve.

NO

Simulate each tenor point of each underlying curve as it is now until the end of the recommended holding period at least 10,000 times.

Step 1: Simulate the price or prices which determine the value of the PRIIP at the end of the recommended holding period. The simulation is based on bootstrapping the expected distribution of prices or price levels for the PRIIP’s underlying contracts from the observed distribution of returns for these contracts with replacement. Go to step 2.
Step 2: Take the sample of historical prices and calculate the return for each observed period by taking the logarithm of the price at the end of that period divided by the price at the end of the previous period.

Step 3: For each simulation of a spot price (or level) the manufacturer shall, for each simulated period in the RHP (N), randomly select one observed period (historical sample) which identifies the return for all underlying contracts.

Step 4: For each contract perform the following steps:
   - Sum the returns from the selected simulated periods in the RHP (N)
   - Subtract the amount $0.5 \sigma^2 N$ where sigma is the standard deviation of the observed historical returns

Question 2: Is the underlying denominated in the same currency as the product?

YES

Compute the value of the underlying at the RHP by taking the exponential of the corrected (and possibly adjusted) return.

NO

Adjust for quanto effects using the following term: $ho \sigma \sigma_{ccy} N$

Step 5: For each set of simulated curves and spot prices, compute the value of the product and sort the resulting 10 000+ values. Go to step 6.

After 10 000 repeats

REPEAT at least 9999 times

YES

NO

REPEAT at least 9999 times
For the unfavourable scenario: take the 10th percentile result, (the 1,000th value in the ordered list of product values, if 10,000 simulations have been used).

For the moderate scenario: take the 50th percentile result, (the 5,000th value in the ordered list of product values, if 10,000 simulations have been used).

For the favourable scenario: take the 90th percentile result (the 9,000th value in the ordered list of product values, if 10,000 simulations have been used).

Question 3
Is the PRIIP an insurance based investment product?

An additional scenario is required. This will be based on the moderate performance scenario that was calculated. This scenario shows the insured event that would be triggered and point 34 of Annex IV needs to be taken into account when calculating the scenario.

Go to calculate the returns for the stress scenario.

Step 6: Select the relevant percentile for each performance scenario.
Calculation Example Category 3 PRIIPs unfavourable, moderate and favourable scenarios

1000 simulations, RHP 1 and 3 years, 5 years of daily observed prices (Euro Stoxx 50 from 01.05.12 to 28.04.17)

<table>
<thead>
<tr>
<th>Years</th>
<th>Unfavorable Scenario</th>
<th>Moderate Scenario</th>
<th>Favourable Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.848537</td>
<td>1.086382</td>
<td>1.39373</td>
</tr>
<tr>
<td>3</td>
<td>0.780318</td>
<td>1.23794</td>
<td>1.936616</td>
</tr>
</tbody>
</table>

Recommended holding period in years (T)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Rank (over 1000 simulations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10th</td>
<td>900</td>
</tr>
<tr>
<td>50th</td>
<td>500</td>
</tr>
<tr>
<td>90th</td>
<td>100</td>
</tr>
</tbody>
</table>

The scenarios values under different performance scenarios shall be calculated in a similar manner as the market risk measure (MRM) - Point 4 Annex IV and Point 12 letter a, b Annex IV)
b) Performance calculations for the stress scenario

**Step 1:** Identify a sub interval of length \( w \) which corresponds to the following intervals:

<table>
<thead>
<tr>
<th></th>
<th>1 year</th>
<th>&gt; 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily prices</td>
<td>21</td>
<td>63</td>
</tr>
<tr>
<td>Weekly prices</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Monthly prices</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

**Step 2:** Identify for each sub interval of length \( w \) the historical lognormal returns \( r_t \), where \( t = t_0, t_1, ..., t_N \).

**Step 3:** Measure the volatility based on the formula below starting from \( t = t_0 \) rolling until \( t = t_{(N-w)} \)

\[
\sigma_{t_1} = \sqrt{\frac{\sum_{t_i}^{t_{i+1}} (r_{t_i} - \bar{r}_{t_i}M_{t})^2}{M_w}}
\]

Where \( M_w \) is the count of number of observations in the sub interval and \( \bar{r}_{t_i}M_{t} \) is the mean of all the historical lognormal returns in the corresponding sub interval.

Infer the stressed volatility \( W_{t} \) that corresponds to the 99th percentile for 1 year and the 90th percentile for the other holding periods.

**Step 4:** Rescale historical returns \( r_t \) based on the formula set out below

\[
r_t^{adj} = r_t \times \frac{\sigma_S}{\sigma_S}
\]

where \( \sigma_S \) is the standard deviation of the observed historical returns

Go to step 5.
Step 5: Calculate the mean of the adjusted returns \( \{ r_{t, \text{adj}} \} \). The mean stressed return is denoted as \( \mu^* \).

Step 6: Randomly select one observed period which identifies the return for all underlying contracts.

Step 7: For each simulation, calculate the asset price at the end of the recommended holding period by:
- Randomly selecting \( N \) returns from the set \( \{ r_{t, \text{adj}} \} \)
- Summing the selected returns and subtracting \( \mu^*N \)
- Subtracting \( \frac{1}{2} \sigma^* N \) (\( \sigma^* \) denotes the standard deviation of the adjusted returns)
- Adjusting for quanto impact if applicable
- Exponentiating the result

Step 8: The stress scenario shall be the value of the PRIIP at the extreme percentile that corresponds to 1% for 1 year and to 5% for the other holding periods.

Go to Part 6: Calculating the performance scenarios for the intermediate periods
Calculation Example Category 3 PRIIPs stress scenario

RECOMMENDED HOLDING PERIOD = N = 2 YEAR = 512 OBS
W=63 days
Starting from ti=t0 rolling until ti=(N-w)=512-63=449

<table>
<thead>
<tr>
<th>DATE</th>
<th>PRICE</th>
<th>OBSERVED RETURNS</th>
<th>N</th>
<th>Rolling volatility</th>
</tr>
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Steps 1-3: 1000 simulations, RHP of 2 years
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<th>Rank</th>
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<th>Stressed returns</th>
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<td>0,009972533</td>
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<td>18/05/2015</td>
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<td>$r_{T-W}$</td>
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## SIMULATED RETURNS IN THE RHP (RHP=512 DAYS = 2 YEARS)

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<th>2</th>
<th>3</th>
<th>509</th>
<th>510</th>
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<th>512</th>
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<tbody>
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<td>Simulation 1</td>
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<td>0.01293</td>
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<td>Simulation 2</td>
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<td>-0.01822</td>
<td>-0.01513</td>
<td>-0.00293</td>
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<td>-0.00621</td>
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<td>Simulation 3</td>
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<td>0.011466</td>
<td>0.001153</td>
<td>0.026313</td>
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<td>Simulation 997</td>
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<td>0.65239</td>
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</table>
### Sum of stressed returns

<table>
<thead>
<tr>
<th>Simulation</th>
<th>Sum of Stressed Returns</th>
<th>Simulated Stressed Returns</th>
<th>Rank</th>
<th>Simulated Stressed Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation 1</td>
<td>0.547871</td>
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<td>Simulation 2</td>
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<tr>
<td>Simulation 3</td>
<td>0.11592</td>
<td>0.209019028</td>
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<td>Simulation 4</td>
<td>0.526658</td>
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<td>Simulation 5</td>
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<td>Simulation 997</td>
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<tr>
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</tbody>
</table>

### Percentile stressed scenario

- **RHP = 2 Y (512 days)**
  - \( Z_\alpha \)
  - Rank: 5
  - Stressed Scenario: 950
  - Sum of Stressed returns: \( 0.376425586 \)
  - Simulated stressed returns: \( 0.488090936 \)
Part 6: Calculating the performance scenarios for the intermediate periods

**Question 1**

Does the PRIIP only reference or invest in one underlying, and is the PRIIP’s value a monotone function of this underlying price (i.e. when the underlying price increases, the PRIIP’s value is either always non-decreasing, or always non-increasing)?

No

This means that the PRIIP includes several underlying investments or exposures and point 24(c) of Annex IV applies. To produce the favourable, moderate, unfavourable and stress scenarios at each intermediate date, pick underlying simulations consistent with (but not necessarily equal to) the corresponding percentiles of the PRIIP’s values and use them as seed values for a simulation to determine the value of the PRIIP at the end of the period.

Yes

To produce the scenarios at each intermediate date, pick 4 underlying simulations used for the calculation of performance scenarios as follows (Point 24 (a) and (b) of Annex IV).

- **For the unfavourable scenario:**
  Pick the simulation leading to (or that is consistent with) the 10th percentile from the scenarios at the recommended holding period and calculate potential return of the PRIIP at the end of each intermediate period consistent with that simulation.

- **For the moderate scenario:**
  Pick the simulation leading to (or that is consistent with) the 50th percentile from the scenarios at the RHP and calculate potential return of the PRIIP at the end of each intermediate period consistent with that simulation.

- **For the favourable scenario:**
  Pick the simulation leading to (or that is consistent with) the 90th percentile from the scenarios at the RHP and calculate potential return of the PRIIP at the end of each intermediate period consistent with that simulation.

- **For the stress scenario:**
  Pick the simulation leading to (or that is consistent with) the percentile that corresponds to 1% for the 1 year intermediate holding period and to 5% for other holding periods from the scenarios at the RHP and calculate potential return of the PRIIP at the end of each intermediate period consistent with that simulation.

**Question 4**

Is the PRIIP an insurance based investment product?

No

No further steps

Yes

An additional scenario is required. This will be based on the moderate performance scenario that was calculated. This scenario shows the insured event that would be triggered and point 34 of Annex IV needs to be taken into account when calculating the scenario.