

# 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 compiled 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.**

## 2. Table of Contents

|                                                                                           |    |
|-------------------------------------------------------------------------------------------|----|
| PRIIPs – Flow diagram for the risk and reward calculations in the PRIIPs KID .....        | 1  |
| 1. Introduction.....                                                                      | 1  |
| 2. Table of Contents .....                                                                | 2  |
| 3. Acronyms used .....                                                                    | 3  |
| 4. Flow Diagrams .....                                                                    | 4  |
| A. Summary Risk Indicator (SRI) .....                                                     | 4  |
| Section 1: Calculating the Summary Risk Indicator .....                                   | 4  |
| Section 2: Market Risk Measure.....                                                       | 5  |
| Part 1: Determine the PRIIP Category to select the applicable methodology .....           | 5  |
| Part 2: Category 2 (linear) PRIIPs.....                                                   | 6  |
| Calculation Example Category 2 PRIIPs .....                                               | 8  |
| Part 3: Category 3 PRIIPs (non-linear products).....                                      | 9  |
| Calculation Example Category 3 PRIIPs .....                                               | 12 |
| Part 4: Category 4 PRIIPs .....                                                           | 13 |
| Section 3: Credit Risk Measure.....                                                       | 14 |
| Part 1: Should credit risk be assessed and if so how .....                                | 14 |
| Part 2 Assessment of credit risk .....                                                    | 14 |
| Part 3: Mitigating or escalating factors .....                                            | 17 |
| B. Performance Scenarios.....                                                             | 18 |
| Part 1: Determining the holding periods that need to be shown .....                       | 18 |
| Part 2: Determining calculation amounts and applicable methodology.....                   | 19 |
| Part 3: Determining Performance Scenarios for Category 1 PRIIPs .....                     | 20 |
| Part 4: Determining Performance Scenarios for Category 2 PRIIPs .....                     | 21 |
| a) Performance calculations for the unfavourable, moderate and favourable scenarios ..... | 21 |
| b) Performance calculations for the stress scenario .....                                 | 23 |
| Part 5: Determining Performance Scenarios for Category 3 PRIIPs .....                     | 25 |
| a) Performance calculations for the unfavourable, moderate and favourable scenarios ..... | 25 |
| b) Performance calculations for the stress scenario .....                                 | 29 |
| Part 6: Calculating the performance scenarios for the intermediate periods .....          | 35 |

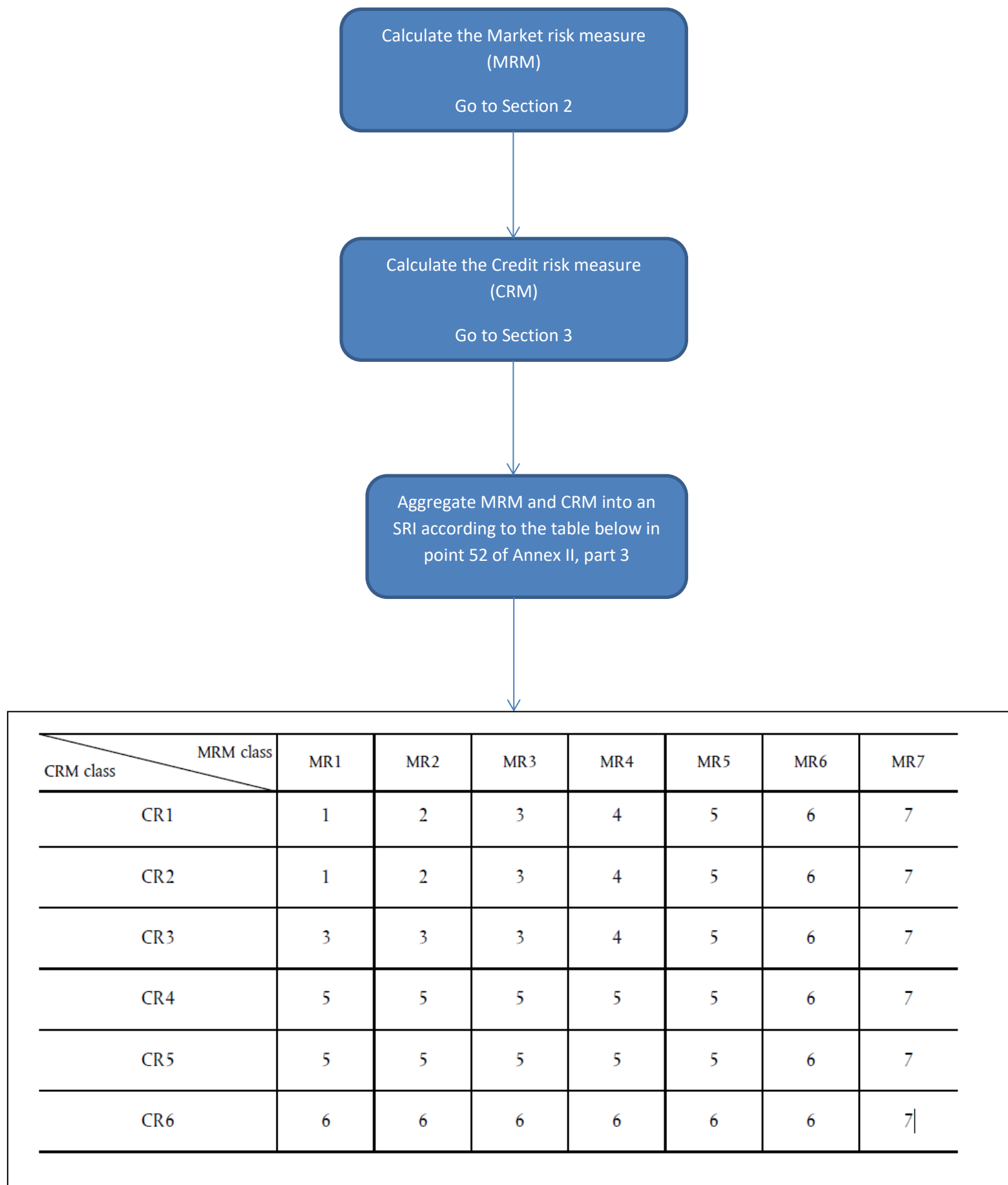
### 3. Acronyms used

|       |                                                       |
|-------|-------------------------------------------------------|
| CQS   | Credit Quality Step                                   |
| CRM   | Credit Risk Measure                                   |
| ECAI  | External Credit Assessment Institution                |
| ESAs  | European Supervisory Authorities                      |
| EXP   | Exponential                                           |
| KID   | Key Information Document                              |
| MRM   | Market Risk Measure                                   |
| OTC   | Over The Counter                                      |
| PCA   | Principal Component Analysis                          |
| PRIIP | Package Retail and Insurance-based Investment Product |
| Q&A   | Question and Answer                                   |
| RHP   | Recommended Holding Period                            |
| SRI   | Summary Risk Indicator                                |
| VaR   | Value-at-risk                                         |
| VEV   | VaR-Equivalent Volatility                             |

## 4. Flow Diagrams

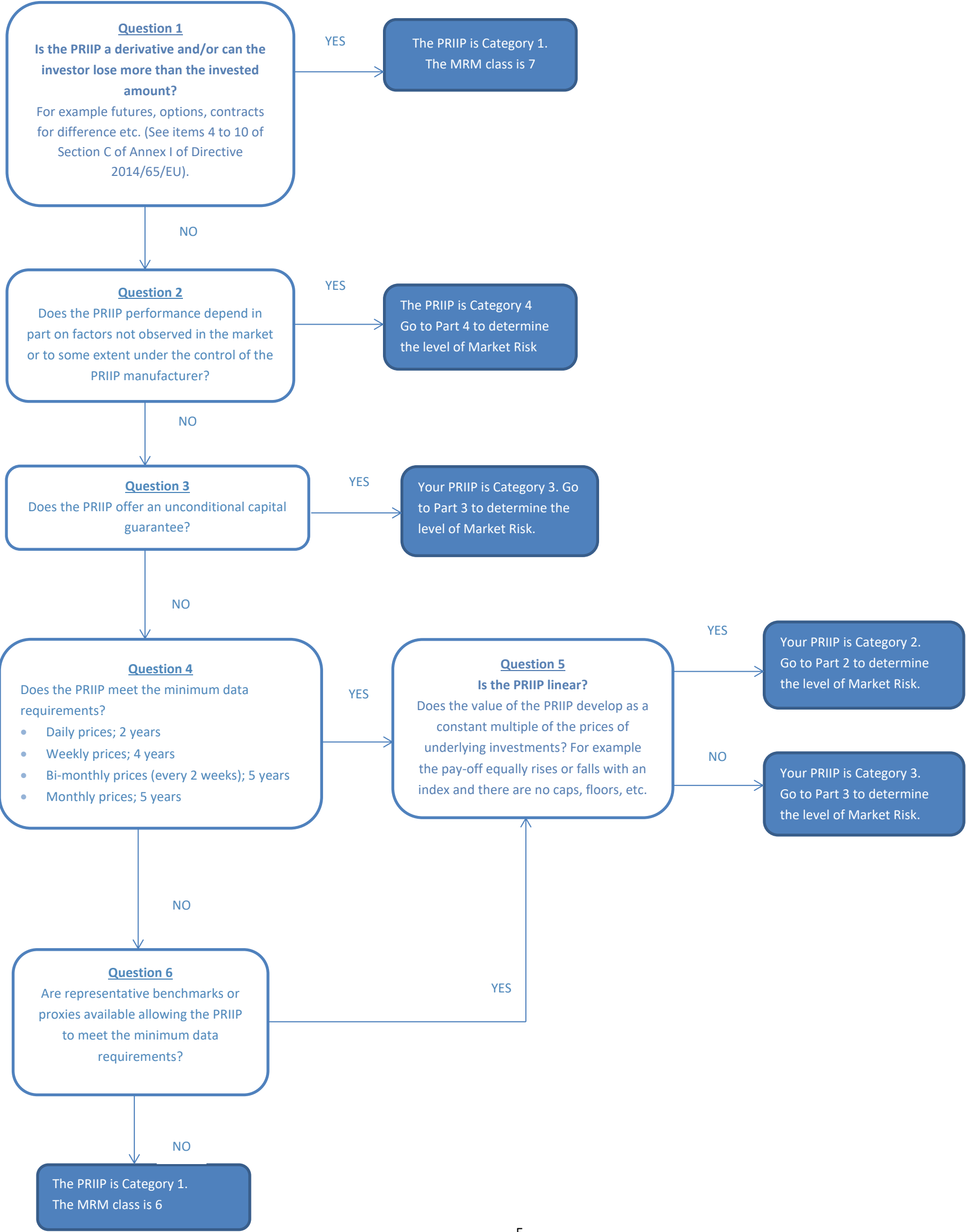
### A. Summary Risk Indicator (SRI)

#### Section 1: Calculating the Summary Risk Indicator

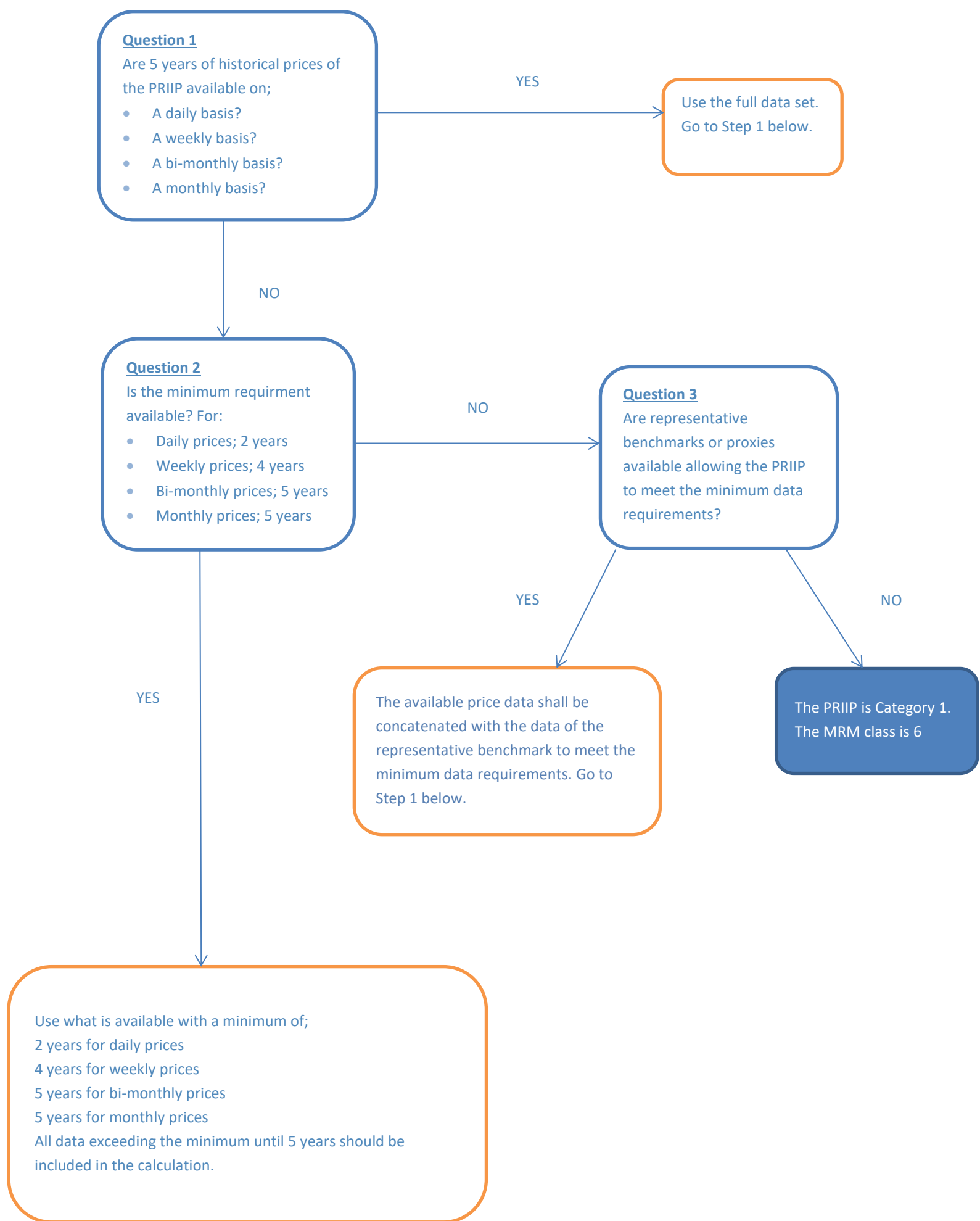


# Section 2: Market Risk Measure

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



Part 2: Category 2 (linear) PRIIPs



### 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:

$$\text{VaR}_{\text{RETURN SPACE}} = \sigma \sqrt{N} * (-1,96 + 0,474 * \mu_1 / \sqrt{N} - 0,0687 * \mu_2 / N + 0,146 * \mu_1^2 / N) - 0,5\sigma^2 N$$

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?

YES

#### Question 5

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

YES

NO

To determine VEV take the maximum of the 2 options below;  
1. VEV of the returns of the pro-forma asset mix that is consistent with the reference asset allocation of the fund at the time of the computation;  
2. The VEV which is consistent with the risk limit of the fund, if any and appropriate.

To determine VEV take the maximum of the 3 options below;  
1. The VEV as computed under step 3.  
2. VEV of the returns of the pro-forma asset mix that is consistent with the reference asset allocation of the fund at the time of the computation;  
3. The VEV which is consistent with the risk limit of the fund, if any and appropriate.

### Step 3

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

$$\text{VEV} = \{ \sqrt{(3.842 - 2 * \text{VaR}_{\text{RETURN SPACE}}) - 1.96} \} / \sqrt{T}$$

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

#### Question 6

Is the calculation based on monthly price data?

NO

YES

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

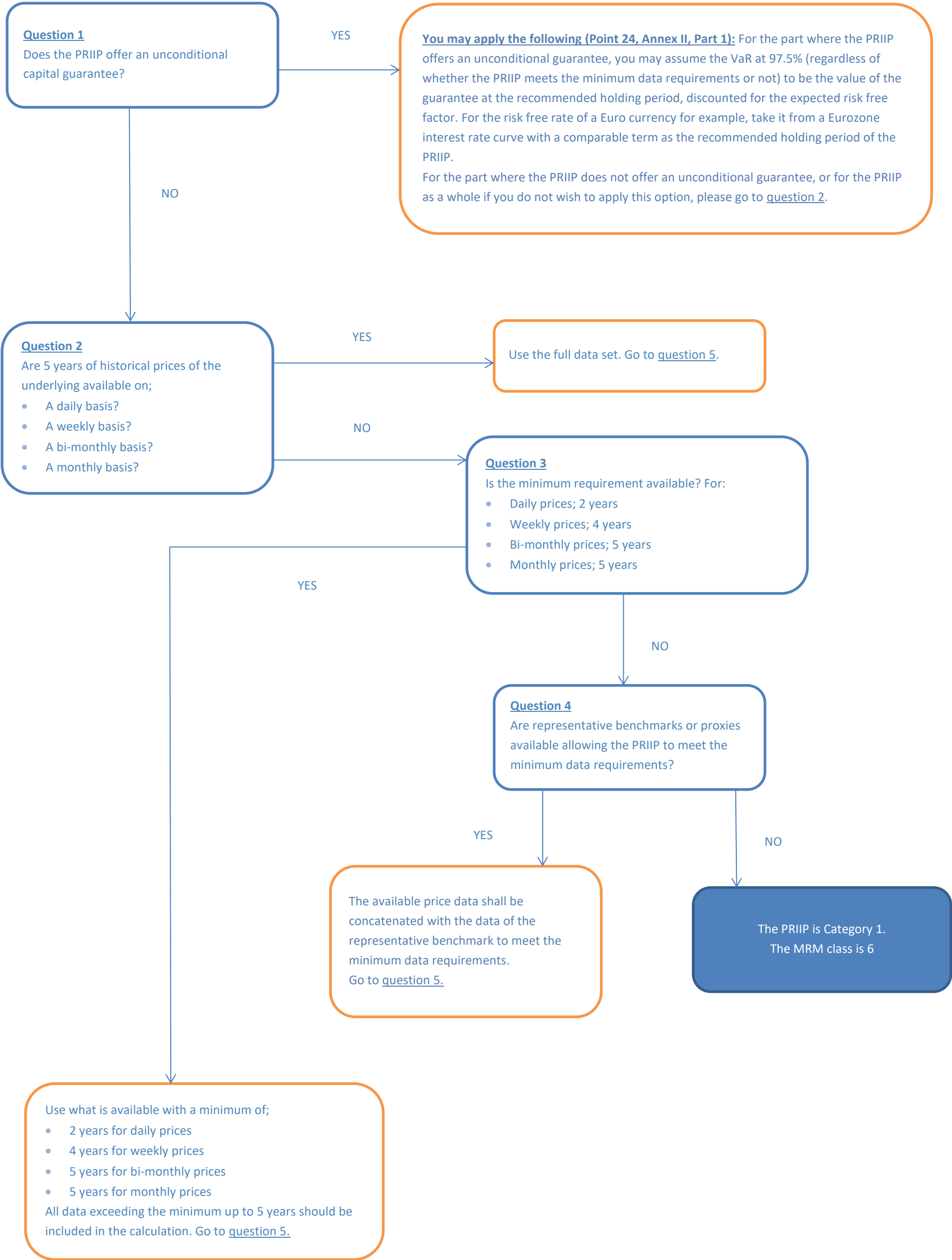
The MRM class is assigned based on the table to the right in point 2 of Annex II, Part 1 and increased by one MRM class.

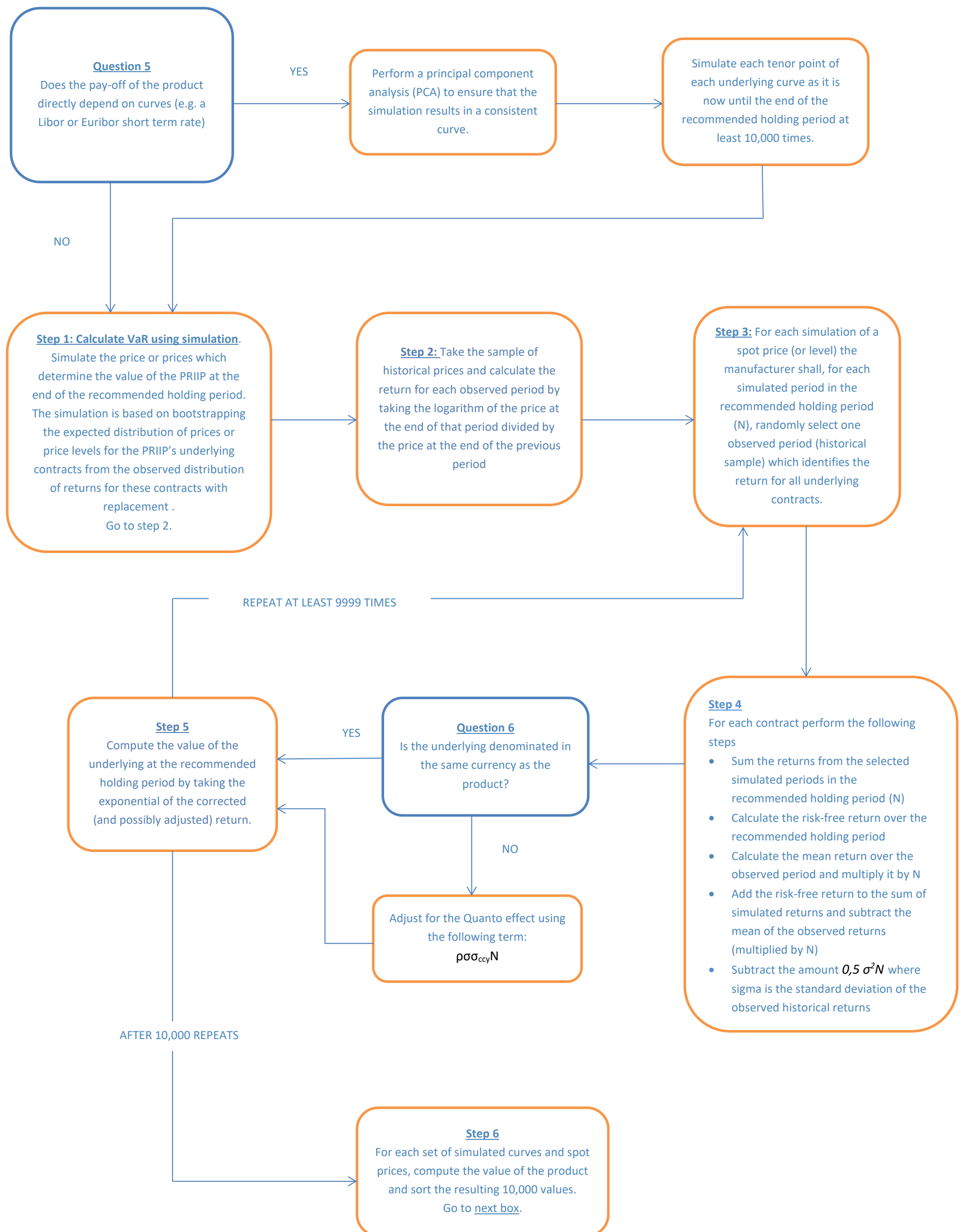
| MRM class | Annualised volatility (VEV) |
|-----------|-----------------------------|
| 1         | < 0,5 %                     |
| 2         | ≥0,5 % and <5,0 %           |
| 3         | ≥5,0 % and <12 %            |
| 4         | ≥12 % and <20 %             |
| 5         | ≥20 % and <30 %             |
| 6         | ≥30 % and <80 %             |
| 7         | ≥80 %                       |

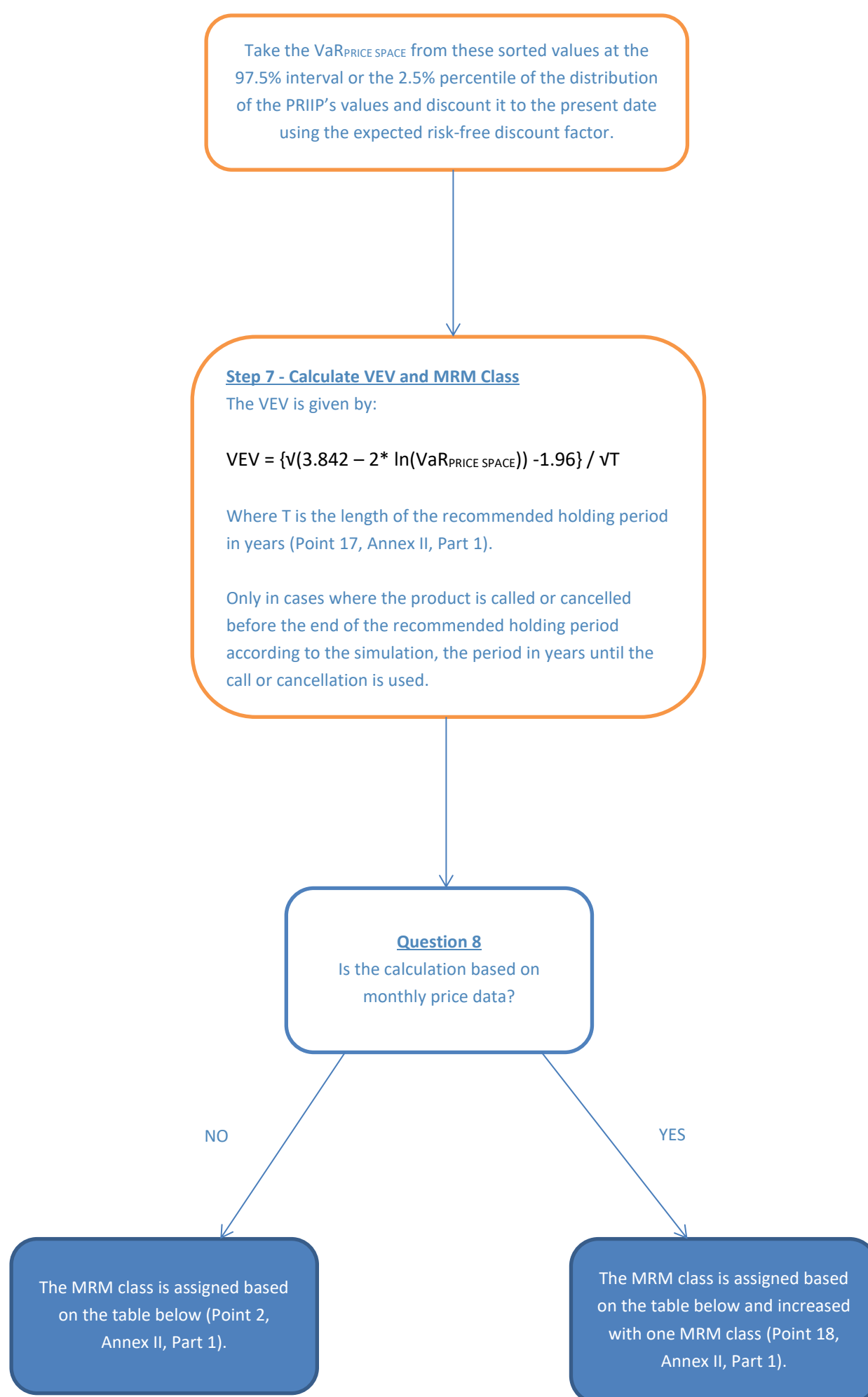
### 5 years of daily observed prices (Euro Stoxx 50 from 01.05.12 to 25.05.17)

|                                                     |                  |                |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 |        |    |
|-----------------------------------------------------|------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------|--------------|---------------------------------|--------|----|
| Trading days per year                               |                  | 256            | 365 (number of days) – 104 (number of weekend days) – 5 (public holidays) = 256 days                                                                                                                                                                                                      |                                                     |                  |              |                                 |        |    |
| M0 (under paragraph 10 of Annex II)                 |                  | 1280           | Number of observations in the period 256*5=1280                                                                                                                                                                                                                                           |                                                     |                  |              |                                 |        |    |
| M1                                                  |                  | 0.0003389      | Mean of all the observed returns in the sample (daily)                                                                                                                                                                                                                                    |                                                     |                  |              |                                 |        |    |
| M2                                                  |                  | 0.000149905    | Second Moment                                                                                                                                                                                                                                                                             | $M_2 = \sum_i \frac{(r_i - M_1)^2}{M_0} = \sigma^2$ | Volatility       | 0.01224357   | $\sigma = \sqrt{M_2}$           |        |    |
| M3                                                  |                  | -6.44479E-07   | Third Moment                                                                                                                                                                                                                                                                              | $M_3 = \sum_i (r_i - M_1)^3 / M_0$                  | Skew             | -0.351143435 | $\mu_1 = M_3 / M_2^{1,5}$       |        |    |
| M4                                                  |                  | 1.46705E-07    | Fourth Moment                                                                                                                                                                                                                                                                             | $M_4 = \sum_i (r_i - M_1)^4 / M_0$                  | Excess Kurtosis  | 3.528503383  | $\mu_2 = (M_4 / M_2^2) - 3$     |        |    |
| Daily                                               | $\sigma$         | 0.01224357     | <div><div>Polynomial</div><div>Divisor</div><div><math>VEV_{Return\ Space} = \frac{\sqrt{z_\alpha^2 - 2 * VaR_{Return\ Space} - z_\sigma}}{\sqrt{T}}</math><br/><math>VEV_{Price\ Space} = \frac{\sqrt{z_\alpha^2 - 2 * \ln(VaR_{Price\ Space}) - z_\alpha}}{\sqrt{T}}</math></div></div> |                                                     |                  |              |                                 |        |    |
| Confidence level                                    | 2.50%            |                |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 |        |    |
| $z_\alpha$                                          | -1.959963985     | z^2-1          |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 | 6      |    |
| Annualized Volatility (1Y)                          | $\sigma\sqrt{N}$ | 19.59%         |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 | z^3-3z | 24 |
| $(z_\alpha^2-1)/6$                                  | 0.47357647       | 2z^3-5z        |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 | 36     |    |
| $(z_\alpha^3-3z_\alpha)/24$                         | -0.068717874     |                |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 |        |    |
| $(2z_\alpha^3-5z_\alpha)/36$                        | -0.146067276     |                |                                                                                                                                                                                                                                                                                           |                                                     |                  |              |                                 |        |    |
| RHP (Recommended Holding Period expressed in years) |                  | Number of Days | VaR (Return Space)                                                                                                                                                                                                                                                                        |                                                     | VEV Return Space | MRM class    | VaR-equivalent volatility (VEV) |        |    |
|                                                     | 1                | 256            | -0.4053                                                                                                                                                                                                                                                                                   |                                                     | 0.1969           | 1            | <0,5%                           |        |    |
|                                                     | 3                | 768            | -0.7247                                                                                                                                                                                                                                                                                   |                                                     | 0.1964           | 2            | 0,5%-5,0%                       |        |    |
|                                                     | 5                | 1280           | -0.9566                                                                                                                                                                                                                                                                                   |                                                     | 0.1963           | 3            | 5,0%-12%                        |        |    |
|                                                     | 10               | 2560           | -1.4081                                                                                                                                                                                                                                                                                   |                                                     | 0.1962           | 4            | 12%-20%                         |        |    |
|                                                     | 20               | 5120           | -2.1029                                                                                                                                                                                                                                                                                   |                                                     | 0.1961           | 5            | 20%-30%                         |        |    |
|                                                     | 50               | 12800          | -3.6764                                                                                                                                                                                                                                                                                   |                                                     | 0.1960           | 6            | 30%-80%                         |        |    |
|                                                     |                  |                |                                                                                                                                                                                                                                                                                           |                                                     |                  | 7            | >80%                            |        |    |

Part 3: Category 3 PRIIPs (non-linear products)







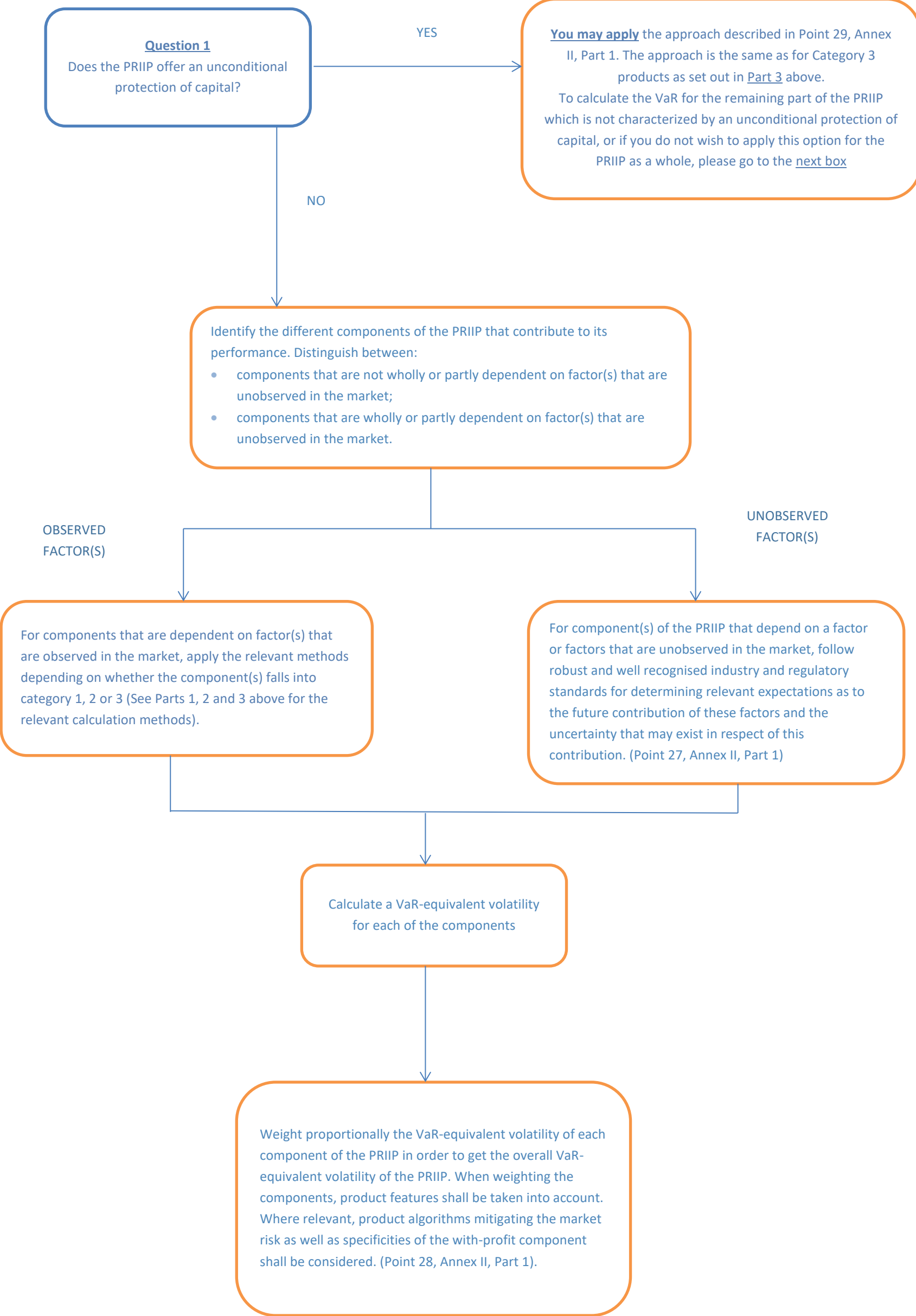
| MRM class | Annualised volatility (VEV) |
|-----------|-----------------------------|
| 1         | < 0,5 %                     |
| 2         | ≥0,5 % and <5,0 %           |
| 3         | ≥5,0 % and <12 %            |
| 4         | ≥12 % and <20 %             |
| 5         | ≥20 % and <30 %             |
| 6         | ≥30 % and <80 %             |
| 7         | ≥80 %                       |

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: SIMULATION 1                                                                    |                                                                     |                                        |  | DISTRIBUTION OF SIMULATIONS |      |            |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------|--|-----------------------------|------|------------|
| EACH SIMULATED PERIOD<br>IN THE RHP (RHP=12 DAYS)                                                   | RANDOMLY SELECT<br>ONE OBSERVED PERIOD OVER 1280<br>PERIODS (5*256) | RETURN FOR ALL<br>UNDERLYING CONTRACTS |  | SIMULATIONS                 | RANK | VALUE      |
| 1                                                                                                   | 754                                                                 | 0,003144319                            |  | 1                           | 9    | 0,9784144  |
| 2                                                                                                   | 247                                                                 | 0,000786848                            |  | 2                           | 1    | 1,05729999 |
| 3                                                                                                   | 840                                                                 | -0,034100705                           |  | 3                           | 15   | 0,9277006  |
| 4                                                                                                   | 137                                                                 | 1,21011E-05                            |  | 4                           | 14   | 0,93097185 |
| 5                                                                                                   | 117                                                                 | 0,012355476                            |  | 5                           | 12   | 0,94650357 |
| 6                                                                                                   | 524                                                                 | -0,000889222                           |  | 6                           | 6    | 0,99116702 |
| 7                                                                                                   | 195                                                                 | 0,002623287                            |  | 7                           | 17   | 0,92026668 |
| 8                                                                                                   | 138                                                                 | 0,000278285                            |  | 8                           | 8    | 0,97890466 |
| 9                                                                                                   | 457                                                                 | 0,014583841                            |  | 9                           | 3    | 1,01099443 |
| 10                                                                                                  | 717                                                                 | 0,001495982                            |  | 10                          | 2    | 1,01111948 |
| 11                                                                                                  | 809                                                                 | -0,01294047                            |  | 11                          | 5    | 0,99193409 |
| 12                                                                                                  | 259                                                                 | -0,00477314                            |  | 12                          | 19   | 0,91167231 |
| $Return = E[Return_{risk-neutral}] - E[Return_{measured}] - 0,5\sigma^2N - \rho\sigma\sigma_{ccy}N$ |                                                                     |                                        |  | 13                          | 10   | 0,95711822 |
| $E[Return_{risk-neutral}] = Riskfree\ Return + Sum\ of\ simulated\ returns$                         |                                                                     |                                        |  | 14                          | 4    | 0,99512444 |
| RISK-FREE RETURN OVER THE RHP                                                                       | 0,000568027                                                         |                                        |  | 15                          | 18   | 0,91342991 |
| SUM OF SIMULATED RETURNS                                                                            | -0,017423398                                                        |                                        |  | 16                          | 7    | 0,98975916 |
| E[RETURN risk-neutral]                                                                              | -0,016855371                                                        |                                        |  | 17                          | 20   | 0,90900029 |
| E [RETURN MEASURED]                                                                                 | 0,004067173                                                         |                                        |  | 18                          | 11   | 0,94922686 |
| 0,5 σ2 N                                                                                            | 0,00089943                                                          |                                        |  | 19                          | 13   | 0,93321018 |
| ADJUSTED SIMULATED RETURN:                                                                          | -0,021821974                                                        |                                        |  | 20                          | 16   | 0,92273156 |
| EXP of SIMULATED RETURN                                                                             | 0,978414403                                                         |                                        |  |                             |      |            |
| RHP LENGTH:                                                                                         | 12 DAYS                                                             |                                        |  |                             |      |            |

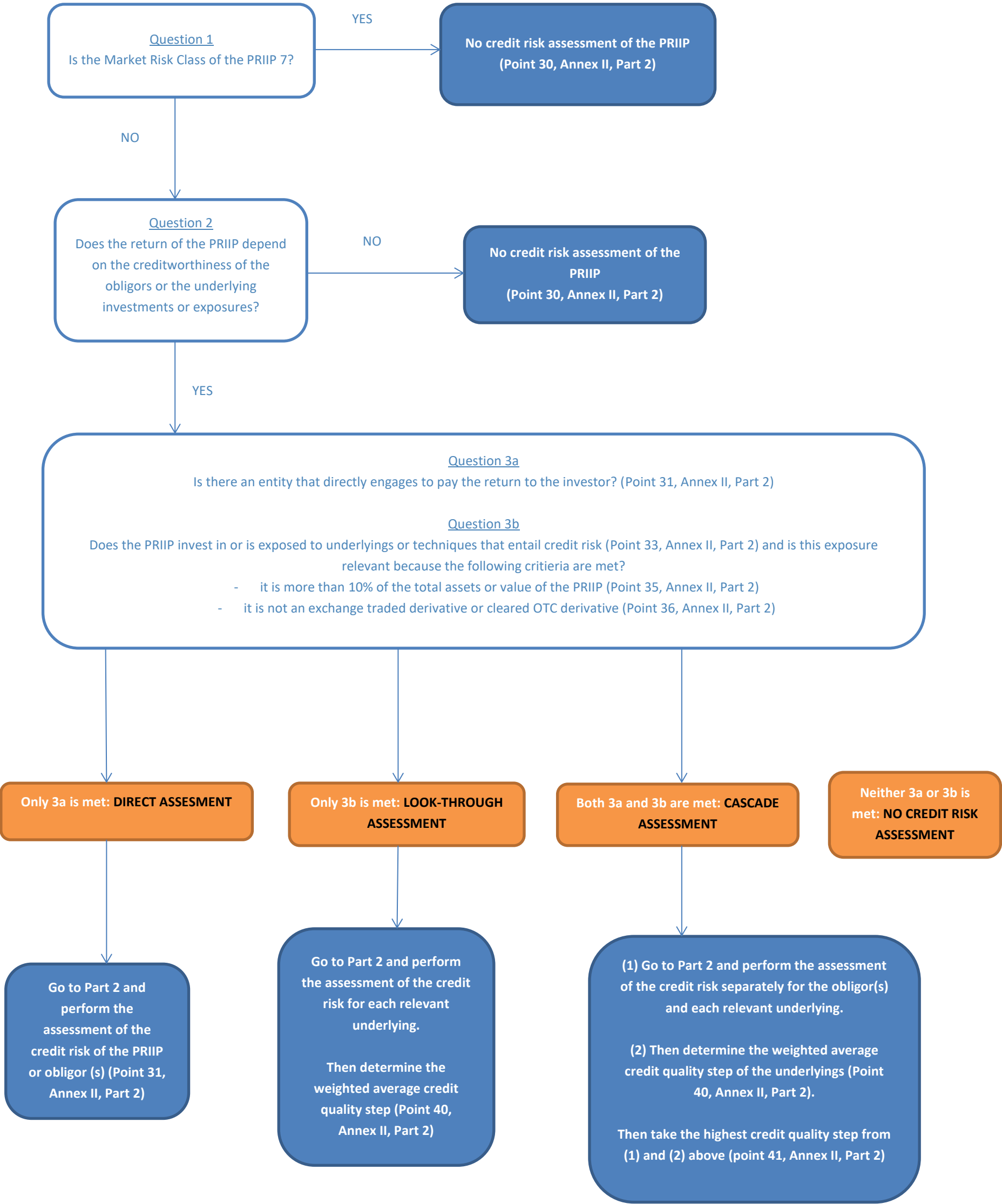
Step 7: RHP = 1 AND 3 YEARS, 1000 simulations, 1280 observed daily prices (5 years – Euro Stoxx 50 – from 01.05.12 to 28.04.17)

|                                                   |             |        |
|---------------------------------------------------|-------------|--------|
| AVG RETURN (OBSERVED):                            | 0,000338931 |        |
| DEV. 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) |             |        |
| YEARS                                             | 1           | 3      |
|                                                   |             |        |
| VaR (price space):                                | 0,6832      | 0,4957 |
| VEV:                                              | 0,1856      | 0,1907 |

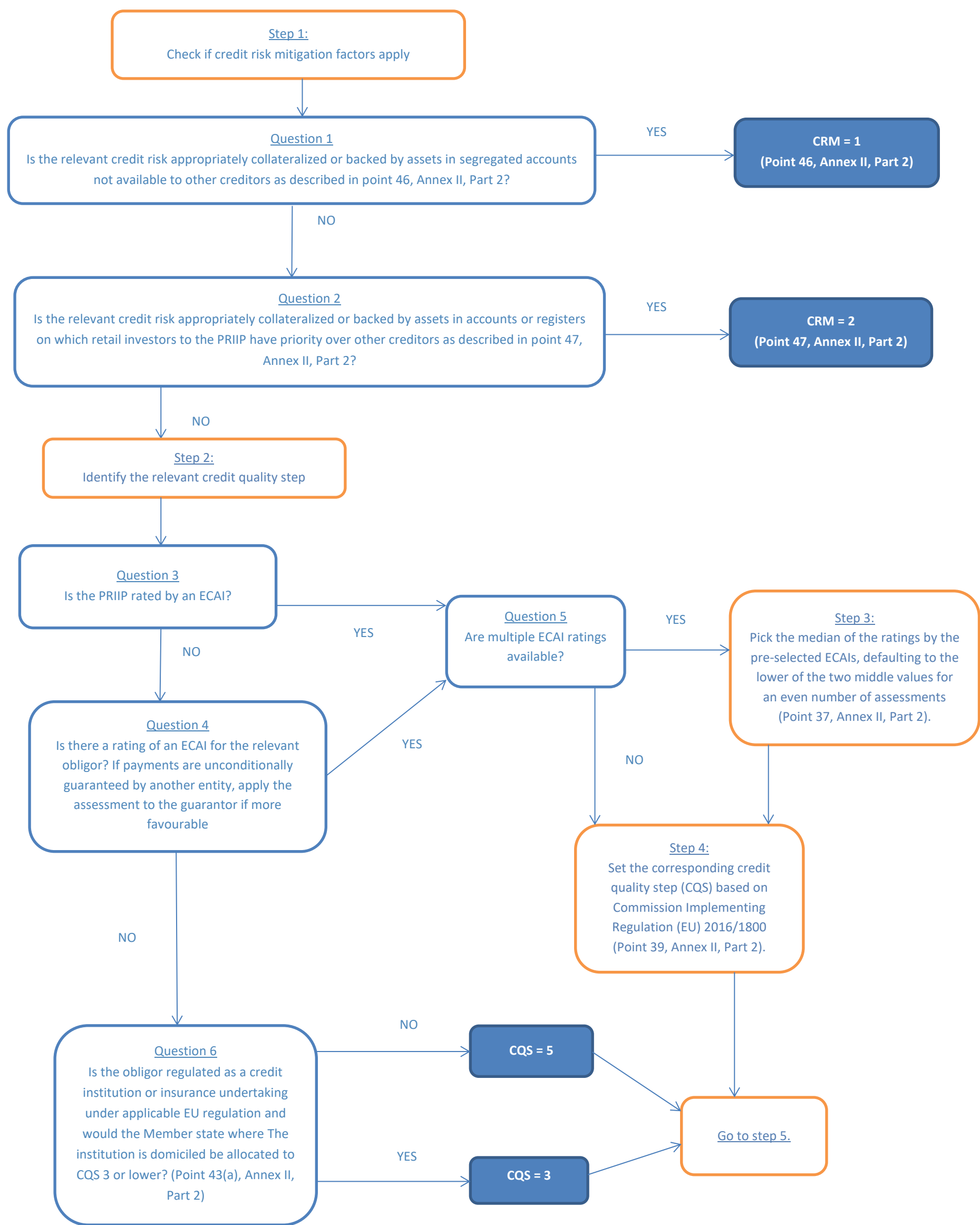


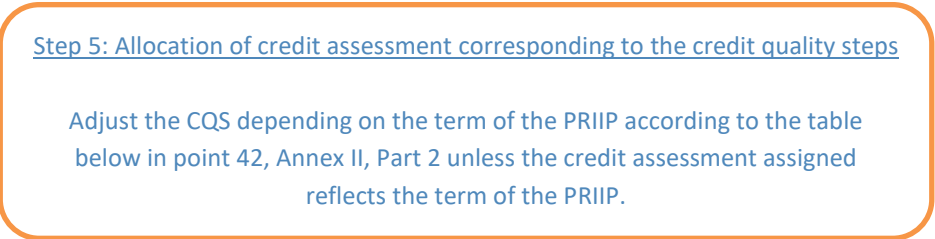
# Section 3: Credit Risk Measure

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

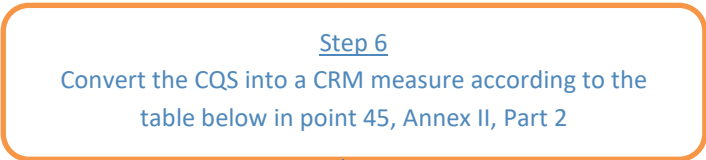


Part 2 Assessment of credit risk

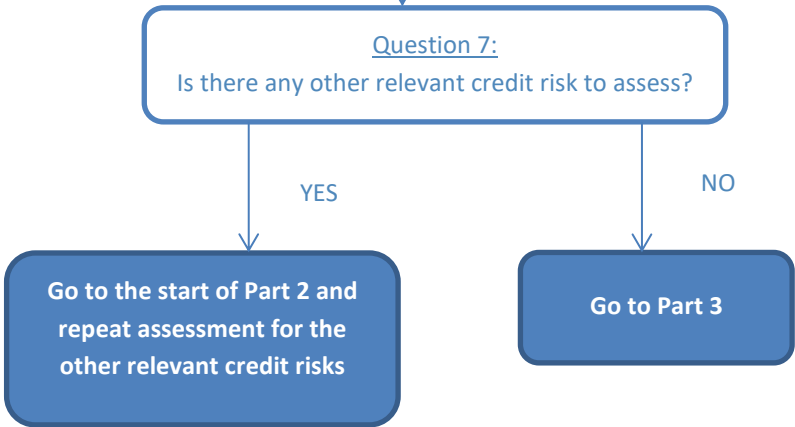


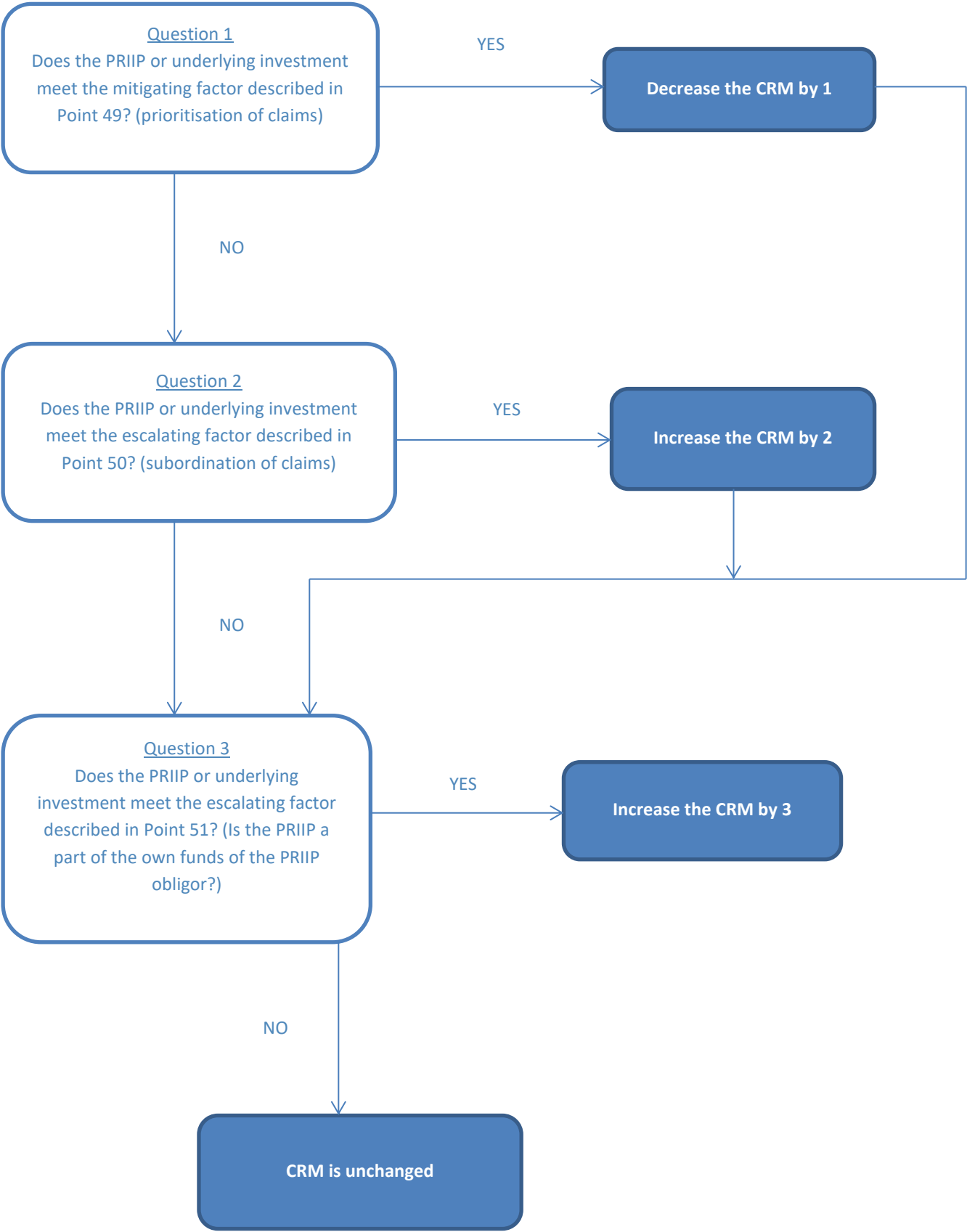


| Credit quality step pursuant to point 38 of this Annex | Adjusted credit quality step, in the case where the maturity of the PRIIP, or its recommended holding period where a PRIIP does not have a maturity, is up to one year | Adjusted credit quality step, in the case where the maturity of the PRIIP, or its recommended holding period where a PRIIP does not have a maturity, ranges from one year up to twelve years | 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 |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                                                      | 0                                                                                                                                                                      | 0                                                                                                                                                                                            | 0                                                                                                                                                                         |
| 1                                                      | 1                                                                                                                                                                      | 1                                                                                                                                                                                            | 1                                                                                                                                                                         |
| 2                                                      | 1                                                                                                                                                                      | 2                                                                                                                                                                                            | 2                                                                                                                                                                         |
| 3                                                      | 2                                                                                                                                                                      | 3                                                                                                                                                                                            | 3                                                                                                                                                                         |
| 4                                                      | 3                                                                                                                                                                      | 4                                                                                                                                                                                            | 5                                                                                                                                                                         |
| 5                                                      | 4                                                                                                                                                                      | 5                                                                                                                                                                                            | 6                                                                                                                                                                         |
| 6                                                      | 6                                                                                                                                                                      | 6                                                                                                                                                                                            | 6                                                                                                                                                                         |



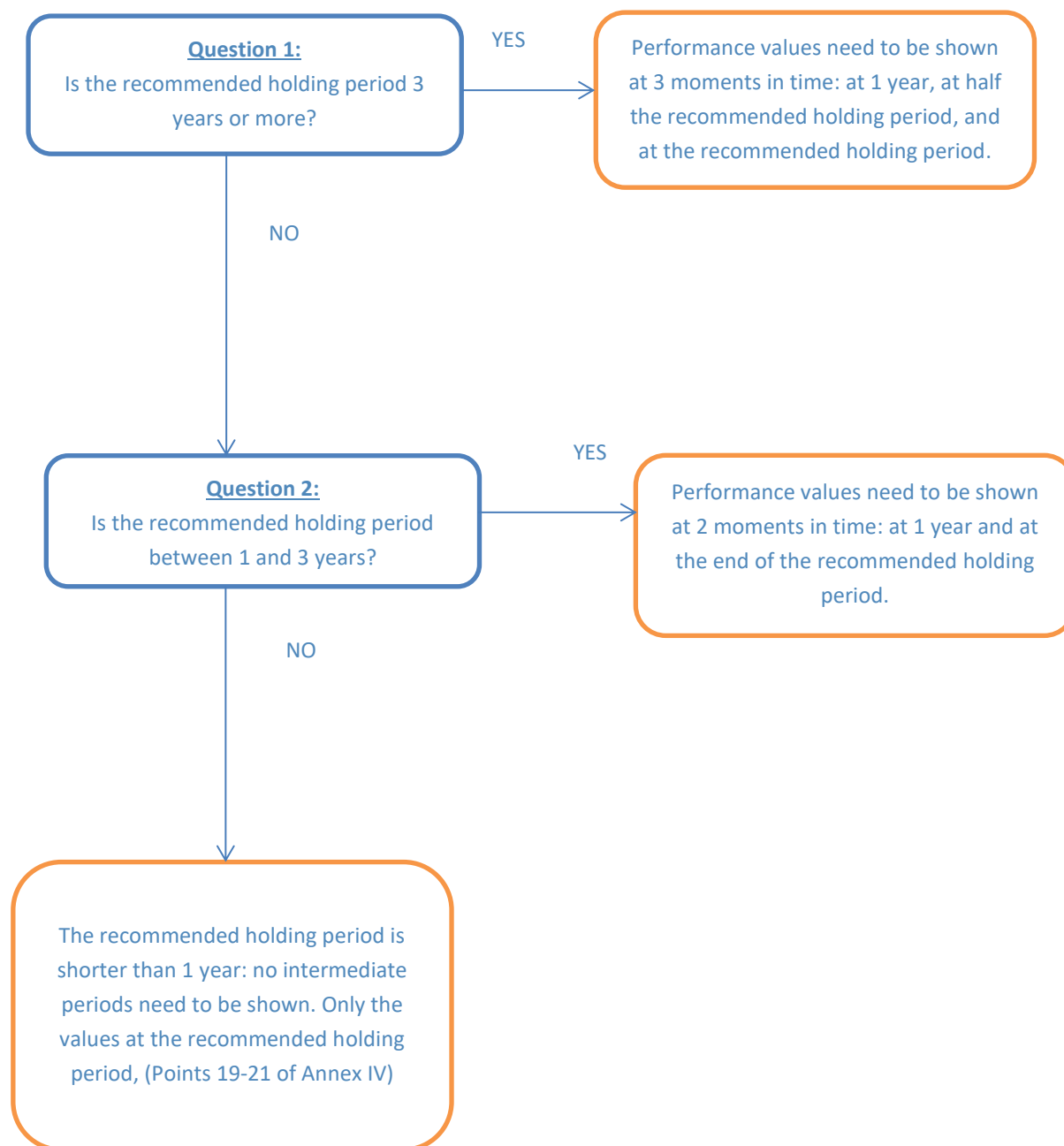
| Adjusted credit quality step | Credit risk measure |
|------------------------------|---------------------|
| 0                            | 1                   |
| 1                            | 1                   |
| 2                            | 2                   |
| 3                      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



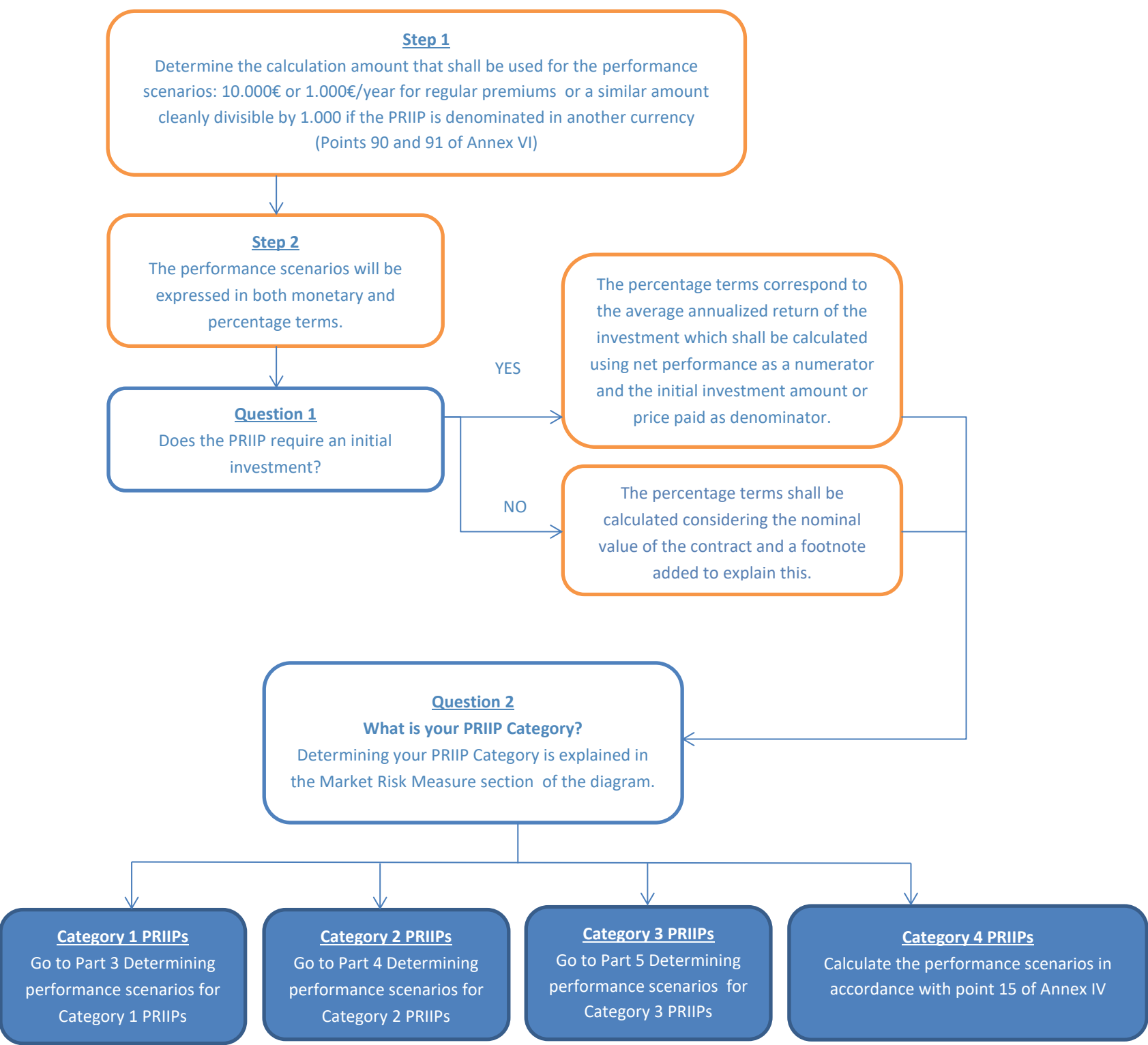


## B. Performance Scenarios

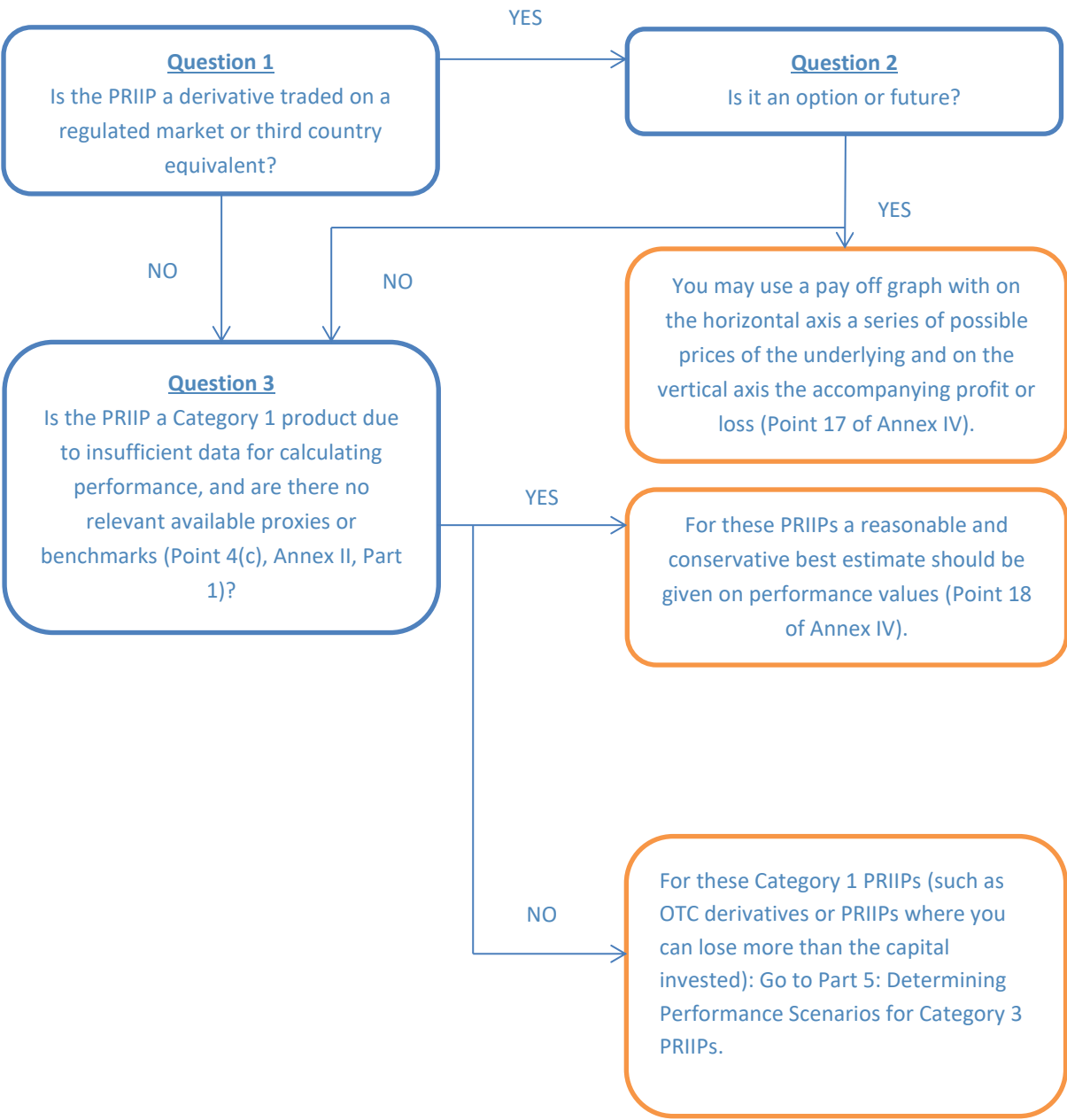
### Part 1: Determining the holding periods that need to be shown



Part 2: Determining calculation amounts and applicable methodology



Part 3: Determining Performance Scenarios for Category 1 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  $N = 5 \times 252 = 1260$ ;
  - Exp - the exponential of;
- $M_1$  - the mean of the distribution of all the observed returns in the historical period;
  - $\sigma$  – standard deviation or volatility of the distribution;
  - $\mu_1$  - skew of the distribution;
  - $\mu_2$  - the excess kurtosis of the distribution.

Unfavourable scenario;

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

Moderate scenario;

$$\text{Exp} [ M_1 \cdot N - \sigma \mu_1 / 6 - 0.5 \sigma^2 N ]$$

Favourable scenario;

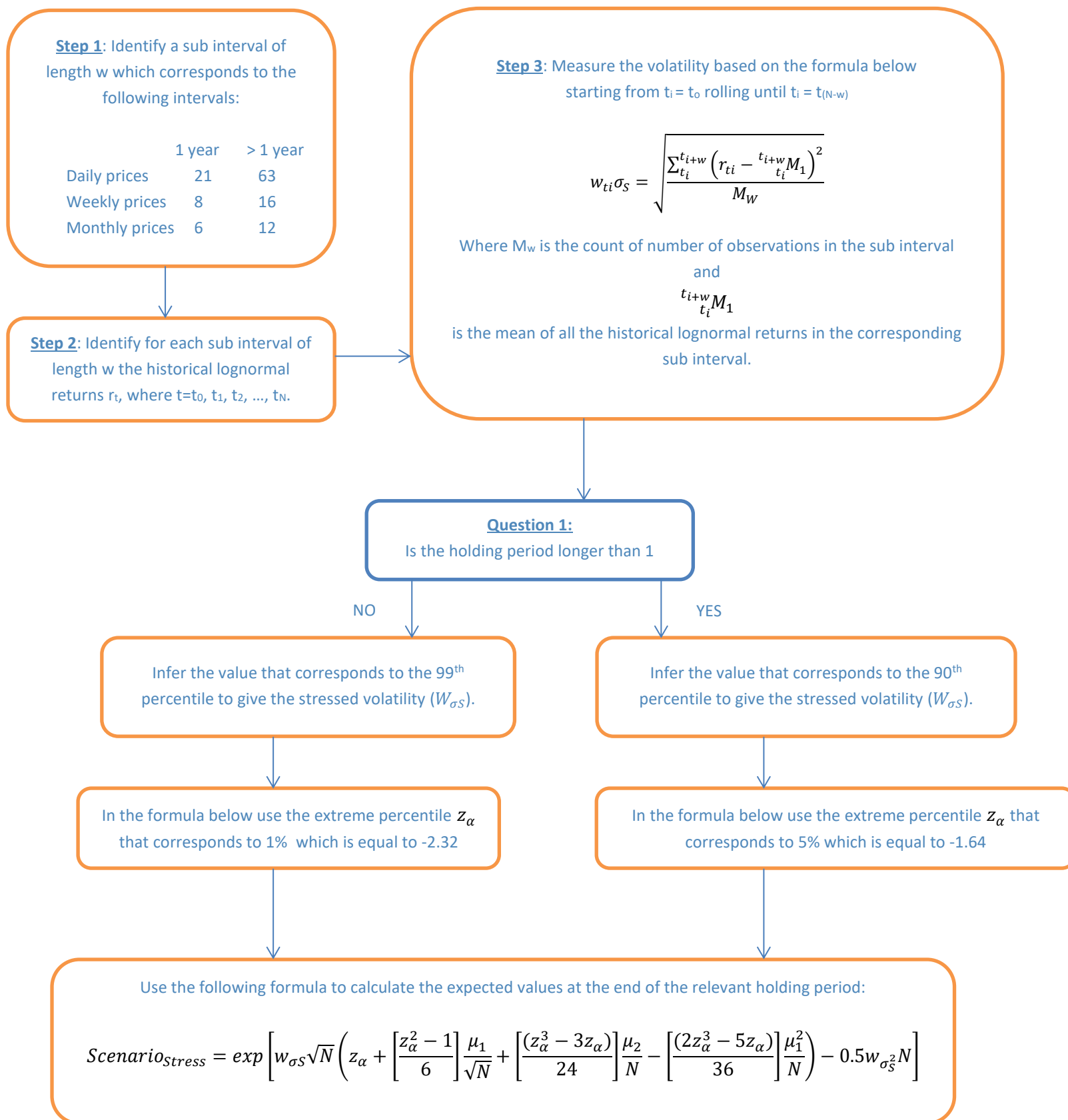
$$\text{Exp} [ M_1 \cdot N + \sigma \sqrt{N} \cdot (1.28 + 0.107 \cdot \mu_1 / \sqrt{N} - 0.0724 \cdot \mu_2 / N + 0.0611 \cdot \mu_1^2 / N) - 0.5 \sigma^2 N ]$$

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 €

|                                        | $\alpha$ | $z_{\alpha}$ | $(z_{\alpha}^2 - 1)/6$ | $(z_{\alpha}^3 - 3z_{\alpha})/24$ | $(2z_{\alpha}^3 - 5z_{\alpha})/36$ |
|----------------------------------------|----------|--------------|------------------------|-----------------------------------|------------------------------------|
| Unfavorable Scenario - Critical values | 10%      | -1,281551566 | 0,107062403            | 0,072494466                       | 0,061060634                        |
| Moderate Scenario - Critical values    | 50%      | 0            | -0,166666667           | 0                                 | 0                                  |
| Favorable Scenario - Critical values   | 90%      | 1,281551566  | 0,107062403            | -0,072494466                      | -0,061060634                       |

| Standard Performance Scenarios                                                           |                      |             |             |             |             |
|------------------------------------------------------------------------------------------|----------------------|-------------|-------------|-------------|-------------|
| Point 9 - letters (a), (b), (c) - Annex IV                                               |                      |             |             |             |             |
| N is the number of trading periods in the recommended holding period<br>$\sigma\sqrt{N}$ | RHP                  | 5 years     | RHP         | 1 year      | 3 years     |
|                                                                                          |                      | 1280        |             | 256         | 768         |
|                                                                                          | Unfavorable scenario | 0,438039282 |             | 0,195897122 | 0,339303769 |
|                                                                                          | Moderate scenario    | 0,799432892 |             | 0,832148758 | 0,792589109 |
|                                                                                          | Favorable scenario   | 1,402994819 |             | 1,070681172 | 1,225626426 |
|                                                                                          | 2,456450066          |             | 1,374349473 | 1,890801557 |             |

b) Performance calculations for the stress scenario



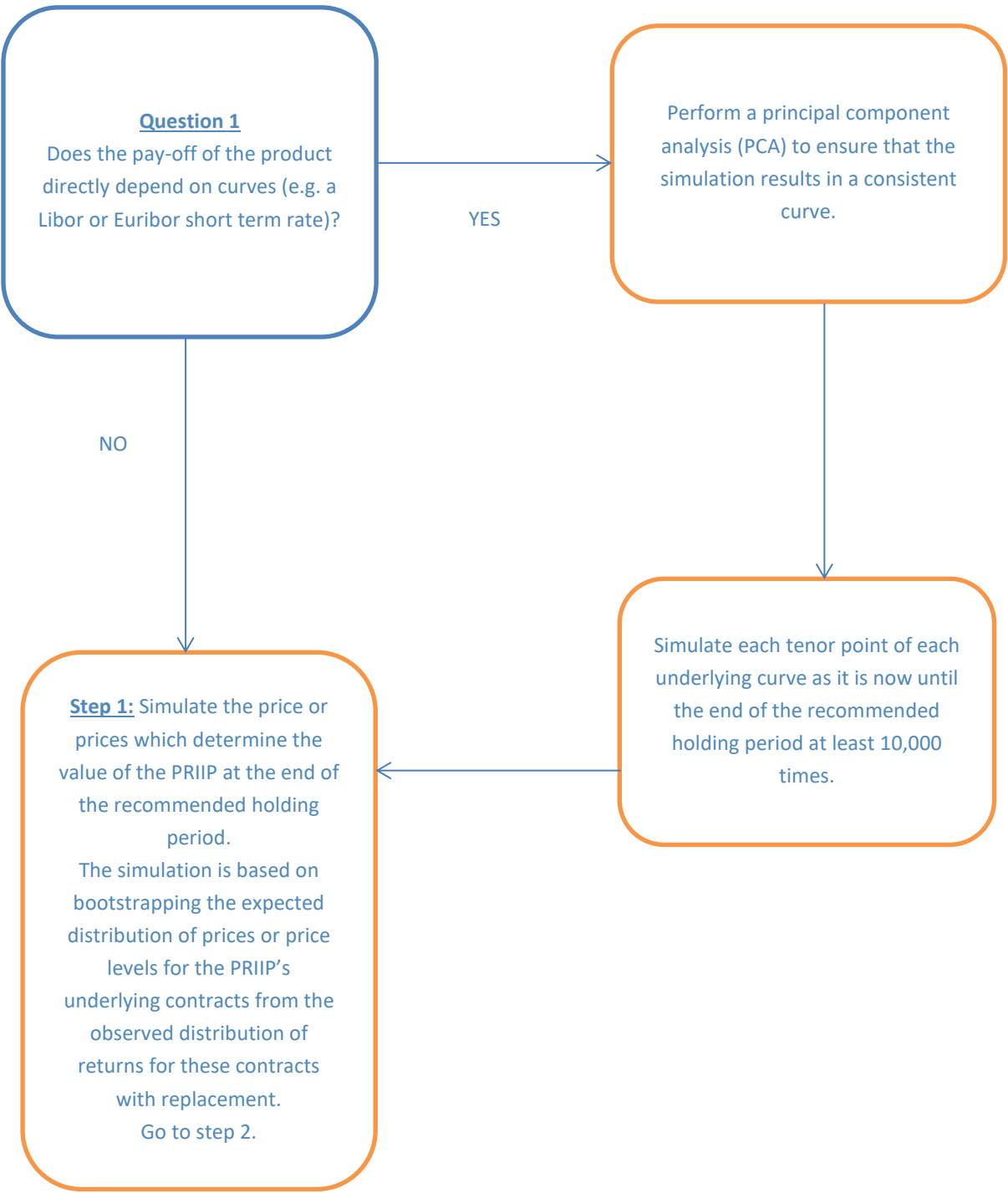
**RHP 1, 3 and 5 years, 5 years of daily observed prices (Euro Stoxx 50 – from 01.05.12 to 25.02.17 )**

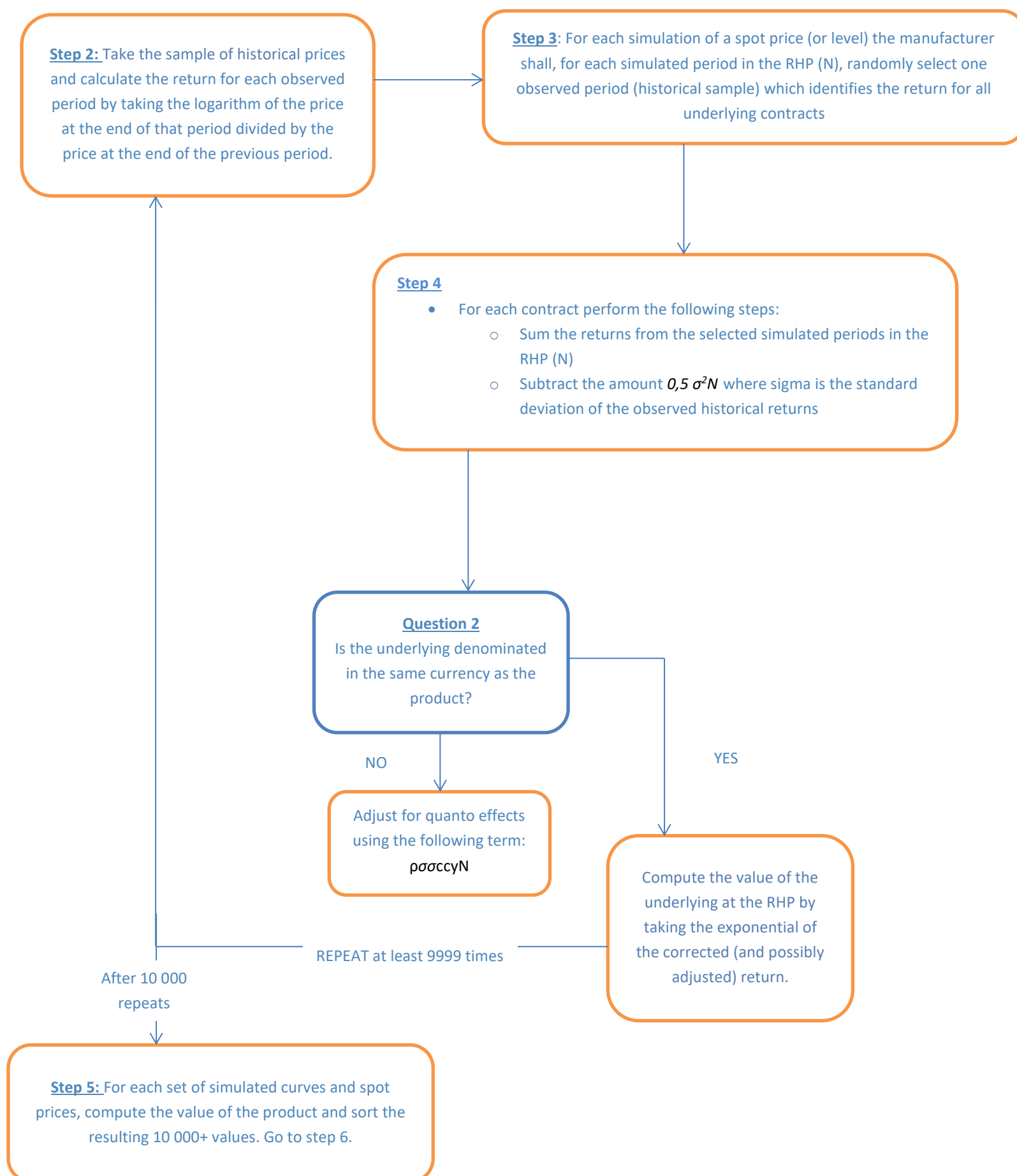
| Stressed Performance Scenario                                        |             |              |                      |                               |                                |
|----------------------------------------------------------------------|-------------|--------------|----------------------|-------------------------------|--------------------------------|
|                                                                      | $\alpha$    | $z_\alpha$   | $(z_\alpha^2 - 1)/6$ | $(z_\alpha^3 - 3z_\alpha)/24$ | $(2z_\alpha^3 - 5z_\alpha)/36$ |
| RHP 1 YEAR - Annex IV, point 11                                      | 1%          | -2,326347874 | 0,735315739          | -0,233787728                  | -0,376337746                   |
| RHP OTHER HOLDING PERIODS - Annex IV, point 11                       | 5%          | -1,644853627 | 0,284257242          | 0,020180747                   | -0,018782716                   |
| Stressed volatility 1 year - Annex IV, point 10(d)                   | 0,025767278 |              |                      |                               |                                |
| Stressed volatility 3 years - Annex IV, point 10(d)                  | 0,017657123 |              |                      |                               |                                |
| Stressed volatility 5 years - Annex IV, point 10(d)                  | 0,017152366 |              |                      |                               |                                |
|                                                                      |             |              |                      | RHP                           |                                |
|                                                                      |             |              | 5 years              | 1 year                        | 3 years                        |
| N is the number of trading periods in the recommended holding period |             |              | 1280                 | 256                           | 768                            |
| $W_{\sigma_S} \sqrt{N}$                                              |             |              | 0,613661699          | 0,412276441                   | 0,489328534                    |
| STRESSED SCENARIO                                                    |             |              | 0,301389802          | 0,349241623                   | 0,396012057                    |

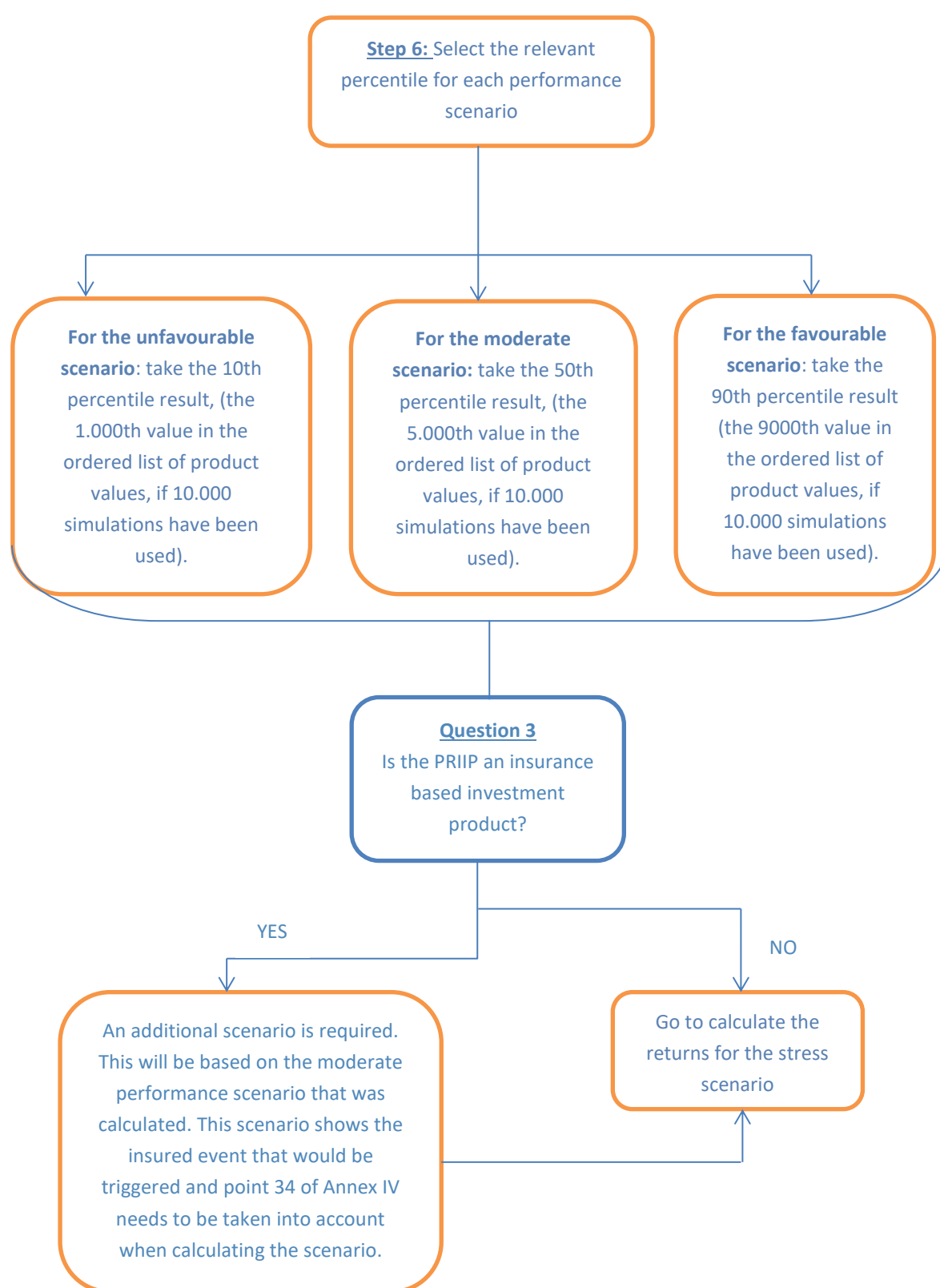
Part 5: Determining Performance Scenarios for Category 3 PRIIPs

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



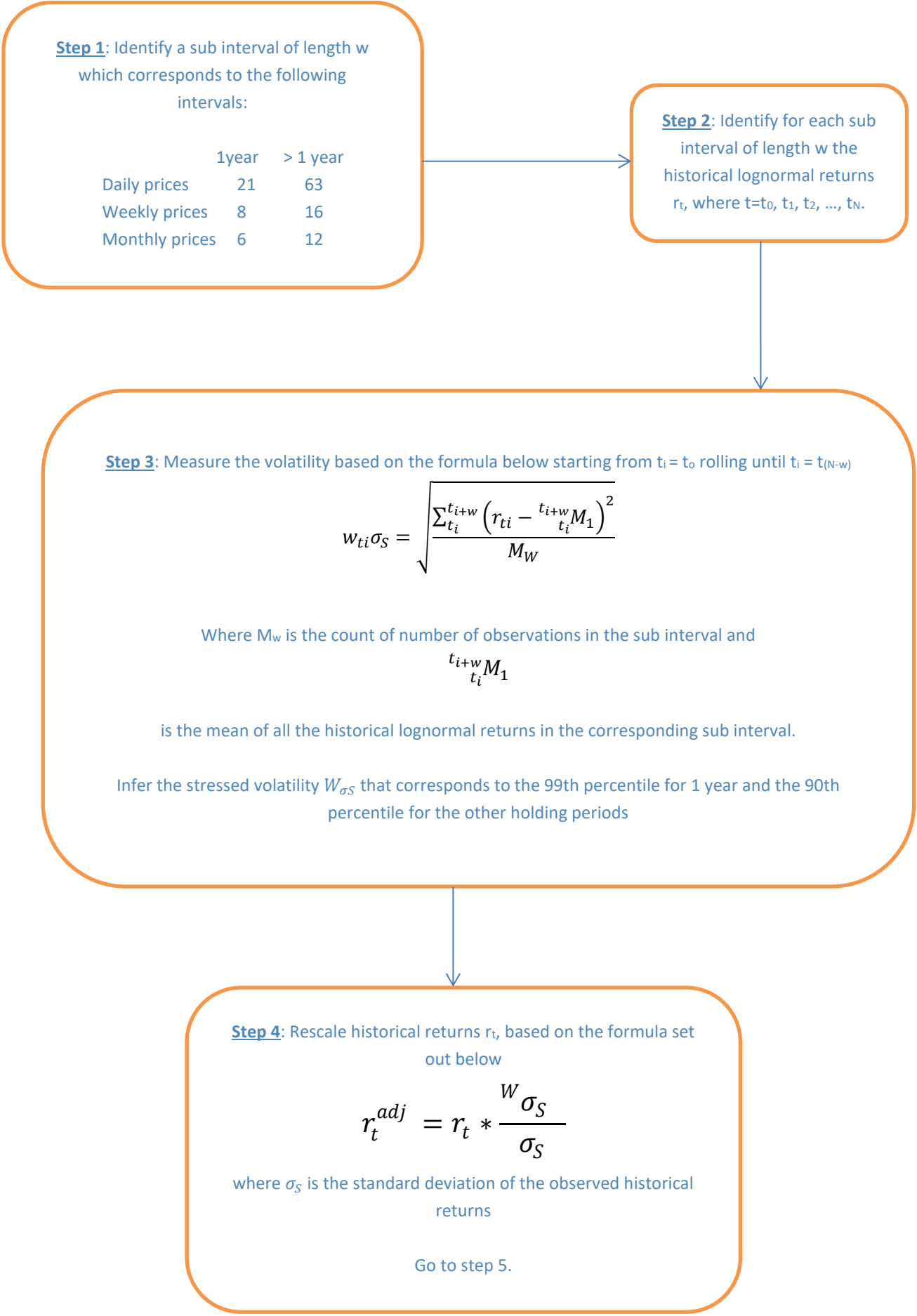


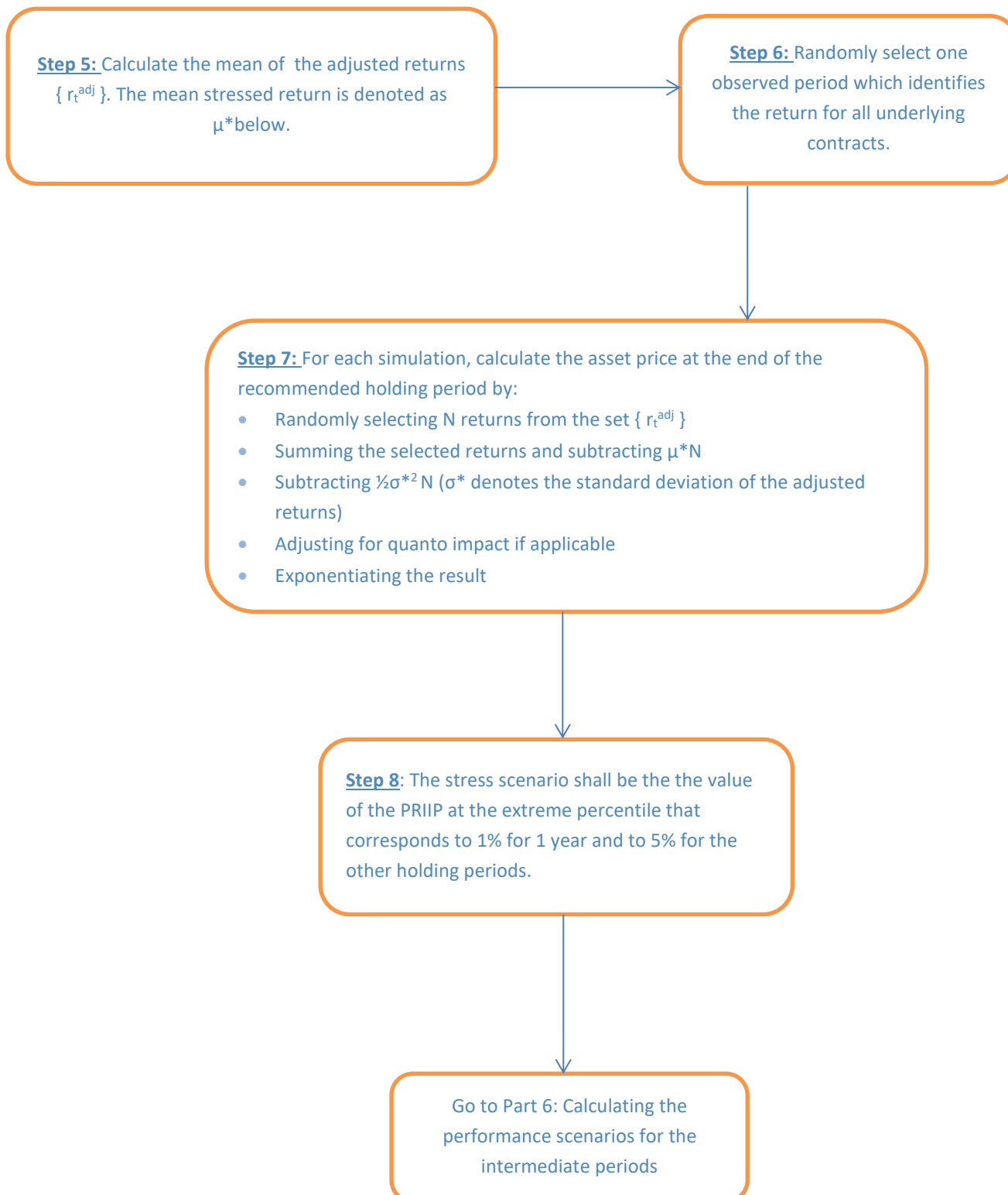


1000 simulations, RHP 1 and 3 years, 5 years of daily observed prices (Euro Stoxx 50 from 01.05.12 to 28.04.17)

| Recommended holding period in years (T) |          |            |                                                                                                                                                                                           |
|-----------------------------------------|----------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         |          | Percentile | Rank (over 1000 simulations)                                                                                                                                                              |
| Used Rank Unfavourable scenario         |          | 10th       | 900                                                                                                                                                                                       |
| Used Rank Moderate scenario             |          | 50th       | 500                                                                                                                                                                                       |
| Used Rank Favourable scenario           |          | 90th       | 100                                                                                                                                                                                       |
| YEARS                                   | 1        | 3          | 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) |
| Unfavorable Scenario                    | 0,848537 | 0,780318   |                                                                                                                                                                                           |
| Moderate Scenario                       | 1,086382 | 1,23794    |                                                                                                                                                                                           |
| Favourable Scenario                     | 1,39373  | 1,936616   |                                                                                                                                                                                           |

b) Performance calculations for the stress scenario





Steps 1-3: 1000 simulations, RHP of 2 years

RECOMMENDED HOLDING PERIOD = N = 2 YEAR = 512 OBS  
W=63 days

Starting from  $t_i=t_0$  rolling until  $t_i=t(N-w)=512-63=449$

| DATE       | PRICE   |                            | OBSERVED RETURNS | N   |                            | Rolling volatility |
|------------|---------|----------------------------|------------------|-----|----------------------------|--------------------|
| 04/05/2015 | 3632,94 |                            |                  |     | $t_0$                      |                    |
| 05/05/2015 | 3546,56 | $r_1$                      | -0,024064118     | 1   | $t_1$                      | 0,011821003        |
| 06/05/2015 | 3558,03 | $r_2$                      | 0,003228901      | 2   | $t_2$                      | 0,010212764        |
| 07/05/2015 | 3556,21 | $r_3$                      | -0,00051165      | 3   | $t_3$                      | 0,010615001        |
| 08/05/2015 | 3649,48 | .                          | 0,025889321      | 4   | .                          | 0,011073765        |
| 11/05/2015 | 3624,41 | .                          | -0,006893175     | 5   | .                          | 0,00829045         |
| 12/05/2015 | 3573,1  | .                          | -0,01425795      | 6   | .                          | 0,00849749         |
| 13/05/2015 | 3553,42 | .                          | -0,005523046     | 7   | .                          | 0,00737515         |
| 14/05/2015 | 3602,22 | .                          | 0,013639802      | 8   | .                          | 0,007389004        |
| 15/05/2015 | 3573,07 | .                          | -0,008125152     | 9   | .                          | 0,012145054        |
| .          | .       | .                          | .                | .   | .                          | .                  |
| .          | .       | .                          | .                | .   | .                          | .                  |
| .          | .       | .                          | .                | .   | .                          | .                  |
| 23/01/2017 | 3273,04 | .                          | -0,002604259     | 445 | .                          | 0,009510134        |
| 24/01/2017 | 3281,53 | .                          | 0,009160707      | 446 | .                          | 0,009459426        |
| 25/01/2017 | 3326,15 | .                          | -0,002328776     | 447 | .                          | 0,009354546        |
| 26/01/2017 | 3319,13 |                            | -0,002037409     | 448 |                            | 0,009401931        |
| 27/01/2017 | 3303,33 | $r_{T-w} = 512 - 63 = 449$ | 0,008093104      | 449 | $t_{T-w} = 512 - 63 = 449$ | 0,009386922        |

Step 4: 1000 simulations, RHP of 2 years

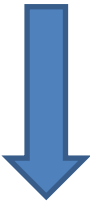
| DATE       | Rank      | Rolling volatility | Stressed returns                   |                                                   |
|------------|-----------|--------------------|------------------------------------|---------------------------------------------------|
| 04/05/2015 | 38        | 0,010556603        | Percentile RHP > 1                 | $r_t^{adj} = r_t * \frac{W_{\sigma_S}}{\sigma_S}$ |
| 05/05/2015 | 57        | 0,009673011        | 95                                 | -0,04568                                          |
| 06/05/2015 | 56        | 0,009676026        |                                    | -0,02817                                          |
| 07/05/2015 | 55        | 0,00967635         | Inferred volatility (RHP > 1 year) | 0,001279                                          |
| 08/05/2015 | 50        | 0,009972533        | 0,018101868                        | -0,00281                                          |
| 11/05/2015 | 49        | 0,01006383         |                                    | 0,015142                                          |
| 12/05/2015 | 45        | 0,010207575        | $W_{\sigma_S}$                     | 0,018321                                          |
| 13/05/2015 | 34        | 0,01152721         |                                    | -0,01762                                          |
| 14/05/2015 | 32        | 0,012145054        |                                    | -0,01695                                          |
| 15/05/2015 | 31        | 0,012591142        |                                    | 0,016882                                          |
| 18/05/2015 | 29        | 0,01293892         |                                    | -0,00417                                          |
| 19/05/2015 | 30        | 0,012933856        | Used rank (RHP > 1)                | -0,01061                                          |
| 20/05/2015 | 28        | 0,013087051        | 45                                 | 0,014619                                          |
| .          | .         | .                  |                                    | -0,02976                                          |
| .          | .         | .                  | Observed Standard Deviation        | .                                                 |
| .          | .         | .                  | 0,013630478                        | .                                                 |
| .          | .         | .                  |                                    | .                                                 |
| 25/04/2017 | .         | 3583,16            |                                    | 0,021522                                          |
| 26/04/2017 | .         | 3578,71            |                                    | -0,00547                                          |
| 27/04/2017 | .         | 3563,29            |                                    | -0,00479                                          |
| 28/04/2017 | $r_{T-w}$ | 3559,59            |                                    | 0,019014                                          |

Steps 5-6: 1000 simulations, RHP of 2 years

| SIMULATED RETURNS IN THE RHP (RHP=512 DAYS = 2 YEARS) |          |          |          |   |   |   |          |          |          |          |                         |
|-------------------------------------------------------|----------|----------|----------|---|---|---|----------|----------|----------|----------|-------------------------|
| DAY                                                   | 1        | 2        | 3        | . | . | . | 509      | 510      | 511      | 512      | Sum of stressed returns |
| Simulation 1                                          | 0,027392 | 0,014038 | -0,2117  | . | . | . | 0,008783 | 0,01293  | 0,026752 | 0,01903  | 1,056163                |
| Simulation 2                                          | -0,00293 | -0,01822 | -0,01513 | . | . | . | -0,00293 | 0,003203 | -0,01623 | -0,00621 | 0,371867                |
| Simulation 3                                          | 0,015496 | -0,001   | -0,01035 | . | . | . | 0,029695 | 0,006496 | -0,00374 | 0,011948 | 0,464389                |
| Simulation 4                                          | -0,02976 | 0,02458  | 0,011466 | . | . | . | 0,001153 | 0,026313 | -0,01102 | -0,00943 | 0,542711                |
| .                                                     | .        | .        | .        | . | . | . | .        | .        | .        | .        | .                       |
| .                                                     | .        | .        | .        | . | . | . | .        | .        | .        | .        | .                       |
| .                                                     | .        | .        | .        | . | . | . | .        | .        | .        | .        | .                       |
| Simulation 997                                        | 0,038841 | 0,008783 | -0,01705 | . | . | . | -0,00612 | 0,029132 | -0,03364 | -0,00746 | 0,399851                |
| Simulation 998                                        | -0,01503 | -0,00293 | 0,007265 | . | . | . | 0,024164 | -0,03123 | -0,02629 | -0,00383 | 0,144918                |
| Simulation 999                                        | -0,01903 | 0,029695 | 0,007654 | . | . | . | -0,00612 | 0,02476  | 0,006858 | 0,054131 | 0,65239                 |
| Simulation 1000                                       | 0,017111 | 0,001153 | -0,00915 | . | . | . | -0,00374 | 0,011466 | 0,029465 | -0,00612 | -0,31238                |

Steps 7-8: 1000 simulations, RHP of 2 years

|                 | Sum of stressed returns |                                                       | Simulated stressed returns | Rank | Simulated stressed prices |
|-----------------|-------------------------|-------------------------------------------------------|----------------------------|------|---------------------------|
| Simulation 1    | 0,547871                | $E[Return_{MEASURED}] = N\mu^*$<br><b>0,376425586</b> | -0,308473702               | 716  | 0,734567                  |
| Simulation 2    | 0,23742                 |                                                       | 0,036099698                | 380  | 1,036759                  |
| Simulation 3    | 0,11592                 |                                                       | 0,209019028                | 236  | 1,232468                  |
| Simulation 4    | 0,526658                |                                                       | -0,145282546               | 570  | 0,864778                  |
| Simulation 5    | 0,388818                |                                                       | 0,500883786                | 68   | 1,650179                  |
| .               | .                       |                                                       | .                          | .    | .                         |
| .               | .                       |                                                       | .                          | .    | .                         |
| .               | .                       |                                                       | .                          | .    | .                         |
| .               | .                       |                                                       | .                          | .    | .                         |
| Simulation 997  | 0,423087                |                                                       | -0,057786731               | 512  | 0,943851                  |
| Simulation 998  | 0,26424                 |                                                       | -0,046921846               | 500  | 0,954162                  |
| Simulation 999  | 0,030446                |                                                       | 0,222387303                | 251  | 1,249055                  |
| Simulation 1000 | -0,20313                |                                                       | -0,66079576                | 904  | 0,51644                   |



|                      | Percentile stressed scenario | Rank Stressed Scenario | Stressed Scenario |
|----------------------|------------------------------|------------------------|-------------------|
|                      | $Z_{\alpha}$                 |                        |                   |
| RHP = 2 Y (512 days) | 5                            | 950                    | 0,488090936       |

Part 6: Calculating the performance scenarios for the intermediate periods

