

# UnRisk

Live Webinar

April 15, 2026 | 10:00 – 10:30

## PRIIP KID Calculations for Structured Products

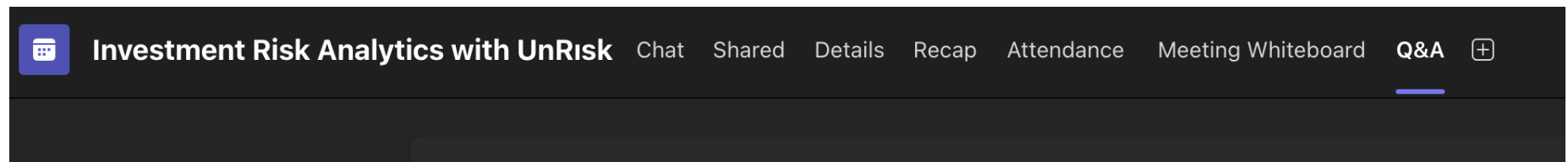
Investment Risk Analytics with UnRisk



**Dr. Michael Aichinger**  
Speaker | CEO UnRisk

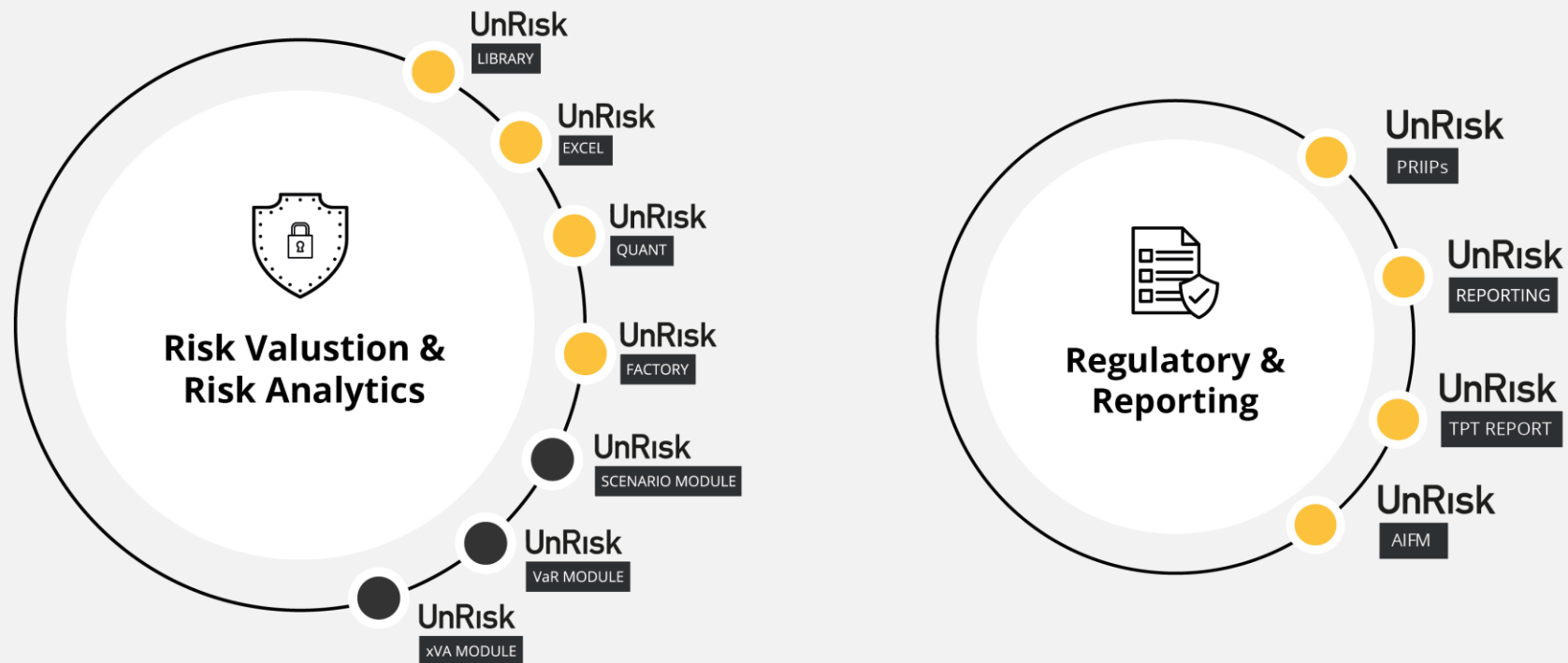
# Housekeeping

- Welcome
- Agenda: approx. 20 minutes presentation // approx. 5-10 minutes Q&A
- Please submit your questions via the Q&A function (top right).
- The recording will be sent to all registered participants by email after the session.



# UnRisk: Quantitative Risk Analytics

- Advanced quantitative analytics platform for financial institutions
- Valuation, risk management & regulatory compliance
- Modular – from Excel add-in to full enterprise platform



# Agenda

- 1 EUSIPA Product Landscape – Where BRCs Fit
- 2 Barrier Reverse Convertible – Structure & Mechanics
- 3 PRIIPS Framework – Scope, Categories & Regulatory Basis
- 4 Market Data Preparation – Bootstrapping & PCA
- 5 Performance Scenarios – Simulation Methodology & Results
- 6 Summary Risk Indicator – VEV, MRM & SRI

# EUSIPA Product Map – Where BRCs Sit

- **EUSIPA**  
(European Structured Investment Products Association)
- **Four Main Categories**  
Capital Protection, Yield Enhancement, Participation, Leverage



- % Fixed coupon
- Barrier protection
- Downside risk

- **Barrier Reverse Convertibles (BRCs)** belong to Yield Enhancement (Category 1220). The key characteristic is that investors earn a fixed coupon in exchange for taking downside equity risk. The barrier provides conditional protection. If the barrier condition is not triggered, the investor typically receives nominal redemption; otherwise the investor can be exposed to downside in the underlying, often the worst-of underlying.
- **Code 1230** applies to Barrier Reverse Convertibles on single/multiple underlyings.

# Barrier Reverse Convertible – Structure

- **Coupon**  
Fixed semi-annual coupon paid regardless of barrier event. Investor receives yield in all scenarios.
- **Barrier**  
European or American barrier observed at or through maturity
- **Redemption / Payoff**
  - Nominal, if barrier not hit ;
  - Nominal, if barrier hit and all  $S_T^i/S_0^i$  above cap level
  - $\text{Nominal} \times \min(S_T^i/S_0^i)$  else
- **Participation**  
Additional payment at RHP depending on basket performance if basket level above cap level

# This Instrument – BRC Product Specification

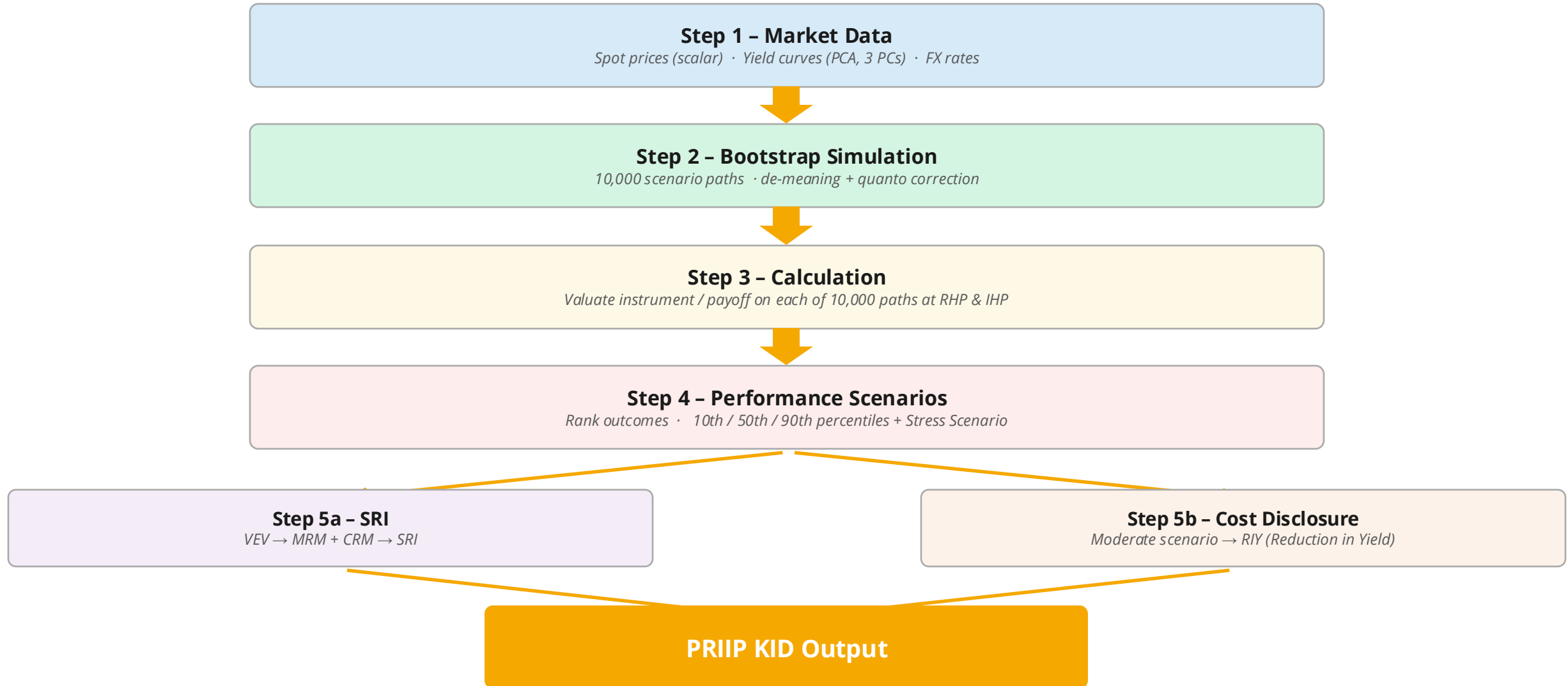
<b>Product</b>	Barrier Reverse Convertible (EUSIPA 1230) – multi-underlying basket
<b>Underlyings</b>	Deutsche Post AG (EUR) / Kühne+Nagel International AG (CHF) / United Parcel Service Inc. (USD)
<b>Currency</b>	EUR (quanto – underlying currencies converted at fixed FX rate)
<b>Barrier Level</b>	81.5% of initial fixing (observed at final fixing – European barrier)
<b>Coupon Rate</b>	0.25% per annum, paid semi-annually (0.125% per coupon)
<b>Semi-Annual Payments</b>	27 Jul 2026 / 27 Jan 2027

<b>Valuation Date</b>	26 Jan 2026
<b>Maturity / RHP</b>	27 Jul 2027 (18 months)
<b>Participation</b>	200% (based on basket performance)
<b>Dirty Value (t=0)</b>	84.88% of nominal
Bond Component	96.93%
Option Component	-12.05%
<b>Barrier Hit Probability</b>	71.6% (under risk-neutral measure, 4096 MC paths)

# PRIIPS Framework – Scope & Product Categories

- **Regulatory Basis:** Regulation (EU) No 1286/2014 (PRIIPs), supplemented by Commission Delegated Regulation (EU) 2017/653 as amended by (EU) 2021/2268 (applies from 1 July 2022).
- **Scope:** PRIIP manufacturers must produce a Key Information Document (KID) for all packaged retail and insurance-based investment products marketed to retail investors in the EU.
- **Category 3 – This BRC:** PRIIPs whose values reflect prices of underlying investments but not as a constant multiple. Requires at least 2 years of daily / 4 years of weekly / 5 years of monthly price history for underlyings. Multi-underlying BRC qualifies as Category 3.
- **KID Structure:** Sections: (1) What is this product? (2) What are the risks and what could I get in return? – SRI + 4 performance scenarios (3) What are the costs? (4) How long should I hold it?
- **Review Obligation:** KID must be reviewed at least every 12 months. Revision required if MRM class changes or moderate scenario return changes by more than 5 percentage points (annualised).

# PRIIPs KID Calculation Workflow



# Performance Scenarios – Purpose & Definition

- **Stress Scenario:** Reflects an exceptionally adverse market outcome. Derived from the 1st percentile of the simulated return distribution, calculated under stress assumptions. Not a worst-case but statistically extreme tail.
- **Unfavourable Scenario:** Reflects a poor but plausible outcome. Derived from the 10th percentile of the simulated distribution at RHP. Represents realistic downside for an unlucky investor.
- **Moderate Scenario:** Central estimate. Derived from the 50th percentile of the simulated distribution at RHP. Represents the median outcome under the simulation model.
- **Favourable Scenario:** Reflects a positive but realistic outcome. Derived from the 90th percentile of the simulated distribution at RHP. Not a best-case but statistically optimistic outcome.
- **Note:** Scenarios are not forecasts. They are model outputs based on a bootstrapped historical simulation.

# Market Data Preparation – Scalar vs. Curve Risk Factors

## ➔ Scalar Risk Factors (Equity Spot Prices)

- Each equity underlying (Deutsche Post, Kühne+Nagel, UPS) treated as a scalar risk factor.
- Historical daily log-returns computed:  $r_t = \ln(S(t) / S(t-1))$  over 5-year lookback window.
- Returns bootstrapped with replacement – 10,000 draws for the PRIIPS simulation (Annex II, Point 19).
- Stress scenarios for scalar risk factors (Annex IV, Point 26, Point 18 a,b,c) - stressed volatility calculated using a series of volatilities over time windows

## ➔ Curve Risk Factors (Yield Curves: EUR, CHF, USD)

- Yield curves modelled via Principal Component Analysis (PCA) –Annex II, Point 23 of 2017/653.
- Step 1: Collect 5 years of daily tenor-point history. Shift all tenors to be positive.
- Step 2: Compute log-returns per tenor; de-mean each tenor's return series.
- Step 3: Build  $N \times M$  covariance matrix ( $N$  observations,  $M$  tenors). Extract 3 leading eigenvectors.
- Step 4: Project historical returns onto 3 PCs → simulate bootstrapped PC shocks → reconstruct full curve.
- This ensures simulated yield curves remain consistent across tenors.
- Stress scenario methodology not provided via regulation

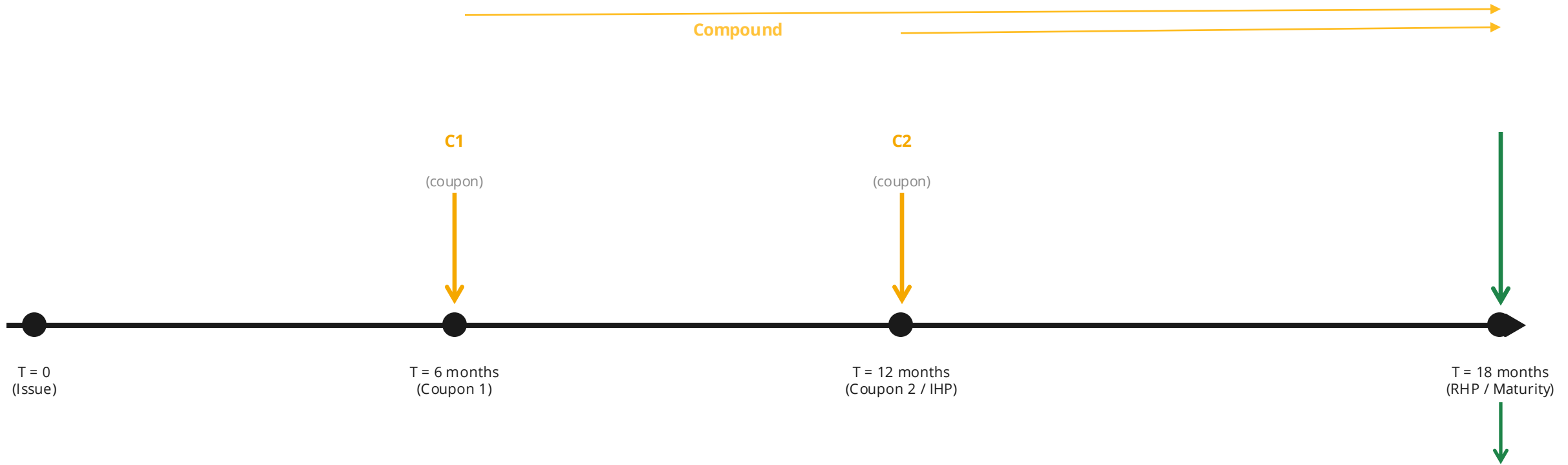
# Simulation Methodology – Category 3 Bootstrap (Annex II)

- **Step 1 – Draw random scenarios:** For each of 10,000 simulations, randomly select N observed trading periods (with replacement) where N = number of trading days in the RHP (here: approx. 370 days for 18-month RHP to Jul 2027).
- **Step 2 – Simulate spot prices:** For each underlying i and each simulated path j, construct the terminal spot price by summing selected log-returns, then applying the regulatory required return adjustment (demeaning and quanto-correction)
- **Step 3 – Simulate yield curves:** For each path, bootstrap PCA factor shocks for EUR/CHF/USD curves, reconstruct full yield curves for the different time points.
- **Step 4 – Price the BRC:** For each of 10,000 paths, compute the BRC payoff:
  - Check barrier with barrier level
  - Check final fixing with cap level
- **Step 5 – VaR and VEV:** Sort 10,000 discounted payoffs. VaR = 97.5th percentile loss (price space). Then:
  - $VEV = ( \sqrt{3.842 - 2 \cdot \ln(\text{VaR}_{\text{price}})} - 1.96 ) / \sqrt{T}$
  - For this BRC: VEV = 14.18%

# RHP vs. Intermediate Holding Period

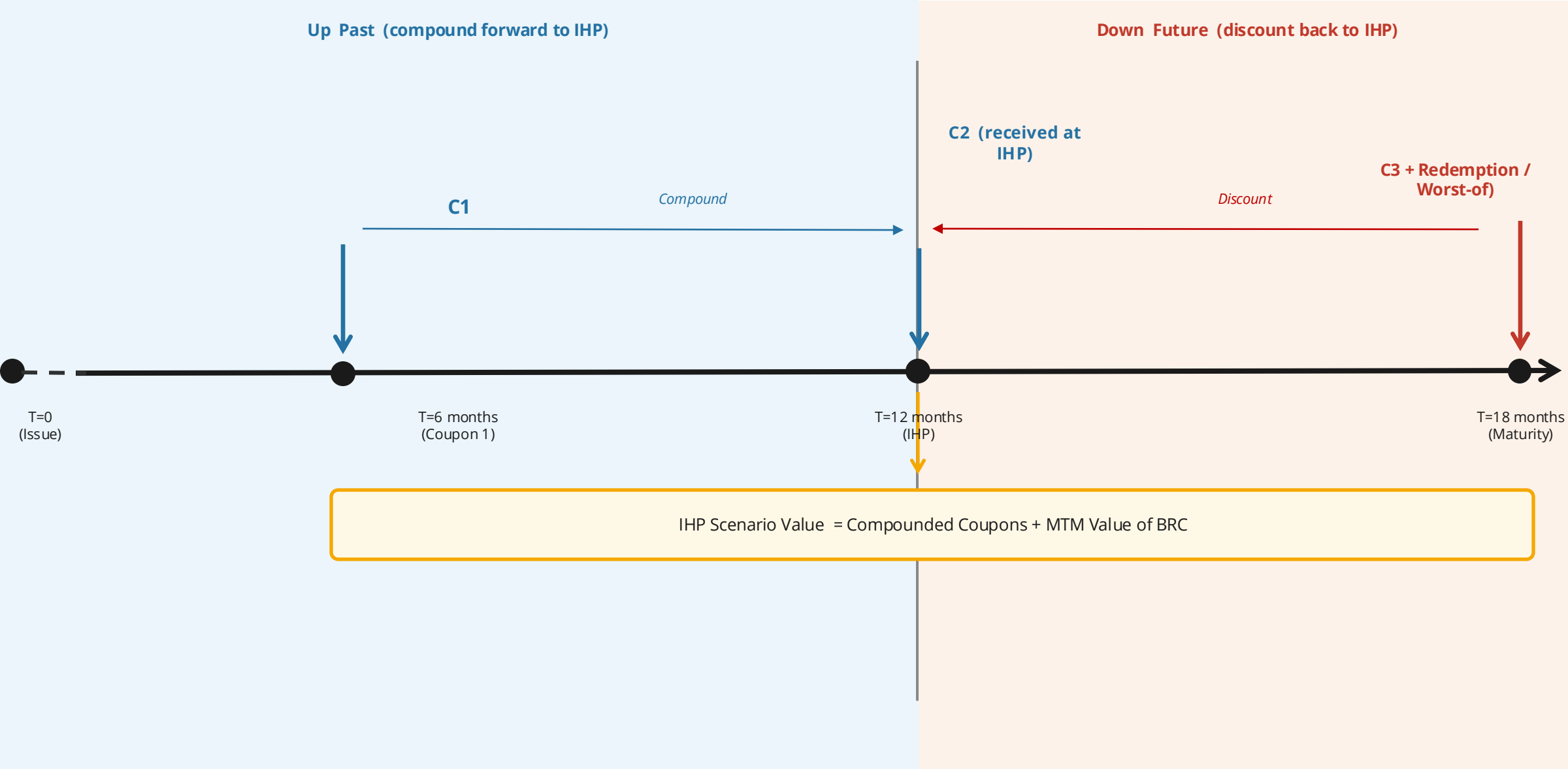
- **Recommended Holding Period (RHP):** Defined as the PRIIP maturity date – 27 Jul 2027 (18 months from valuation date 26 Jan 2026). Scenarios at RHP reflect the full product lifecycle including barrier observation and final redemption mechanics.
- **Intermediate Holding Period (Year 1):** Mandated by regulation for products with RHP > 1 year. Calculated at: 27 Jan 2027 (12 months). At Year 1, the investor sells the product at its prevailing market value – there is no barrier event, no coupon settlement at maturity. The price is the MTM (mark-to-market) of the remaining structure.
- **Why Year 1 is more volatile:** At Year 1, the BRC is mid-life – the barrier has not been resolved and the product carries full optionality risk. This explains the wide spread between Year 1 scenarios (Stress: -89%, Favourable: +61%) vs. RHP scenarios (Stress: -58%, Favourable: +11%).
- **Regulatory logic:** The intermediate scenario protects investors who may not hold to maturity, by showing the risk of selling early when market value can differ substantially from par.

# RHP Scenario Value – Cashflow Timeline



RHP Scenario Value = Sum of compounded coupons + C3+Redemption / Worst Of Value + Participation

# IHP Scenario Value – Cashflow Timeline



# Performance Scenario Calculation – Coupon-Bearing Instruments

- The key challenge for coupon-bearing instruments: scenario values must include both the expected coupon cashflows AND the terminal redemption value, all discounted at the relevant risk-free rate.
- For each scenario (e.g. 10th percentile path), the scenario value =  $PV(\text{coupons remaining}) + PV(\text{terminal payoff at that percentile})$ .
- The intermediate holding period scenario reflects mark-to-market: PV of all future cashflows repriced on the scenario yield curve with scenario equity levels.
- Demanding computation:
  - At RHP we have to compound all cash flows to this date utilizing the respective yield curves, check barrier observation and calculate redemption / worst-of.
  - At IHP each MTM valuation requires full valuation – here: QMC simulation with 3 underlyings utilizing a BS model
  - Quanto correction needs to be applied per underlying

# Performance Scenario Results

## EUR 10,000 Investment | Valuation: 26 Jan 2026 | RHP: 27 Jul 2027

Scenario	Year 1 (Jan 2027)		RHP (Jul 2027)	
<b>Stress</b>	<b>EUR 1,104</b>	<b>( -89.0%)</b>	<b>EUR 2,779</b>	<b>( -72.2%)</b>
<b>Unfavourable</b>	<b>EUR 6,114</b>	<b>( -38.9%)</b>	<b>EUR 5,736</b>	<b>( -42.6%)</b>
<b>Moderate</b>	<b>EUR 9,090</b>	<b>( -9.1%)</b>	<b>EUR 8,478</b>	<b>( -15.2%)</b>
<b>Favourable</b>	<b>EUR 16,087</b>	<b>( +60.9%)</b>	<b>EUR 11,738</b>	<b>( +17.3%)</b>

**Note:**

*Relative returns shown net of costs. RHP return is annualised over 1.5 years*

*Values from UnRisk PRIIP KID calculation engine, 10,000 Monte Carlo paths*

*Scenarios are not forecasts of future performance. Actual performance may differ materially*

*Based on Commission Delegated Regulation (EU) 2021/2268*

# Summary Risk Indicator – From VEV to SRI

- **Market Risk Measure (MRM) – Category 3 method**

- VEV formula (Annex II, Point 17):

$$\text{VEV} = ( \text{sqrt}(3.842 - 2 * \ln(\text{VaR\_Price})) - 1.96 ) / \text{sqrt}(T)$$

$$\text{VEV} = 14.18\% \rightarrow \text{MRM Class 4 (12\% - 20\% band)}$$

- **Credit Risk Measure (CRM)**

- Input credit class: 3 (issuer rating equivalent, per Annex II Part 2 of 2017/653)
- CRM contribution: mapped to risk class per the SRI combination table

- **SRI Combination (Annex III)**

- The SRI is determined by combining MRM and CRM via the regulatory combination table:

$$\text{MRM 4} + \text{CRM 3} \rightarrow \text{SRI} = 4$$

- SRI scale: 1 (lowest) to 7 (highest). SRI 4 = moderate-to-medium risk for an 18-month worst-of BRC.

# Cost Disclosure – Post-Processing Step

- **Role in the KID workflow**

Costs are computed after scenario simulation. The PRIIP cost indicator uses the moderate scenario return to derive a Reduction in Yield (RIY) – the cost impact as a drag on the moderate scenario return.

- **Cost composition for this BRC**

- Entry costs: 0.75% of invested amount (bid-mid spread + distribution margin)
- Exit costs: 0.00% | Ongoing / other costs: 0.00% (no management fee) | Transaction costs: 0.00%
- Total cost impact at RHP: 0.45% p.a. (EUR 75 on EUR 10,000 over 18 months)
- Total cost impact at Year 1: EUR 125 on EUR 10,000

- **Important**

Costs shown are impact costs – drag on return in EUR and %. Entry costs appear higher at Year 1 as they amortise over a shorter holding period. Regulatory basis: Art. 5 and Annex VI of (EU) 2017/653, as amended by (EU) 2021/2268.

# Key Takeaways

- **End-to-end workflow:** A PRIIP KID for a worst-of BRC requires: product specification → market data assembly → 10,000-path bootstrap simulation → scenario extraction → VEV/SRI computation → cost post-processing.
- **Two types of risk factors:** Equity spot prices use direct bootstrap with quanto correction. Yield curves require PCA (3 factors) to ensure curve consistency across tenors.
- **SRI = 4 for this BRC:** VEV of 14.18% (transformed from 97.5% VaR in price space) places this instrument in MRM class 4. Combined with CRM class 3, the SRI is 4 on a 1–7 scale.
- **Intermediate horizon:** Year 1 scenarios show substantially wider dispersion than RHP scenarios. This is economically plausible and commonly observed for this type of structure as mid-life BRC MTM carries remaining time value, barrier probability, volatility sensitivity, correlation effects
- **Regulation is current:** The methodology follows Commission Delegated Regulation (EU) 2021/2268 amending 2017/653 (in force 1 July 2022) – the latest enacted RTS for PRIIP performance scenarios and SRI.

# Thank you



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