PRIIPs Scenarios for Retail Structured Products (a high level guide for non-experts)

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PRIIPs Scenarios - background

- There are 4 'categories' of PRIIP described in the RTS (RTS = Regulatory technical standards)
  - Category 1 - mainly derivatives
  - Category 2 - "linear" products (so delta-1, funds etc)
  - Category 3 – non-linear products (most retail structured products fit here)
  - Category 4 – products where the value depends on unobservable factors
- Each category has a different approach for calculating scenarios (and risk indicators) – in this document we will focus on Category 3 given it's the main category relevant for retail structured products

Investment EUR 10,000				
Scenarios		**1 year**	**4 years**	**Maturity**
Stress scenario	What you might get back after costs	EUR 5,957.00	EUR 3,529.00	EUR 2,920.00
	Average return each year	-40.43%	-22.93%	-14.26%
Unfavourable scenario	What you might get back after costs	EUR 7,218.00	EUR 4,175.00	EUR 3,591.00
	Average return each year	-27.82%	-19.62%	-12.02%
Moderate scenario	What you might get back after costs	EUR 9,017.00	EUR 10,750.00	EUR 10,750.00
	Average return each year	-9.83%	1.82%	0.91%
Favourable scenario	What you might get back after costs	EUR 10,568.00	EUR 11,500.00	EUR 11,500.00
	Average return each year	5.68%	3.56%	1.76%

PRIIPs Scenarios for Category 3 PRIIPs– how are they generated for most structured products?

- The first step is to take the historic prices of the underlying(s)

Date	Close Price
12-Mar-14	6620.9
13-Mar-14	6553.78
14-Mar-14	6527.89
17-Mar-14	6568.35
18-Mar-14	6605.28
19-Mar-14	6573.13
20-Mar-14	6542.44
21-Mar-14	6557.17
24-Mar-14	6520.39
25-Mar-14	6604.89
26-Mar-14	6605.3
27-Mar-14	6588.32
28-Mar-14	6615.58
31-Mar-14	6598.37

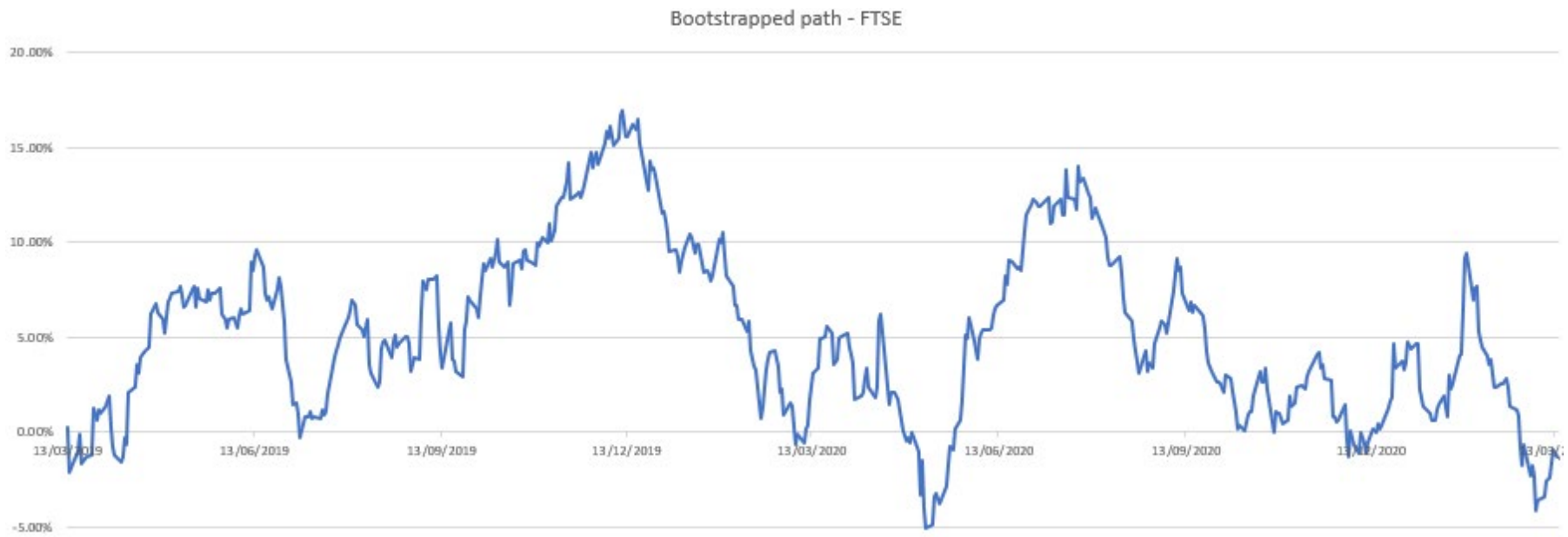
- Then calculate the daily move for each day

Date	Close Price	Daily move
12-Mar-14	6620.9	
13-Mar-14	6553.78	-1.02%
14-Mar-14	6527.89	-0.40%
17-Mar-14	6568.35	0.62%
18-Mar-14	6605.28	0.56%
19-Mar-14	6573.13	-0.49%
20-Mar-14	6542.44	-0.47%
21-Mar-14	6557.17	0.22%
24-Mar-14	6520.39	-0.56%
25-Mar-14	6604.89	1.29%
26-Mar-14	6605.3	0.01%
27-Mar-14	6588.32	-0.26%
28-Mar-14	6615.58	0.41%
31-Mar-14	6598.37	-0.26%

PRIIPs Scenarios – how are they generated?

Bootstrapping

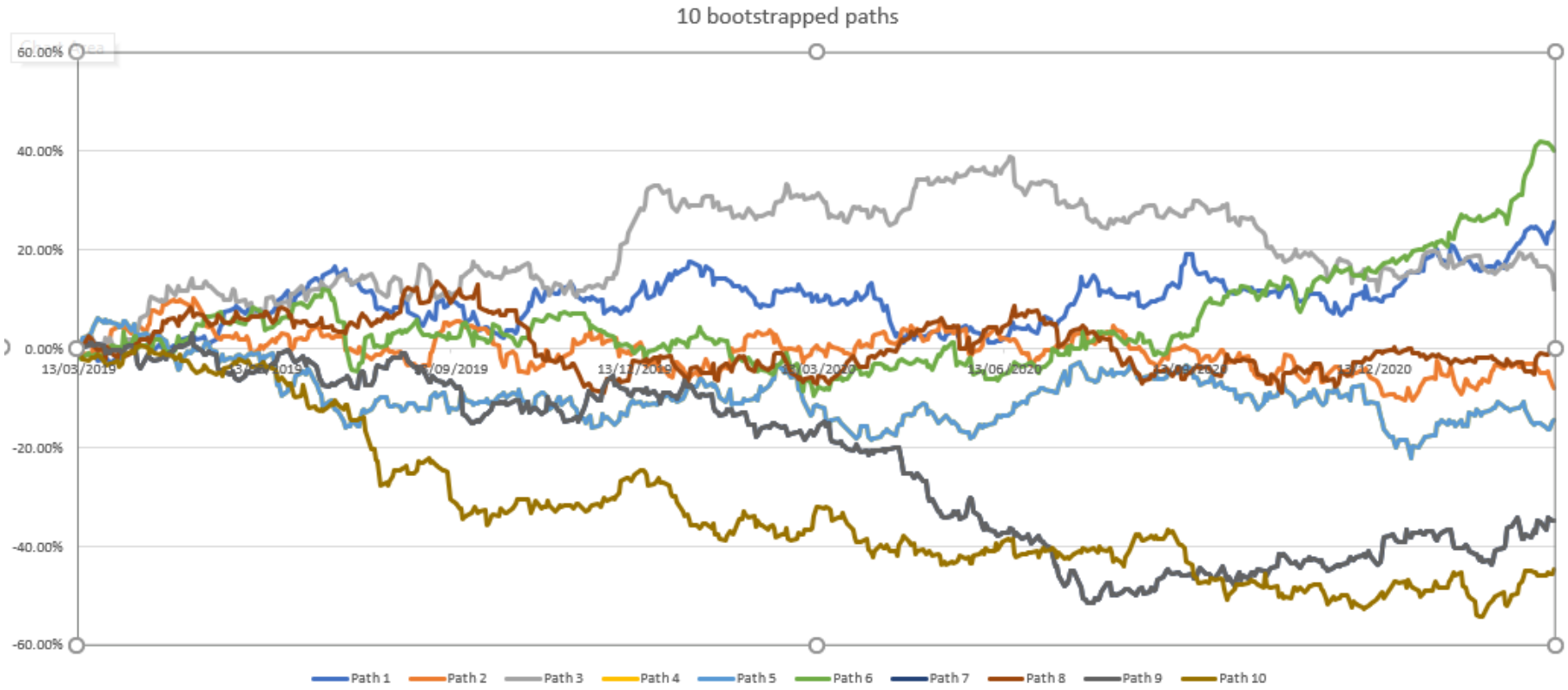
- With this data, we're going to generate a random path.
- To generate this path, we're going to select one of the daily moves above at random. Then another. And keep doing this until we have a random daily move for each business day the product could be live for. An example of a simulated path for the FTSE:



PRIIPs Scenarios – how are they generated?

Bootstrapping 2

- We're going to repeat this 9,999 more times – so that we end up with 10,000 paths in total. Here's how different just 10 can look with the same underlying data:



PRIIPs Scenarios – how are they generated?

Evaluating the bootstrapped paths

- Once we have 10,000 paths, each path needs to be used to evaluate the product payout for the scenario the path shows:
  - For a Reverse Convertible KI Put with this generated path, we could calculate the investor's loss given this simulation (payout is coupons over the product's life + end redemption amount)
  - For an Autocall with this generated path and an autocall observation date falling in Jan 2020, we can calculate the early redemption amount that would be expected to payout on the Autocall payment date

Ok – so we've generated 10,000 paths and know what the investor would get back for each – now what?

Paths and investor returns from each

Path 1	65.87%
Path 2	10.20%
Path 3	42.58%
Path 4	40.71%
Path 5	100.00%
Path 6	69.78%
Path 7	125.00%
Path 8	69.57%
Path 9	50.51%
Path 10	100.00%
Path 11	100.00%
Path 12	75.38%
Path 13	34.75%
Path 14	74.71%
Path 15	100.00%
Path 16	100.00%
Path 17	44.69%
Path 18	14.07%
Path 19	45.94%
Path 20	69.63%
Path 21	41.33%
Path 22	100.00%
Path 23	36.40%
Path 24	55.03%
Path 25	100.00%
Path 26	100.00%
Path 27	12.82%
Path 28	49.30%
Path 29	73.58%
Path 30	73.82%
Path 31	35.83%
Path 32	38.87%
Path 33	26.99%
Path 34	100.00%
Path 35	100.00%
Path 36	31.30%
Path 37	100.00%
Path 38	49.18%

We rank each path based on investor outcome

Rank	Value
1	10.20%
2	11.67%
3	12.82%
4	13.42%
5	14.07%
6	16.97%
7	22.26%
8	22.79%
9	24.47%
10	26.99%
11	29.48%
12	30.43%
13	31.06%
14	31.30%
15	34.51%
16	34.75%
17	35.83%
18	36.40%
19	36.64%
20	36.72%
21	36.73%
22	38.87%
23	40.71%
24	41.33%
25	42.58%
26	42.84%
27	42.86%
28	43.75%
29	44.69%
30	44.76%
31	45.06%
32	45.94%
33	47.40%
34	47.52%
35	47.60%
36	47.96%
37	48.68%

- The RTS then says we should take different percentiles for different scenarios to get the RHP values (RHP = Recommended holding period – this usually corresponds to the product maturity). So we need to rank them based on the investor outcome of each.
- The favourable scenario is the value at the 90th percentile. Given we have 10k paths, this is one of the higher values - at rank 9000.
- Similarly for the moderate scenario and unfavourable scenario we take the 50th and 10th percentiles (rank 5000 and rank 1000)
- Generating the stress scenario RHP value is a little more involved. At a very high level, the main differences are:

- The daily moves we use to simulate the paths are first scaled up using a "stress volatility". This stress volatility is calculated by taking a high percentile from the historic volatility (using the same historic prices we used for the 3 main scenarios). The returns are corrected to flatten out any historic growth rate.
- Instead of the 10th percentile used for the unfavourable scenario, the 1st or 5th percentile is used depending on the remaining length of the product.
- The scaling of the data makes the underlying data a lot more volatile. So the paths will reflect a wider range of outcomes with a flat growth rate on average. Picking a very low percentile from these means the end result is likely to be a lot worse than the other scenarios

Great, we have the values at the RHP for each scenario – how do we get the IHP values now?

(IHP = intermediate holding period, for products with over 3 years remaining, there are 2 IHPs – at 1 year and half way through the product life, rounded up)

- The RTS is unhelpfully vague as to how to do this. There is a fairly diverse range of approaches in the market here, most of which could be defended as compliant with the RTS, with advantages and disadvantages to each.
- A few of the approaches in the market today;

    1. Some firms use regression based techniques that can approximate intermediate values based on the relationship between the simulated spots at the IHP point and the payoff values at the RHP point.
    2. Some firms "walk" back down the path that gave them the particular scenario value at the RHP to the IHP point, then use this simulated spot as a starting point to approximate the value of the PRIIP at this point and in this scenario by re-simulating from here.
    3. Some firms run a new set of 10k paths to the IHP point, then rank them based on the simulated spot, then re-simulate to determine a value.

- There is a little more consistency in approach to how some of the common costs are incorporated. Many manufacturers deduct a standard spread from any IHP value that reflects a "live" path (i.e. no early termination event has taken place). This could be based on some internal expectation of what a typical bid-mid spread would be applied to that product type when bought back early; or calculated based on half of their standard bid-offer spread.

IHP Value challenges

- A big challenge with producing the performance scenarios is how certain products are presented. Often it's impossible to have both scenarios that are both ordered correctly at all points and scenarios that are internally consistent with themselves. This includes some widely offered product features.

  - Is it most important that at every point shown that the favourable scenario is always better than the moderate scenario, which in turn is always better than the unfavourable scenario?

  - Is it most important that an individual scenario is consistent across all the points within a specific scenario heading. (e.g. Can a KID show a moderate scenario where an IHP value incorporates a paid contingent coupon that isn't incorporated in the RHP value for the moderate scenario?)

Autocall example - which makes more sense to you?

- A 5 year product with an annual 100% autocall feature illustrates this conundrum very well.
- Typically the investor would be paid the highest cash amount where the underlying is above the autocall level at year 5.
- However for the product to still be live in year 5, the underlying needs to be below 100% for years 1-4. If we're trying to keep the scenario consistent within itself this would usually result in an IHP value below the corresponding autocall amounts for these years. This will usually mean the scenarios will be out of order everywhere except the RHP. See the top table on the next page.
- If instead it's decided that it's more important to always show the scenarios in the right order relative to each other, the KID could end up showing a favourable scenario that might misleadingly suggest to an investor that the product can autocall 3 times. See the bottom table on the next page.

Autocall presentation examples – same product, very different outcomes

		1 year	3 years	5 years
Unfavourable scenario	What you might get back after costs	EUR 10,500.00	EUR 10,500.00	EUR 10,500.00
	Average return each year	5.00%	1.67%	1.00%
Moderate scenario	What you might get back after costs	EUR 9,600.00	EUR 11,500.00	EUR 11,500.00
	Average return each year	-4.00%	5.00%	3.00%
Favourable scenario	What you might get back after costs	EUR 9,000.00	EUR 9,700.00	EUR 12,500.00
	Average return each year	-10.00%	-1.00%	5.00%

- Here it's pretty clear each scenario only autocalls once, however the favourable 1 year point is a lot worse than the unfavourable 1 year point. Many investors could find this confusing and unintuitive

		1 year	3 years	5 years
Unfavourable scenario	What you might get back after costs	EUR 9,700.00	EUR 10,100.00	EUR 10,500.00
	Average return each year	-3.00%	0.33%	1.00%
Moderate scenario	What you might get back after costs	EUR 10,133.00	EUR 11,000.00	EUR 11,500.00
	Average return each year	1.33%	3.33%	3.00%
Favourable scenario	What you might get back after costs	EUR 10,500.00	EUR 11,500.00	EUR 12,500.00
	Average return each year	5.00%	5.00%	5.00%

- Here, the scenarios are nicely ordered, but if an investor tries to understand the favourable scenario without knowing the points are not linked by the same path, they may end up confused as it appears to autocall 3 times (year 1, 3 and 5)

Other scenario challenges

- The use of historic data to simulate the scenarios can cause some very serious issues.
  Any underlying which has a very positive historic performance over the last 5 years is likely to generate very positive PRIIPs scenarios (this is true for most major European indices).

  This could result in situations where a retail investor is misled by the inclusion of a regulatory mandated scenario methodology.

- The scenarios do not reflect any credit risk; so two identical products issued by different manufacturers with very different credit risks are liable to show similar scenario results (methodology differences aside)

Recap

- There are 4 PRIIPs categories with different approaches to scenarios.
- Most retail structured products fall into category 3.
- Category 3 involves simulating some paths based on historic data, evaluating each path, sorting the results, and then selecting specific percentiles to get RHP values.
- There's more interpretation needed to decide on a methodology for IHP value determination.
- Reliance on historical data and lack of clear guidance for path dependant products means scenarios can often be unrealistic or unhelpful.

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