BNP PARIBAS
CORPORATE & INSTITUTIONAL BANKING

BNP PARIBAS INDICES
INDEX METHODOLOGY SUPPLEMENT
Smart Balance China Index

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This document (the "**BNP Paribas Index Methodology Supplement**") supplements, forms a part of and is subject to the BNP Paribas Index Handbook (the "**Handbook**"), as may be amended, supplemented, replaced or superseded from time to time. The current version of the Handbook and all supplements thereto are available at https://indx.bnpparibas.com/.

The Handbook, this BNP Paribas Index Methodology Supplement and any Technical Annex, Disclosure Annex or other document that by its terms applies to certain features of a particular BNP Paribas Index together comprise the "**BNP Paribas Index Rules**" for each BNP Paribas Index described herein. In the event of an inconsistency, the following order of precedence will prevail for the purposes of each BNP Paribas Index described herein: (i) this BNP Paribas Index Methodology Supplement, (ii) a supplement, Technical Annex, Disclosure Annex or other document that does not form part of the Handbook, but is incorporated by reference and by its terms applies to certain features of each BNP Paribas Index described herein, and (iii) the Handbook. Terms used herein, but not defined, bear the meaning set forth in the Handbook, any supplement thereto, or in any applicable Technical Annex or Disclosure Annex.

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Nothing contained in the BNP Paribas Index Rules should be construed as an offer or solicitation of any transaction.

Objective of the BNP Paribas Index

The objective of the BNP Paribas Smart Balance China Index (the "**BNP Paribas Index**") and the strategy and methodology related thereto (the "**BNP Paribas Index Methodology**") is to provide exposure to the performance of a portfolio comprised of (i) an equity mutual fund (the **"Equity Fund"** and **"Index Component 1"**), (ii) a bond fund (the **"Bond Fund"** and **"Index Component 2")** and (iii) a USD money market component (the **"Cash Component"** and **"Index Component 3"**), while limiting the realised volatility at or near a target (the **"Target Volatility"**) of 8%.

Calculation of the BNP Paribas Index Level

On each BNP Paribas Index Level Calculation Date, the Index Calculation Agent calculates the BNP Paribas Index Level in accordance with the provisions of the BNP Paribas Index Rules and as described below.

The BNP Paribas Index Level is the product of the BNP Paribas Index Level on the immediately preceding BNP Paribas Index Level Calculation Date and the sum of (i) one and (ii) the weighted sum of the performance of each Index Component multiplied by their respective Used Weights calculated in accordance with Section 3 (*Calculation of the Used Weights*) of Annex 1, multiplied by (iii) one minus the Annual Fee adjusted by a day count fraction, as specified in Section 1 (*Calculation of the BNP Paribas Index Level*) of Annex 1.

BNP Paribas Index Methodology

On each BNP Paribas Index Level Calculation Date, the Used Weight of Index Components 1 and 2 are reweighted to the relevant Target Weight, as calculated on the immediately preceding BNP Paribas Index Level Calculation Date.

The Used Weight of Index Component 3 on each BNP Paribas Index Level Calculation Date is calculated as one minus the sum of the Used Weights of each of Index Component 1 and Index Component 2.

In order to determine the Target Weight for Index Component 1 and Index Component 2, four sets of potential Target Weights are calculated for each of the Short Term Variance Decay Factor of 0.94 and Long Term Variance Decay Factor of 0.97 in accordance with the provisions of Section 4 (*Calculation of the Target Weight)* of Annex 1, using the Correlation (calculated in accordance with Section 5 (*Correlation*) of Annex 1) and the Volatility (calculated in accordance with Section 8 (*Volatility*) of Annex 1). The set of potential Target Weights which (i) gives the lowest weighting of the BNP Paribas Index to Index Component 1 and (ii) meets the Target Volatility, is selected as the Target Weights for implementation on the next following Rebalancing Date.

For the purpose of determining the Covariance for use in the calculation of the Correlation on the BNP Paribas Index Start Date only, the BNP Paribas Index Methodology uses data from the Covariance Observation Period, as described below.

The Index Components

The BNP Paribas Index is comprised of a synthetic portfolio of funds. There is no actual portfolio of assets to which any person is entitled or has any ownership interest. The BNP Paribas Index does not entail the actual execution of any transactions with respect to the Index Components. The BNP Paribas Index Methodology synthetically replicates all of the referenced Index Components and any related transactions.

The Index Components that comprise the BNP Paribas Index are:

Index Component i	Index Component	Pricing Page	Type
1	JPM Funds - China Fund	JPCHAAU LX Equity	Fund Share
2	PIMCO GIS Global Bond Fund	PIMGLBA ID Equity	Fund Share
3	Cash Component		Capitalized Cash

Index Fees

The BNP Paribas Index incorporates certain charges, costs, or expenses (the "**Index Fees**") that are deducted from the level of the BNP Paribas Index.

The Index Fee incorporated in the BNP Paribas Index is an annual fee (the "**Annual Fee**").

The Annual Fee is fixed at 1.50% per annum, which is deducted from the BNP Paribas Index Level on a daily basis.

BNP Paribas Index Definitions

BNP Paribas Index:	Smart Balance China Index (Bloomberg code: ENHASBCI Index)
BNP Paribas Index Launch Date	@LAUNCH_DATE@
BNP Paribas Index Start Date	@START_DATE@
Index Calculation Agent:	Solactive AG Unless otherwise indicated, all calculations and determinations set forth in this BNP Paribas Index Methodology Supplement are performed by the Index Calculation Agent.
Weighting Determination Agent:	Not Applicable
BNP Paribas Index Status:	Public Index
Benchmark Family:	Risk Control
Index Currency:	USD
BNP Paribas Index Features	
Return Type:	Total Return
Rebalancing:	See Annex 1
Weighting Determination Date	Each BNP Paribas Index Level Calculation Date
Rebalancing Dates:	The BNP Paribas Index Level Calculation Date next following the relevant Weighting Determination Date.
Index Fees:	Applicable See Section 1 (*Calculation of the BNP Paribas Index Level*) of Annex 1
Currency Conversion Mechanism:	Not Applicable
Volatility Control Mechanism:	Applicable. The Target Volatility is 8%.

Calculation and Publication of the BNP Paribas Index Level:	
Initial BNP Paribas Index Level:	100.00, as of the BNP Paribas Index Start Date.
Frequency of calculation of BNP Paribas Index Level:	Once per day, on each BNP Paribas Index Level Calculation Date
BNP Paribas Index Publication Date:	The second Business Day following each BNP Paribas Index Level Calculation Date.
BNP Paribas Index Publication Page:	Bloomberg: ENHASBCI Index
Website where current composition of the BNP Paribas Index is published:	Not Applicable

Price Disrupted Days:

Section 4.3 of the Handbook (*Price Disrupted Days*) will be deleted in its entirety and replaced with the following:

"**4.3 Price Disrupted Days**

(a) If any Scheduled BNP Paribas Index Business Day is a Price Disrupted Day in respect of one or more Index Components (each, an **"affected Index Component"**), then such day shall be a BNP Paribas Index Level Calculation Date and the Index Calculation Agent will:

(i) calculate and publish the BNP Paribas Index Level with respect to such BNP Paribas Index Level Calculation Date using the price, level or rate for the affected Index Component as of the immediately preceding Scheduled BNP Paribas Index Business Day that was not a Price Disrupted Day;

and

(ii) deem such day to be a Weighting Determination Date, notwithstanding the occurrence of the Price Disrupted Day, and determine the Target Weight for implementation on the next following Rebalancing Date (the **"scheduled Rebalancing Date"**) using the last available Settlement Price (the **"affected Settlement Price"**), as the case may be, to calculate the relevant inputs for the affected Index Component;

provided that if each subsequent Scheduled BNP Paribas Index Business Day is also a Price Disrupted Day up to and including the Maximum Number of Days of Price Disruption, the Index Calculation Agent will contact the Index Sponsor, who will determine whether or not the circumstances causing the Price Source Disruption constitute an Index Adjustment Event, and:

(i) if an Index Adjustment Event has occurred, the Index Sponsor will determine the consequences thereof in accordance with the provisions of Section 5.2 (*Consequences of an Index Adjustment Event*); or

(ii) if an Index Adjustment Event has not occurred, the Index Sponsor shall instruct the Index Calculation Agent to resume regular calculation and publication of the BNP Paribas Index Level and rebalancing of the BNP Paribas Index using the last value which was available for the affected Index Component(s), or if the Index Sponsor determines that the use of the last value for the affected Index Component(s) would result in a BNP Paribas Index Level that is not consistent with the strategy and objective of the BNP Paribas Index, to use its good faith estimate of the value that would prevail on such day but for the occurrence of the Price Disrupted Day and calculate and publish the BNP Paribas Index Level and rebalance the BNP Paribas Index accordingly."

Index Adjustment Events:

Section 5 (*Index Adjustment Events and Consequences*) of the Handbook shall apply.

Index Potential Adjustment Events:

Section 6 (*Index Potential Adjustment Events and Consequences*) of the Handbook shall apply

Technical Annexes applicable to the BNP Paribas Index:

Not Applicable

Amended definitions and provisions applicable to the BNP Paribas Index:

Not Applicable

New definitions and provisions applicable to the BNP Paribas Index:

Not Applicable

Bespoke definitions and provisions applicable to the BNP Paribas Index:

Certain calculations used by the BNP Paribas Index Methodology were calculated during the period from, and including, 7 December 2012 to, but excluding, the BNP Paribas Index Start Date (the "**Covariance Observation Period**"). Such calculated figures are exclusively used for the purpose of accurately calculating the Target Weights on the BNP Paribas Index Start Date only and are not reflected in any hypothetical index levels or backtesting data that may be available.

Date offsets:

For any BNP Paribas Index Level Calculation Date t, and for any integer value j, $t+j$ (respectively $t-j$) refers to the BNP Paribas Index Level Calculation Date that is j BNP Paribas Index Level Calculation Dates following (respectively preceding) BNP Paribas Index Level Calculation Date t. For example, $t-1$ refers to the BNP Paribas Index Level Calculation Date immediately preceding BNP Paribas Index Level Calculation Date t, and $t-2$ refers to the BNP Paribas Index Level Calculation Date immediately preceding BNP Paribas Index Level Calculation Date $t-1$.

Annex 1
The BNP Paribas Index Methodology for the Smart Balance China Index:

1. Calculation of the BNP Paribas Index Level:

On the BNP Paribas Index Start Date, the BNP Paribas Index Level shall be equal to:

$$Index_0 = 100$$

On each BNP Paribas Index Level Calculation Date t subsequent to the BNP Paribas Index Start Date, the BNP Paribas Index Level shall be calculated in accordance with the following formula:

$$Index_t = Index_{t-1} \times \left[1 + \sum_{i=1}^{3} W_{t-1}^{(i)} \times \left(\frac{U_t^{(i)}}{U_{t-1}^{(i)}} - 1\right)\right] \times \left(1 - AF \times \frac{Act_{t-1,t}}{365}\right)$$

where:

$W_{t-1}^{(i)}$ is the Used Weight in respect of each Index Component on BNP Paribas Index Level Calculation Date $t-1$, calculated in accordance with Section 3 (*Calculation of the Used Weights*)

$U_t^{(i)}$ is the Value in respect of each Index Component, calculated in accordance with Section 2 *(Calculation of the Values)*

AF means the Annual Fee, set at an annualized rate of 1.5%

2. Calculation of the Values:

On the BNP Paribas Index Start Date, the value for each Index Component (collectively, the **"Values"**) shall be equal to 100.

On each BNP Paribas Index Level Calculation Date t subsequent to the BNP Paribas Index Start Date:

(i) the Value of Index Component 1 shall be calculated in accordance with the following formula:

$$U_t^{(1)} = U_{t-1}^{(1)} \times \frac{IC_{1,t}}{IC_{1,t-1}}$$

(ii) the Value of the Index Component 2 shall be calculated in accordance with the following formula:

$$U_t^{(2)} = U_{t-1}^{(2)} \times \frac{IC_{2,t}}{IC_{2,t-1}}$$

(iii) the Value of Index Component 3 shall be calculated in accordance with the following formula:

$$U_t^{(3)} = U_{t-1}^{(3)} \times \left(1 + RATE_{t-1} \times \frac{Act_{t-1,t}}{360}\right)$$

where:

$IC_{i,t}$ is the Settlement Price in respect of Index Component i on BNP Paribas Index Level Calculation Date t; and

$RATE_{t-1}$ is the Reference Rate on BNP Paribas Index Level Calculation Date t-1.

3. Calculation of the Used Weights:

On the BNP Paribas Index Start Date, the Used Weights are:

$$\begin{cases} W_0^{(1)} = 50\% \\ W_0^{(2)} = 50\% \\ W_0^{(3)} = 0\% \end{cases}$$

Where:

$W^{(1)}$ means the Used Weight of Index Component 1;

$W^{(2)}$ means the Used Weight of the Index Component 2; and

$W^{(3)}$ means the Used Weight of Index Component 3.

On each BNP Paribas Index Level Calculation Date t subsequent to the BNP Paribas Index Start Date, the Used Weight is calculated in accordance with the following provisions:

(i) in respect of Index Component 1 and Index Component 2, the Used Weights ($W_t^{(1)}$and $W_t^{(2)}$ respectively) are equal to the Target Weight (calculated in accordance with Section 4 (*Calculation of the Target Weight*)) on BNP Paribas Index Level Calculation Date t-1;

(ii) in respect of Index Component 2, the Used Weight $W_t^{(3)}$is calculated in accordance with the following formula:

$$W_t^{(3)} = 1 - \left(W_t^{(1)} + W_t^{(2)}\right)$$

4. Calculation of the Target Weight:

On each Weighting Determination Date, for each of the Short Term (ST) Variance Decay Factor and the Long Term Variance (LT) Decay Factor (each denoted as λ), the Index Calculation Agent determines the potential Target Weights $\left(TW_{\lambda,t}^{+} \text{ and } TW_{\lambda,t}^{-}\right)$ at which the realised volatility of Index Component 1 and the Index Component 2 would be at or near the Target Volatility ($VolTarget$) in accordance with the following formulae:

$$TW_{\lambda,t}^{+} = \frac{-b_{\lambda,\,t} + \sqrt{\Delta}}{a_{\lambda,\,t}}$$

$$TW_{\lambda,t}^{-} = \frac{-b_{\lambda,\,t} - \sqrt{\Delta}}{a_{\lambda,\,t}}$$

Where :

$b_{\lambda,\,t} = \rho_{\lambda,\,t} \times \sigma_{\lambda,\,t}^{(1)} \times \sigma_{\lambda,\,t}^{(2)} - \left[\sigma_{\lambda,\,t}^{(2)}\right]^2$;

$\Delta = (b_{\lambda,\,t})^2 - a_{\lambda,\,t} \times c_{\lambda,\,t}$

$c_{\lambda,\,t} = \left[\sigma_{\lambda,\,t}^{(2)}\right]^2 - (VolTarget)^2$

$a_{\lambda,\,t} = \left[\sigma_{\lambda,\,t}^{(1)}\right]^2 + \left[\sigma_{\lambda,\,t}^{(2)}\right]^2 - 2 \times \rho_{\lambda,\,t} \times \sigma_{\lambda,\,t}^{(1)} \times \sigma_{\lambda,\,t}^{(2)}$

And

ρ means the Correlation, calculated in accordance with Section 5 (*Calculation of the Correlation*); and

σ means the Volatility, calculated in accordance with Section 8 (*Calculation of the Volatility*);

Next, for each Variance Decay Factor (λ), the four sets of potential Target Weights (PTWi) for each Index Component are determined using the following formulae:

PTW1:

$$if\ \ TW_{\lambda,t}^{+}\ and\ TW_{\lambda,t}^{-} \notin [0;\ 100\%]\ then \begin{cases} TW_{\lambda,t}^{(1)} = \min(\frac{VolTarget}{\sigma_{\lambda,t}^{(1)}}, 100\%) \\ TW_{\lambda,\,t}^{(2)} = 0 \\ TW_{\lambda,\,t}^{(3)} = 1 - TW_{\lambda,t}^{(1)} \end{cases};$$

PTW2 :

$$if\ \ TW_{\lambda,t}^{+}\ and\ TW_{\lambda,t}^{-} \in [0;\ 100\%]\ then \begin{cases} TW_{\lambda,t}^{(1)} = \max\left(TW_{\lambda,t}^{+}, TW_{\lambda,t}^{-}\right) \\ TW_{\lambda,\,t}^{(2)} = 1 - TW_{\lambda,t}^{(1)} \\ TW_{\lambda,\,t}^{(3)} = 0 \end{cases};$$

PTW3 :

$$if\ \ TW_{\lambda,t}^{+} \in [0;\ 100\%]\ and\ TW_{\lambda,t}^{-} \notin [0;\ 100\%]\ then \begin{cases} TW_{\lambda,t}^{(1)} = TW_{\lambda,t}^{+} \\ TW_{\lambda,\,t}^{(2)} = 1 - TW_{\lambda,t}^{(1)} \\ TW_{\lambda,\,t}^{(3)} = 0 \end{cases};$$

PTW4:

$$if\ \ TW_{\lambda,t}^{+} \notin [0;\ 100\%]\ and\ TW_{\lambda,t}^{-} \in [0;\ 100\%]\ then \begin{cases} TW_{\lambda,t}^{(1)} = TW_{\lambda,t}^{-} \\ TW_{\lambda,\,t}^{(2)} = 1 - TW_{\lambda,t}^{(1)} \\ TW_{\lambda,\,t}^{(3)} = 0 \end{cases}$$

The set of Target Weights in which the lowest weight is assigned to Index Component 1 are deemed to be the Target Weights $TW_t^{(i)}$ for the next following Rebalancing Date:

$$if\ TW_{ST,t}^{(1)} \leq TW_{LT,t}^{(1)}\ then \begin{cases} TW_t^{(1)} = TW_{ST,t}^{(1)} \\ TW_t^{(2)} = TW_{ST,t}^{(2)} \\ TW_t^{(3)} = TW_{ST,t}^{(3)} \end{cases},\quad else \quad \begin{cases} TW_t^{(1)} = TW_{LT,t}^{(1)} \\ TW_t^{(2)} = TW_{LT,t}^{(2)} \\ TW_t^{(3)} = TW_{LT,t}^{(3)} \end{cases}$$

5. Calculation of the Correlation

For each Variance Decay Factor λ, on each BNP Paribas Index Level Calculation Date t, the Correlation ($\rho_{\lambda,\,t}$) for each of Index Component 1 and Index Component 2 is determined in accordance with the following formula:

$$\rho_{\lambda,\,t} = \frac{Covariance_{\lambda,\,t}}{\sqrt{Variance_{\lambda,\,t}^{(1)} \times Variance_{\lambda,\,t}^{(2)}}}$$

where:

$Covariance_{\lambda,\,t}$ means the Covariance of the performance of each of Index Component 1 and Index Component 2, calculated in accordance with Section 6 (*Calculation of the Covariance*);

$Variance_{\lambda,\,t}^{(1)}$ means the Variance of the performance of Index Component 1, calculated in accordance with Section 7 (*Calculation of the Variance*); and

$Variance_{\lambda,\,t}^{(2)}$ means the Variance of the performance of Index Component 2, calculated in accordance with Section 7 (*Calculation of the Variance*).

6. Calculation of the Covariance

On the BNP Paribas Index Start Date, the Covariance for each of Index Component 1 and Index Component 2 is calculated in accordance with the following formula:

$$Covariance_{\lambda,0} = 252 \times \sum_{s=-98}^{0} \frac{(1-\lambda) \times \lambda^{-s}}{\sum_{p=-98}^{0}(1-\lambda) \times \lambda^{-p}} \times \ln\left(\frac{U_s^{(1)}}{U_{s-1}^{(1)}}\right) \times \ln\left(\frac{U_s^{(2)}}{U_{s-1}^{(2)}}\right)$$

And on each BNP Paribas Index Level Calculation Date subsequent to the BNP Paribas Index Start Date in accordance with the following formula:

$$Covariance_{\lambda,\,t} = \lambda \times Covariance_{\lambda,\,t\text{-}1} + 252 \times (1-\lambda) \times \ln\left(\frac{U_t^{(1)}}{U_{t-1}^{(1)}}\right) \times \ln\left(\frac{U_t^{(2)}}{U_{t-1}^{(2)}}\right)$$

where:

252 means the expected number of Scheduled Trading Days during each calendar year;

98 means each day during the Covariance Observation Period which is a Scheduled Trading Day for each of Index Component 1 and Index Component 2;

ln means the Napierian logarithm function;

$U^{(1)}$ means the value of Index Component 1, calculated in accordance with the provisions of Section 2 (*Calculation of the Values*) above; and

$U^{(2)}$ means the value of Index Component 2, calculated in accordance with the provisions of Section 2 (*Calculation of the Values*) above.

7. Calculation of the Variance:

On the BNP Paribas Index Start Date, the Variance for each of Index Component 1 and Index Component 2 for each Variance Decay Factor is calculated in accordance with the following formula:

$$Variance_{\lambda,0}^{(i)} = 252 \times \sum_{s=-98}^{0} \frac{(1-\lambda) \times \lambda^{-s}}{\sum_{p=-98}^{0}(1-\lambda) \times \lambda^{-p}} \times \left(\ln\left(\frac{U_s^{(i)}}{U_{s-1}^{(i)}} \right) \right)^2$$

And on each BNP Paribas Index Level Calculation Date subsequent to the BNP Paribas Index Start Date in accordance with the following formula:

$$Variance_{\lambda,\,t}^{(\mathrm{i})} = \lambda \times Variance_{\lambda,\,t\text{-}1}^{(\mathrm{i})} + 252 \times (1-\lambda) \times \left(\ln\left(\frac{U_t^{(i)}}{U_{t-1}^{(i)}} \right) \right)^2$$

Where :

252 means the expected number of Scheduled Trading Days during each calendar year;

98 means each day during the Covariance Observation Period which is a Scheduled Trading Day for each of Index Component 1 and Index Component 2;

λ means each Variance Decay Factor, as defined in Section 4 (*Calculation of the Target Weights*);

ln means the Napierian logarithm function;

$U^{(1)}$ means the value of Index Component 1, calculated in accordance with the provisions of Section 2 (*Calculation of the Values*) above; and

$U^{(2)}$ means the value of Index Component 2, calculated in accordance with the provisions of Section 2 (*Calculation of the Values*) above.

8. Calculation of the Volatility

For each Variance Decay Factor λ, on each BNP Paribas Index Level Calculation Date t, the Volatility $\left(\sigma_{\lambda,\,t}^{(\mathrm{i})}\right)$ for each of Index Component 1 and Index Component 2 is determined in accordance with the following formula:

$$\sigma_{\lambda,\,t}^{(\mathrm{i})} = \sqrt{Variance_{\lambda,\,t}^{(\mathrm{i})}}$$

where:

$Variance_{\lambda,\,t}^{(\mathrm{i})}$ means the Variance of the performance of each of Index Component 1 and the Index Component 2 for Variance Decay Factor λ, calculated in accordance with Section 7 (*Calculation of the Variance*).

Annex 2

Table 1 – Index Components

k=	Index Component	Type	Pricing Page	Index Component Currency	Price Source
1	JPM Funds - China Fund	Fund Share	JPCHAAU LX Equity	USD	JPMorgan Asset Management Europe Sarl
2	PIMCO GIS Global Bond Fund	Fund Share	PIMGLBA ID Equity	USD	PIMCO Europe Ltd
3	Cash Component	Capitalized Cash		USD	

Table 2 – Reference Rates

	Reference Rate	Type	Settlement Price/Designated Maturity	Price Source	Pricing Page
1	SOFR Rate	Interest Rate	Overnight	Federal Reserve Bank of New York	As published on Bloomberg page SOFRRATE Index