S&P Dow Jones Indices

A Division of S&P Global

INDEX ANNOUNCEMENT

IHS Markit Benchmark Administration Limited Consultation on the LGIM Matching Plus and Core Indices – Results

LONDON, AUGUST 23, 2023: IHS Markit Benchmark Administration Limited (IMBA UK) has conducted a consultation with market participants on potential changes to the LGIM Matching Plus and Core indices.

IMBA is updating the leverage check method within the methodology of the LGIM Matching Plus and Core indices including the upper, lower, and optimal hedging multiples used. The updated method aims to increase the headroom on the funds capturing the impact of the initial margin held within the Matching Plus and Core funds more accurately. The changes are described in the following tables.

Matching Plus Indices:

Change – Matching Plus Leverage Check

Updated Methodology

Section 4.6.1 Hedging Multiples

Index Family categorisation used in calculating Hedging Multiples:

Index Family	Formula Categorisation	Effective Interest Rate Curve
Leveraged Gilt, Fixed Swap	Type A	OIS Curve
Leveraged Linker, Real Swap	Type A	OIS Curve MINUS Inflation Swap Curve (real swap curve)
Inflation Swap	Type B	Inflation Swap Curve

Parameters used in calculating Hedging Multiples:

Parameter	Value
d	PV01/10K of the index at Index Business day t
r	Interest rate from Effective Interest Rate Curve calculated at Index Business day t, effective at d at Index Business day t
ca	collateral adjustment, set to 1.1% for Fixed Swap, Real Swap 0.6% for Inflation Swap 1.1% - Leveraged Gilt, Leveraged Linker
ohr	optimal headroom rate, set to 3.50%
llr	lower limit rate, set to 0.50%
l	lagged IM buffer, set to 1%
f	% of fund risk from swaps set to 100% for Fixed Swap, Inflation, Real Swap 0.00% for Leveraged Gilt, Leveraged Linker

Section 4.6.2 Hedging Multiple Upper Bound

The Hedging Multiple Upper Bounds are defined as below for various index families.

Categorisation	Upper Bound
Type A	$MAX(1.2, MIN(\left[1+(1+r)^{d}.\left(ca.f.\left(\frac{1}{(1+r+ohr-ulr-l)^{d}}-\frac{1}{(1+r+ohr-ulr-l+0.0001)^{d}}\right)-\frac{1}{(1+r+ohr-ulr)^{d}}\right)\right]^{-1}, 7.7))$
Type B	$MAX(1.2, MIN(\left[1+\frac{ca.f.((1+i-ohr+ulr+l)^{d}-(1+i-ohr+ulr+l-0.0001)^{d})-(1+i-ohr+ulr)^{d}}{(1+i)^{d}}\right]^{-1}, 7.7))$

Change – Matching Plus Leverage Check

Updated Methodology (continued)

Section 4.6.3 Hedging Multiple Lower Bound

The Hedging Multiple Lower Bounds are defined as below for various index families.

Categorisation	Lower Bound
Type A	$MAX(1.0,MIN(\left[1+(1+r)^{d}.\left(ca.f.\left(\frac{1}{(1+r+ohr+lhr-l)^{d}}-\frac{1}{(1+r+ohr+lhr-l+0.0001)^{d}}\right)-\frac{1}{(1+r+ohr+lhr)^{d}}\right)\right]^{-1},5.6))$
Type B	$MAX(1.0,MIN(\left[1+\frac{ca.f.((1+i-ohr-lhr+l)^{d}-(1+i-ohr-lhr+l-0.0001)^{d})-(1+i-ohr-lhr)^{d}}{(1+i)^{d}}\right]^{-1},5.6))$

Section 4.6.4 Optimal Hedging Multiple

The Optimal Hedging Multiples are defined as below for various index families.

Categorisation	Optimal Bound
Type A	$MAX(1.1,MIN(\left[1+(1+r)^{d}.\left(ca.f.\left(\frac{1}{(1+r+ohr-l)^{d}}-\frac{1}{(1+r+ohr-l+0.0001)^{d}}\right)-\frac{1}{(1+r+ohr)^{d}}\right)\right]^{-1},6.5))$
Type B	$MAX(1.1,MIN(\left[1+\frac{ca.f.((1+i-ohr+l)^{d}-(1+i-ohr+l-0.0001)^{d})-(1+i-ohr)^{d}}{(1+i)^{d}}\right]^{-1},6.5))$

Previous Methodology

Section 4.6.1 Hedging Multiples

Index Family categorisation used in calculating Hedging Multiples:

Index Family	Formula Categorisation	Effective Interest Rate Curve
Leveraged Gilt, Leveraged Gilt+, Fixed Swap	Type A	OIS Curve
Leveraged Linker, Leveraged Linker+, Real Swap	Type A	OIS Curve MINUS Inflation Swap Curve (real swap curve)
Inflation Swap	Type B	Inflation Swap Curve

Parameters used in calculating Hedging Multiples:

Parameter	Value
d	Modified Duration of the underlying asset at Index Business day t
r	Interest rate from Effective Interest Rate Curve calculated at Index Business day t, effective at d at Index Business day t
ohr	optimal headroom rate, set to 3.00%
llr	lower limit rate, set to 0.50%
ulr	Upper limit rate, set to 0.50%

Section 4.6.2 Hedging Multiple Upper Bound

The Hedging Multiple Upper Bounds are defined as below for various index families.

Categorisation	Upper Bound
Type A	$MAX(1.2,MIN(\left[1-\left(\frac{1+r}{1+r+ohr-ulr}\right)^{d}\right]^{-1},7.7))$
Type B	$MAX(1.2,MIN(\left[1-\left(\frac{1+r-ohr+ulr}{1+r}\right)^{d}\right]^{-1},7.7))$

Section 4.6.3 Hedging Multiple Lower Bound

The Hedging Multiple Lower Bounds are defined as below for various index families.

Categorisation	Lower Bound
Type A	$MAX(1.0,MIN(\left[1-\left(\frac{1+r}{1+r+ohr+llr}\right)^{d}\right]^{-1},5.6))$
Type B	$MAX(1.0,MIN(\left[1-\left(\frac{1+r-ohr-llr}{1+r}\right)^{d}\right]^{-1},5.6))$

Matching Core Indices:

Change – Matching Core Leverage Check

Updated Methodology

Hedging Multiples

Optimal, Upper, and Lower Hedging Multiple formulas:

Term	Formula
Optimal HM	$MAX(1.1,MIN(\left[1+(1+r)^d.\left(ca.f.\left(\frac{1}{(1+r+ohr-l)^d}-\frac{1}{(1+r+ohr-l+0.0001)^d}\right)-\frac{1}{(1+r+ohr)^d}\right)\right]^{-1},6.5))$
Upper HM	$MAX(1.2,MIN(\left[1+(1+r)^d.\left(ca.f.\left(\frac{1}{(1+r+ohr-ulr-l)^d}-\frac{1}{(1+r+ohr-ulr-l+0.0001)^d}\right)-\frac{1}{(1+r+ohr-ulr)^d}\right)\right]^{-1},7.7))$
Lower HM	$MAX(1.0,MIN(\left[1+(1+r)^d.\left(ca.f.\left(\frac{1}{(1+r+ohr+lhr-l)^d}-\frac{1}{(1+r+ohr+lhr-l+0.0001)^d}\right)-\frac{1}{(1+r+ohr+lhr)^d}\right)\right]^{-1},5.6))$

Parameters used in calculating Hedging Multiples:

Parameter	Value
d	PV01/10K of the index at Index Business day t
r	Interest rate from Effective Interest Rate Curve calculated at Index Business day t, effective at d at Index Business day t
ca	collateral adjustment, set to 1.10%
ohr	optimal headroom rate, set to 3.50%
llr	lower limit rate, set to 0.50%
ulr	Upper limit rate, set to 0.50%
f	% of fund risk from swaps set to 25% for Matching Core Fixed Short 20% for Matching Core Real Short 10% for Matching Core Real Long 0% for Matching Core Fixed Long

Previous Methodology

Index Leverage Rebalance Process – Hedging Multiples Calculation

Term	Formula
Optimal HM	$MAX(1.1,MIN(\left[1-\left(\frac{1+r}{1+r+ohr+ca}\right)^d\right]^{-1},6.5))$
Upper HM	$MAX(1.2,MIN(\left[1-\left(\frac{1+r}{1+r+ohr+ca-ulr}\right)^d\right]^{-1},7.7))$
Lower HM	$MAX(1.0,MIN(\left[1-\left(\frac{1+r}{1+r+ohr+ca+llr}\right)^d\right]^{-1},5.6))$

Parameters used in calculating Hedging Multiples:

Parameter	Value
d	Modified Duration of the underlying asset at Index Business day t
r	Interest rate from Effective Interest Rate Curve calculated at Index Business day t, effective at d at Index Business day t
ca	collateral adjustment, set to 0.0%
ohr	optimal headroom rate, set to 3.00%
llr	lower limit rate, set to 0.50%
ulr	Upper limit rate, set to 0.50%

IMBA UK is also updating the methodology of the LGIM Matching Core regarding the choice between gilts and swaps. The updated methodology aims to allow for a more accurate cost evaluation of holding interest rate swaps and inflation swaps.

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Matching Core Indices:

Change – Matching Core Gilts vs. Swaps	
Updated Methodology	Section 4.1.5 For each tenor point, the choice between Nominal/Index-linked gilt or Interest Rate/Inflation Swap is made by comparing the **Gilt_adjusted_Z-Spread** of the Nominal/Index-linked gilt to the **Equivalent_Swap_Z-Spread**. For each tenor point, either a Nominal/Index-linked gilt or a Swap, but not both, is selected. The selection criterion is as follows: a) Fixed Indices: 1. if (**Gilt_adjusted_Z-Spread > Equivalent_Swap_Z-Spread_Fixed**), then choose Gilt; 2. if (**Gilt_adjusted_Z-Spread <= Equivalent_Swap_Z-Spread_Fixed**), then choose swap. b) Real Indices: 1. if (**Gilt_adjusted_Z-Spread > Equivalent_Swap_Z-Spread_Real**), then choose gilt; 2. if (**Gilt_adjusted_Z-Spread <= Equivalent_Swap_Z-Spread_Real**), then choose swap.
	Section 4.1.6 For each tenor point, compare the selections in step 5 to the corresponding instrument of the tenor in the **Current Portfolio** to determine the **Optimal Selection**, only where the asset determined by step 5 is not already present in the Current Portfolio: a. Fixed Indices: 1. If (**Gilt_adjusted_Z-Spread - Equivalent_Swap_Z-Spread_Fixed**) > 2.5bps, then switch from swaps to gilts; 2. if (**Gilt_adjusted_Z-Spread - Equivalent_Swap_Z-Spread_Fixed**) < -2.5bps, then switch from gilts to swaps. b. Real Indices: 1. If (**Gilt_adjusted_Z-Spread - Equivalent_Swap_Z-Spread_Real**) > 3bps, then switch from swaps to gilts; 2. if (**Gilt_adjusted_Z-Spread - Equivalent_Swap_Z-Spread_Real**) < -3bps, then switch from gilts to swaps.
Previous Methodology	Section 4.1.5 For each tenor point, the choice between Nominal/Index-linked gilt or Interest Rate/Inflation Swap is made by comparing the **Z-Spread** of the Nominal/Index-linked gilt to its funding cost. For each tenor point, either a Nominal/Index-linked gilt or a Swap, but not both, is selected. The selection criterion is as follows: a. if (**Z-Spread > Long Term Repo Funding Spread**), then choose gilt; b. if (**Z-Spread <= Long Term Repo Funding Spread**), then choose swap.
	Section 4.1.6 For each tenor point, compare the selections in step 5 to the corresponding instrument of the tenor in the **Current Portfolio** to determine the **Optimal Selection**, only where the asset determined by step 5 is not already present in the Current Portfolio: a. Fixed Indices: 1. If (**Z-Spread - Long Term Repo Funding Spread**) > 2.5bps, then switch from swaps to gilts; 2. if (**Z-Spread - Long Term Repo Funding Spread**) < -2.5bps, then switch from gilts to swaps. b. Real Indices: 1. If (**Z-Spread - Long Term Repo Funding Spread**) > 3bps, then switch from swaps to gilts; 2. if (**Z-Spread - Long Term Repo Funding Spread**) < -3bps, then switch from gilts to swaps.

The tables below list the impacted indices:

LGIM Matching Core Indices:

Index Name	Ticker	Formula Categorisation
LGIM LONGFIXED Index	LGIM_LONGFIXED_Portfolio	Type A
LGIM LONGREAL Index	LGIM_LONGREAL_Portfolio	Type A
LGIM SHORTFIXED Index	LGIM_SHORTFIXED_Portfolio	Type A
LGIM SHORTREAL Index	LGIM_SHORTREAL_Portfolio	Type A

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LGIM Matching Plus Indices:

Index Name	Ticker	Formula Categorisation
2024 Leveraged Linker Index	LGIM2024LL	Type A
2025 Fixed Swap Index	LGIM2025FS	Type A
2025 Inflation Swap Index	LGIM2025IS	Type A
2025 Real Swap Index	LGIM2025RS	Type A
2030 Fixed Swap Index	LGIM2030FS	Type A
2030 Inflation Swap Index	LGIM2030IS	Type B
2030 Leveraged Linker Index	LGIM2030LL	Type A
2030 Real Swap Index	LGIM2030RS	Type A
2034 Leveraged Linker Index	LGIM2034LL	Type A
2035 Fixed Swap Index	LGIM2035FS	Type A
2035 Inflation Swap Index	LGIM2035IS	Type B
2035 Real Swap Index	LGIM2035RS	Type A
2037 Leveraged Linker Index	LGIM2037LL	Type A
2038 Leveraged Gilt Index	LGIM2038LG	Type A
2040 Fixed Swap Index	LGIM2040FS	Type A
2040 Inflation Swap Index	LGIM2040IS	Type B
2040 Leveraged Linker Index	LGIM2040LL	Type A
2040 Real Swap Index	LGIM2040RS	Type A
2042 Leveraged Gilt Index	LGIM2042LG	Type A
2042 Leveraged Linker Index	LGIM2042LL	Type A
2045 Fixed Swap Index	LGIM2045FS	Type A
2045 Inflation Swap Index	LGIM2045IS	Type B
2045 Leveraged Gilt Index	LGIM2045LG	Type A
2045 Real Swap Index	LGIM2045RS	Type A
2047 Leveraged Linker Index	LGIM2047LL	Type A
2049 Leveraged Gilt Index	LGIM2049LG	Type A
2050 Fixed Swap Index	LGIM2050FS	Type A
2050 Inflation Swap Index	LGIM2050IS	Type B
2050 Leveraged Linker Index	LGIM2050LL	Type A
2050 Real Swap Index	LGIM2050RS	Type A
2055 Fixed Swap Index	LGIM2055FS	Type A
2055 Leveraged Gilt Index	LGIM2055LG	Type A
2055 Leveraged Linker Index	LGIM2055LL	Type A
2055 Real Swap Index	LGIM2055RS	Type A
2060 Fixed Swap Index	LGIM2060FS	Type A
2060 Inflation Swap Index	LGIM2060IS	Type B
2060 Leveraged Gilt Index	LGIM2060LG	Type A
2060 Real Swap Index	LGIM2060RS	Type A
2062 Leveraged Linker Index	LGIM2062LL	Type A
2068 Leveraged Gilt Index	LGIM2068LG	Type A
2068 Leveraged Linker Index	LGIM2068LL	Type A

IMPLEMENTATION TIMING

IMBA UK will implement the previously described methodology changes in conjunction with the August 2023 month-end rebalancing, which takes effect prior to the market open on **Friday, September 1, 2023**. The changes will first be visible to clients in pro-forma files beginning on **Thursday, August 24, 2023.**

ABOUT S&P DOW JONES INDICES

S&P Dow Jones Indices is the largest global resource for essential index-based concepts, data and

research, and home to iconic financial market indicators, such as the S&P 500 ® and the Dow Jones Industrial Average®. More assets are invested in products based on our indices than products based on indices from any other provider in the world. Since Charles Dow invented the first index in 1884, S&P DJI has been innovating and developing indices across the spectrum of asset classes helping to define the way investors measure and trade the markets.

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