MSCI FIXED INCOME INDEX CALCULATION METHODOLOGY

September 2024

Contents

1 Introduction

This methodology book describes MSCI's general Index calculation methodology for the MSCI Fixed Income Indexes.

These policies and guidelines affect all securities across the MSCI Fixed Income Indexes and products. Unless otherwise stated the policies and guidelines apply therefore to all securities in the MSCI Fixed Income universe.

Please note that the index construction methodology, input data specification and other guiding principles for MSCI Fixed Income Indexes can be found at www.msci.com.

2   MSCI Fixed Income Indexes

MSCI Fixed Income Indexes measure the performance of a set of fixed income securities over time. They are calculated using the Laspeyres' concept of a weighted arithmetic average together with the concept of chain-linking.

MSCI calculates its fixed income indexes in "local" currency as well as in USD. Index levels are also available in several other currencies such as EUR, GBP etc. While the local currency series of indexes cannot be replicated in the real world, it represents the theoretical performance of an index without any impact from foreign exchange fluctuations i.e., a continuously hedged portfolio.

MSCI Fixed Income Indexes are calculated 5 days a week, from Monday to Friday. However, the index levels may not change on days that are noted as holidays as per the MSCI Fixed Income Data methodology[1]

MSCI also reviews its fixed income indexes on an ongoing basis to account for the following:

- If an index constituent is no longer priced (intra-rebalancing) by the pricing source or the price is unavailable, the last available price is used.

- MSCI, at times, may use a price different from the last available price provided, including 0.00 in the case of as default or missed interest payment. MSCI will employ procedures as noted in the MSCI Fixed Income Data Methodology document relevant to pricing.

Please see Appendix 5.4 for detailed policy around handling of missing data and use of alternate data sources.

Announcements with relevant information pertaining to MSCI Fixed Income Indexes will be made at 6 p.m. EST and calculated Index levels will be distributed at end of each business day at 7 p.m. EST.

---

[1] MSCI Fixed Income Data Methodology on https://www.msci.com/index-methodology

3 MSCI Fixed Income Index Return Calculation Methodology

The total return index measures the change in market value of a Fixed Income portfolio over a given period relative to a starting base date value. This includes, return from fixed income security price[2] movements, exchange rate fluctuations, coupon income earned as well as P&L generated from redemption of principal.

Market value of a Fixed Income Security

Market Value of a security is defined as the product of its notional amount outstanding and dirty price. Dirty price of the security is calculated by adding its clean bid price and accrued interest[3]. Therefore, market value of the security accounts for daily changes in price and interest accrued from the fixed income security.

$$DP_{t,j} = P_{t,j} + A_{t,j} --- (1)$$

$$MV_{t,j} = \frac{DP_{t,j} * N_{s,j} * K_{t,j}}{100} --- (2)$$

Where:

$P_{t,j}$ − Clean Bid Price of the security j at the close of day t

$A_{t,j}$ - Accrued Interest of the security j at the close of day t [4]

$DP_{t,j}$ - Dirty Price of the security j at the close of day t

$N_{s,j}$ - Amount Outstanding of the security j at the close of the previous index rebalancing day s

$MV_{t,j}$ − Market Value of the security j at the close of day t

$K_{t,j}$ − Security Inclusion Factor of the security j at the close of day t

---

[2] In the document term price refers to price of the fixed income security, unless explicitly stated otherwise. Please refer to MSCI Fixed Income Data Methodology for detailed specification on input data points.

[3] Please refer to MSCI Fixed Income Glossary for definition of the technical terms used in the document.

[4] Please refer to Appendix – Section 5.3 of the document for details in adjustment to accrued interest in the ex-coupon period.

Market value and Cash calculations

In the MSCI Fixed Income Indexes, constituent securities accrue cash balance from regular interest payments and principal redemptions in between two index reviews. The accrued cash is reinvested across the index on the Rebalancing date.

Therefore, we define market value with cash as follows.

$$MVC_{t,j} = MV_{t,j} + CCB_{t,j} --- (3)$$

Where:

$MVC_{t,j}$ – Market Value with Cash of the security j at the close of day t

$CCB_{t,j}$ - Total cumulative cash balance of the security j at the close of day t

Total cumulative cash balance of the security is a summation of cash flow accrued from interest payments and principal redemptions between last Rebalancing date and the return calculation date (t).

$$CCB_{t,j} = CCB_{t-1,j} + Cash\ from\ Coupon_{t,j} --- (4)$$

Where:

$CCB_{t,j}$ – Total cumulative cash balance of the security j accrued since last rebalancing at the close of t

In case of a redemption or coupon payment event for a bond, cash from coupon and cash from redemption are calculated using the formulae defined below.

$$Cash\ from\ Coupon_{t,j} = \frac{CouponPaid_{j,t}}{100} * N_{s,j} * K_{t,j}{}^5 --- (5)$$

Where:

$CouponPaid_j$ – Coupon payment of the bond j at the close of day t

---

[5] Please refer to Appendix – Section 5.3 for details on calculation of cash from coupon for bonds with a provision for ex-coupon period.

Security Level Total Return Calculation

MSCI calculates daily security level total return to account for changes in-

- Market Price

- Accrued Interest

- Cash generated from interest payments.

- Cash generated from redemption or prepayment of the outstanding principal.

- Exchange Rate

- Corporate Events

Daily security level total return between t-1 and t is calculated using the following formula.

$$SLTR^{USD}_{t-1,t,j} = \left(\frac{Adjusted\ MVC_{t,j}}{Initial\ MVC_{t,j}} - 1 \right) --- (6)$$

$$Initial\ MVC_{t,j} = MVC_{t-1,j} * FX_{t-1,j} --- (7)$$

$$Adjusted\ MVC_{t,j} = MVC_{t,j} * FX_{t,j} --- (8)$$

Where:

$FX_{t,j}$ − Foreign exchange rate applicable for security j at the close of day t

$Initial\ MVC_{t,j}$ − Market value inclusive of cash with which security j is included in the opening index portfolio for return calculation on day t

$Adjusted\ MVC_{t,j}$- Market value inclusive of cash for security j adjusted for changes in price, interest and / or principal on day t

Note that $Adjusted\ MVC_{t,j}$ calculation shown above pertains to return calculation in base currency which is USD. In case of return calculation in "local" currency, the following formula is employed.

$$SLTR^{local}_{t-1,t,j} = \left(\frac{MVC_{t,j}}{MVC_{t-1,j}} - 1 \right) --- (9)$$

MSCI decomposes security level total return calculation into the following components for attribution purposes.

Security Level Price Return

Price return of the security in local currency is calculated using the following formula–

$$SLPR_{t-1,t,j}^{local} = \frac{P_{t,j}}{P_{t-1,j}} - 1 --- (10)$$

Where:

$P_{t,j}$ – Clean Bid Price of the security j at the close of day t

Security Level Income Return

Income Return of the security in local currency represents part of total return that is earned via regular interest payments as well as interest accrued over time in between interest payment dates.

$$SLIR_{t-1,t,j}^{local} = \frac{1 + SLTR_{t-1,t,j}^{local}}{1 + SLPR_{t-1,t,j}^{local}} - 1 --- (11)$$

Currency

Fixed Income securities denominated in foreign currency will be impacted by the movement of exchange rate between foreign and local currency. MSCI captures return from exchange rate movements using the following formula.

$$FXR_{t-1,t,j} = \frac{FX_{t,j}}{FX_{t-1,j}} - 1 --- (12)$$

Accounting for FX movements, local total and price returns can be converted into total and price returns of various currencies (e.g., USD, EUR, GBP etc.) using the following formulae –

$$SLTR_{t-1,t,j}^{USD} = \left(1 + SLTR_{t-1,t,j}^{local}\right) * \left(1 + FXR_{t-1,t,j}\right) - 1 --- (13)$$

$$SLPR_{t-1,t,j}^{USD} = \left(1 + SLPR_{t-1,t,j}^{local}\right) * \left(1 + FXR_{t-1,t,j}\right) - 1 --- (14)$$

Index Level Total Return Calculation

Index level total return can be calculated using the below formula -

$$Index\ TR^{USD}_{t-1,t} = \sum_{j=1}^{n} SLTR^{USD}_{t-1,t,j} * opening\ wt^{MVC\ 6}_{t,j} --- (15)$$

$$Index\ TR^{local}_{t-1,t} = \sum_{j=1}^{n} SLTR^{local}_{t-1,t,j} * opening\ wt^{MVC}_{t,j} --- (16)$$

Where:

opening $\mathrm{wt}^{MVC}_{t,j}$ − Opening weight of security j in the index including market value and cash on day t

$$opening\ \mathrm{wt}^{MVC}_{t,j} = \frac{Initial\ MVC_{t,j}}{\sum_{j=1}^{n} Initial\ MVC_{t,j}}$$

Index Level Total Return Attribution

Security level attribution outlined earlier in Section 2.3 is extended to the index level by aggregating security level price and income returns using the weighted average method. Daily Index level total return is attributed into the following two parts −

- Daily Index Level Price Return (Index PR)

- Daily Index Level Income Return (Index IR)

They are calculated as shown in the formulae below −

$$Index\ PR^{USD}_{t-1,t} = \sum_{j=1}^{n} SLPR^{USD}_{t-1,t,j} * opening\ wt^{MVC}_{t,j} --- (17)$$

$$Index\ PR^{local}_{t-1,t} = \sum_{j=1}^{n} SLPR^{local}_{t-1,t,j} * opening\ wt^{MVC}_{t,j} --- (18)$$

$$Index\ IR^{USD}_{t-1,t} = \frac{1 + Index\ TR^{USD}_{t-1,t}}{1 + Index\ PR^{USD}_{t-1,t}} - 1 --- (19)$$

$$Index\ IR^{local}_{t-1,t} = \frac{1 + Index\ TR^{local}_{t-1,t}}{1 + Index\ PR^{local}_{t-1,t}} - 1 --- (20)$$

---

[6] Note that on the effective date of index rebalancing, certain variants of the index total return are adjusted to account for transaction costs. Details on transaction cost adjustment to the total return variant is outlined in the Appendix − Section 5.1.

Calculation of Index Levels

Generally, MSCI will calculate and publish three variants of the index levels. They will start with the base value (example: 1000) and will be calculated by chain-linking of appropriate daily index returns. Formulae shown below are example of chain-linking daily index returns in USD between period t-s and t to calculate index levels in USD. A similar approach is used on daily index returns in local currency to calculate index levels in local currency.

$$TRI_t^{USD} = TRI_{t-s}^{USD} * \left[\prod_{t-s<u\leq t}\left[1 + Index\ TR_{u-1,u}^{USD}\right]\right] --- (21)$$

$$PRI_t^{USD} = PRI_{t-s}^{USD} * \left[\prod_{t-s<u\leq t}\left[1 + Index\ PR_{u-1,u}^{USD}\right]\right] --- (22)$$

$$IRI_t^{USD} = IRI_{t-s}^{USD} * \left[\prod_{t-s<u\leq t}\left[1 + Index\ IR_{u-1,u}^{USD}\right]\right] --- (23)$$

Where:

TRI_t^{USD} – Total Return Index Level in USD at the close of day t

PRI_t^{USD} – Price Return Index Level in USD at the close of day t

IRI_t^{USD} – Income Return Index Level in USD at the close of day t

4   MSCI Index Level Datapoints

MSCI calculates aggregated index level data points for MSCI Fixed Income Indexes using weighted average methodology, as shown in the formulae enlisted below.

Index Average Clean Price

$$AP_t = \sum_{j=1}^{n} P_{t,j} * w_{t,j}^{N} --- (24)$$

Index Average Dirty Price

$$ADP_t = \sum_{j=1}^{n} DP_{t,j} * w_{t,j}^{N} --- (25)$$

Index Average Coupon

$$AC_t = \sum_{j=1}^{n} Coupon_j * w_{t,j}^{N} --- (26)$$

Index Average Notional

$$AN_t = \frac{\sum_{j=1}^{n} N_{t,j} * K_{t,j}}{n} --- (27)$$

Index Average Time to Maturity

$$TM_t = \sum_{j=1}^{n} TM_{t,j} * w_{t,j}^{N} --- (28)$$

$$Where, TM_{t,j} = \frac{Number\ of\ days\ between\ Maturity\ Date\ and\ t}{365}$$

Index Average Modified Duration

$$AD_t^{MOD} = \sum_{j=1}^{n} D_{t,j}^{MOD} * w_{t,j}^{MVC} --- (29)$$

Index Average Effective duration

$$AD_t^{EFF} = \sum_{j=1}^{n} D_{t,j}^{EFF} * w_{t,j}^{MVC} \; - - - (30)$$

Index Average Convexity

$$AX_t = \sum_{j=1}^{n} X_t * w_{t,j}^{MVC} \; - - - (31)$$

Index Average Effective Convexity

$$AEX_t = \sum_{j=1}^{n} EX_t * w_{t,j}^{MVC} \; - - - (32)$$

Index Average Yield to Maturity

$$AY_t = \sum_{j=1}^{n} Y_{t,j} * w_{t,j}^{MVC} \; - - - (33)$$

Index Average Yield to Worst

$$AYW_t = \sum_{j=1}^{n} YW_{t,j} * w_{t,j}^{MVC} \; - - - (34)$$

Index Average OAS

$$OAS_t = \sum_{j=1}^{n} OAS_{t,j} * w_{t,j}^{DMV} \; - - - (35)$$

Index Average Credit Rating

$$ART_t = \sum_{j=1}^{n} RT_{t,j} * w_{t,j}^{MVC} \; - - - (36)$$

MSCI converts credit rating in letter from Moody's and S&P by assigning each security with a credit score using the table presented in the Appendix. Using the numerical scores, final credit rating score of the security is calculated as shown below.

$$Where, RT_{t,j} = \max \left(RT_{t,j}^{Moody's}, RT_{t,j}^{S\&P} \right)$$

Index level aggregated numerical credit rating score is rounded to the nearest integer and converted back to a MSCI credit rating as presented in the table in the Appendix.

Weight calculation formulae, employed in evaluation of these index level metrics are enlisted below -

    Market Value Weight with Cash

$$w_{t,j}^{MVC} = \frac{MV_{t,j} * FX_{t,j}}{\sum_{j=1}^{n}(MV_{t,j} + CCB_{t,j}) * FX_{t,j}}$$

    Nominal Weight

$$w_{t,j}^{N} = \frac{N_{t,j} * K_{t,j}}{\sum_{j=1}^{n} N_{t,j} * K_{t,j}}$$

    Effective Duration Adjusted Weight

$$w_{t,j}^{DMV} = \frac{MV_{t,j} * FX_{t,j} * D_{t,j}^{EFF}}{\sum_{j=1}^{n} D_{t,j}^{EFF} * (MV_{t,j} + CCB_{t,j}) * FX_{t,j}}$$

5 Appendix

Transaction cost adjustment on Index Returns

On the effective date of index rebalancing (t = s), certain variants of the total index return are adjusted to account for transaction costs. The return adjustment for transaction costs reflects the fact that in replicating portfolio rebalancing, new index additions and securities where weight has increased are traded at the ask price, whereas index deletions and securities where weight has decreased are traded at the bid price. The formulae mentioned below calculates the impact of the bid-ask spread on the index total return.

$$Cost_{t=s} = \sum_{\substack{j= \text{all bonds with increase in} \\ wt\ including \\ new\ index\ additions}} \frac{P_{ask,t-1,j} - P_{bid,t-1,j}}{P_{bid,t-1,j} + A_{t-1,j}} * (opening\ wt_{j,t}^{mv} - closing\ wt_{j,t-1}^{mv}) --- (37)$$

Where:

$P_{t-1,j}^{ask}$ – Closing ask price of security j on one business day before the effective day of rebalancing

$P_{t-1,j}^{bid}$ – Closing bid price of security j on one business day before the effective day of rebalancing

$$opening\ wt_{j,t}^{mv} = \frac{Initial\ MV_{t,j}}{\sum_{j=1}^{n} Initial\ MV_{t,j}}$$

$$closing\ wt_{j,t-1}^{mv} = \frac{Adjusted\ MV_{t-1,j}}{\sum_{j=1}^{n} Adjusted\ MV_{t-1,j}}$$

$$Initial\ MV_{t,j} = \frac{DP_{t-1,j} * N_{t-1,j} * FX_{t-1,j} * K_{t,j}}{100}$$

$$Adjusted\ MV_{t,j} = \frac{DP_{t,j} * N_{t,j} * FX_{t,j} * K_{t,j}}{100}$$

Therefore, index total return (Index TR) on the effective date of rebalancing is adjusted as follows.

$$Index\ TR_{t=s}^{TC} = Index\ TR_{t=s} - Cost_{t=s}$$

Where:

$Index\ TR_s^{TC}$ - Index total return adjusted for transaction cost on the effective date of rebalancing.

Credit Rating Scale

Moody's	S&P	Score	MSCI
Aaa	AAA	0	AAA
Aa1	AA+	1	AA+
Aa2	AA	2	AA
Aa3	AA-	3	AA-
A1	A+	4	A+
A2	A	5	A
A3	A-	6	A-
Baa1	BBB+	7	BBB+
Baa2	BBB	8	BBB
Baa3	BBB-	9	BBB-
Ba1	BB+	10	BB+
Ba2	BB	11	BB
Ba3	BB-	12	BB-
B1	B+	13	B+
B2	B	14	B
B3	B-	15	B-
Caa1	CCC+	16	CCC+
Caa2	CCC	17	CCC
Caa3	CCC-	18	CCC-
Ca1	CC+	19	CC+
Ca2	CC	20	CC
Ca3	CC-	21	CC-
C1	C+	22	C+
C2	C	23	C
C3	C-	24	C-
D[7]	D	25	D

---

[7] Average ratings methodology applies to defaulted assets too, and default events are reported individually in corporate action.

Treatment for Negative Accrued Interest

Accrued Interest is almost always expected to be positive, but bonds with a provision for ex-coupon period can have negative accrued interest.

If a bond is purchased in the ex-coupon period, the buyer is not entitled to the upcoming coupon payment. The buyer of such a bond thus incurs a loss of interest income for remainder of the ex-coupon period. This aspect is reflected accurately by negative accrued interest during that period.

Total return calculation framework for the MSCI Fixed Income Indexes accounts for this by adjusting security calculation in the ex-coupon period based on when it was added to the index.

If a security was added to the index in the ex-coupon period, then it does not receive coupon payment on the next coupon date (i.e., Cash from Coupon = 0). On the other hand, if a security is already a part of the index portfolio when it enters the ex-coupon period, then accrued interest for the security is adjusted for calculation purposes as shown below.

$$A_{t,j}^{ex-coupon} = A_{t,j} + \frac{Coupon_j/100}{Coupon\ Frequency_j}$$

Treatment of Missing Data and Usage of Alternate Sources

For index maintenance purposes, MSCI often uses data received from multiple sources. Such data may need to be taken on specific and defined dates ('Data Date') as is relevant to a specific index methodology. In certain instances, due to an extraordinary event or exceptional technical issue, data needed as of a Data Date may not be available as expected. In such cases, unless otherwise specified in the relevant index methodology, MSCI will use the most recent data available prior to the Data Date. MSCI will release a public announcement to inform clients about the occurrence of any event where this methodological directive is enacted.

Additionally, MSCI independently monitors the quality of data from its data sources on an ongoing basis. MSCI may under exceptional circumstances elect to use data from alternative sources if MSCI determines that the primary source data is not reflective of market conditions. In such circumstances, and if deemed material, MSCI will release a public announcement to inform clients about the change. All such determinations are made by the MSCI Fixed Income Index Committee (FIIC). If appropriate, MSCI may conduct a consultation with the investment community to gather feedback on the most relevant alternate source.

Glossary of Terms

Glossary of Terms in the order of their appearance

P − Clean Bid Price of a security

A - Accrued Interest of a security

DP - Dirty Price of a security

N - Amount Outstanding of a security

K − Security Inclusion Factor of a security

MV − Market Value of a security

MVC − Market Value with Cash of a security

CCB - Total cumulative cash balance of a security

CCP - Cumulative cash from coupon payments of a security accrued since last rebalancing

$CouponPaid$ − Actual coupon paid for a security on the coupon payment date

FX − Foreign exchange rate

$Initial\ MVC$ − Market value inclusive of cash a security in the opening index portfolio

$Adjusted\ MVC$ - Market value inclusive of cash for a security adjusted for changes in price, interest and / or principal

$SLTR$ − Security level Total Return

$SLPR$ − Security level Price Return

$SLIR$ − Security level Income Return

FXR − FX Return

$Index\ TR$ − Index Total Return

$Index\ PR$ − Index Price Return

$Index\ IR$ − *Index Income Return*

TRI − Total Return Index Level

PRI − Price Return Index Level

IRI − Income Return Index Level

The following sections have been modified since August 2020:

Section MSCI Fixed Income Indexes: Referenced the MSCI Fixed Income Data methodology for details on holiday treatment.

The following sections have been modified since April 2022:

Section 1.3.1 – Security Level Price Return

Section 1.3.2 – Security Level Income Return

Section 1.4.1 – Index Level Total Return Attribution

Added Section 4.5 – Glossary of Terms

The following sections have been modified since December 2023:

Section 6.2 – Credit rating scale expanded to include all credit ratings till Default.

The following sections have been modified since September 2024:

Section 3 – Modified to reflect fixing of amount outstanding as per last rebalance date of the index.
Section 4 – Removed

Contact us

msci.com/contact-us

AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

* toll-free

About MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 50 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

To learn more, please visit www.msci.com.

Notice and disclaimer

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI. All rights in the Information are reserved by MSCI and/or its Information Providers.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. The calculation of indexes and index returns may deviate from the stated methodology. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked

Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such, provided that applicable products or services from MSCI ESG Research may constitute investment advice. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body. MSCI ESG and climate ratings, research and data are produced by MSCI ESG Research LLC, a subsidiary of MSCI Inc. MSCI ESG Indexes, Analytics and Real Estate are products of MSCI Inc. that utilize information from MSCI ESG Research LLC. MSCI Indexes are administered by MSCI Limited (UK).

Please note that the issuers mentioned in MSCI ESG Research materials sometimes have commercial relationships with MSCI ESG Research and/or MSCI Inc. (collectively, "MSCI") and that these relationships create potential conflicts of interest. In some cases, the issuers or their affiliates purchase research or other products or services from one or more MSCI affiliates. In other cases, MSCI ESG Research rates financial products such as mutual funds or ETFs that are managed by MSCI's clients or their affiliates, or are based on MSCI Inc. Indexes. In addition, constituents in MSCI Inc. equity indexes include companies that subscribe to MSCI products or services. In some cases, MSCI clients pay fees based in whole or part on the assets they manage. MSCI ESG Research has taken a number of steps to mitigate potential conflicts of interest and safeguard the integrity and independence of its research and ratings. More information about these conflict mitigation measures is available in our Form ADV, available at https://adviserinfo.sec.gov/firm/summary/169222.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and S&P Global Market Intelligence. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and S&P Global Market Intelligence.

MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data.

Privacy notice: For information about how MSCI collects and uses personal data, please refer to our Privacy Notice at https://www.msci.com/privacy-pledge.