MSCI Property Fund Indexes Methodology

Index Construction Objectives, Guiding Principles and Methodology for the MSCI Property Fund Indexes.

February 2024

1 Introduction

The objective of MSCI Property Fund Indexes is to measure the performance of unlisted pooled structures, including the effects of cash holdings, leverage and fund operating costs, fees as well as the returns to the underlying real estate assets.

To achieve this objective, indexes are constructed top-down from using the financial records of real estate investment funds. This contrasts with, and complements, the MSCI Property Indexes, which are constructed bottom-up from records of individual property assets.

The fund-level data used in constructing the MSCI Property Fund Indexes are generally provided by or on behalf of the managers of funds included in each of the index universes. When available and appropriate, MSCI may supplement this data with information from public sources.

To effectively represent the performance of a market, market segment or strategy, MSCI Property Fund Indexes use Net Asset Values (NAVs). The asset values used by the fund to calculate NAV are primarily property valuations. It is not possible to create representative indexes using only transactions, as unlisted property funds' investments are illiquid, and transactions are infrequent.

MSCI employs one of the following return calculation methodologies for its Property Fund Indexes: Unitized, Modified Dietz or Time Weighted Return (with adjustment for daily-weighted external cash flows), computation framework. All three are described in this methodology document.

MSCI Private Real Estate Indexes are governed by a set of methodology documents (Methodology Set) which define the full methodology governing a specific index. The Methodology Set for the MSCI Property Fund Indexes includes:

- MSCI Real Estate - Index Policies
- MSCI Global Data Standards for Real Estate Investment
- MSCI Property Fund Indexes Methodology (this document)
- Additional methodology specifications, as appropriate to the market or index, for example, MSCI/AREF UK Quarterly Property Fund Index Methodology.

2 Index Composition

Most MSCI's Property Fund Indexes are restricted to unlisted pooled structures. As data provision is voluntary, as with all MSCI Private Real Estate Indexes, exhaustive coverage is generally not possible. However, the widely shared interest of end investors in a rigorously defined and transparent framework for the comparison of pooled funds' performance track records, often coupled with the active support and collaboration of relevant trade associations, can result in the achievement of high market coverage ratios.

2.1 Index Inclusion Requirements

The index inclusion criteria for a Standard[1] Property Fund Indexes may include, but are not limited to, specifications of:

- the investor participation structure of the fund (e.g., open vs. closed-ended)
- the types of investors (e.g., retail vs. professional/institutional)
- investment mandate or underlying real estate allocation (e.g., balanced vs. specialist, domestic vs. international)
- the targeted fund risk profile/style (e.g., core vs. non-core)

These classifications are made at the fund level and are generally self-reported by the data provider.

Additionally, for a vehicle to be eligible for inclusion in any Standard Property Fund Index, its historical data must first be provided to and then validated and verified by MSCI.

Specific inclusion requirements are detailed in the relevant market specific methodology documents for MSCI Property Fund Indexes, as needed (e.g., the "MSCI/AREF UK Quarterly Property Fund Index Methodology").

[1] A "Standard" Index is the MSCI Private Real Estate Index for a country or region with the broadest market coverage, for a specific index methodology and for a specific reporting frequency. For example, for the UK, this includes the MSCI/AREF UK Quarterly Property Fund Index.

The MSCI/PREA U.S. ACOE Quarterly Property Fund Index (Unfrozen) in addition to the MSCI/PREA U.S. AFOE Quarterly Property Fund Index (Unfrozen) is considered as a Standard Index to which all index policies apply, because of the earlier publication date although there are similar Standard Indexes within the same country, same index methodology and same reporting frequency.

2.2 Sub-Indexes

For most Standard Property Fund Indexes, sub-indexes are also calculated. Sub-indexes represent the performance of one or more underlying segments of the Standard Index. The criteria listed above may be used to calculate sub-indexes, if they are not used as the index inclusion requirements for the Standard Index. Sub-index definitions may differ from market to market and are detailed in the relevant property fund index methodology document.

As MSCI Property Fund Indexes are created from top-down information, they cannot usually be partitioned based on real estate sub-market definitions, for example, property uses, geographies and management activities.

2.3 Changes in Composition of Indexes

Index composition changes may result from fund liquidations, as well as other changes to MSCI's access to fund data, including newly launched or existing funds providing their data to MSCI. Where the resulting index composition change is deemed material, as defined in the MSCI Real Estate – Index Policies, MSCI will publish an index announcement on the MSCI website describing the change.

The historical data provided by any data provider withdrawing from the index will be retained and continue to be used in index calculations. For an index with unfrozen history, new fund data that has met MSCI's quality standard will be included in the index historically. For an index with frozen history, new fund data will only be included going forward.

All index compositions are checked for Fund Confidentiality Rules and Fund Dominance Rules defined below.

3 Data Collection and Validation

3.1 Real Estate Fund Data Requirements

The data required for calculating the MSCI Property Fund Indexes include fund-level Net Asset Values (NAVs) and distributions. In addition, non-mandatory data may also be used to allow for more detailed analyses and the production of customized sub-indexes.

The table below describes the data field specifications, dependent upon the return computation method, i.e., Unitized, Modified Dietz or Time-Weighted Return (TWR).

Data category	Data used for calculating index returns
Unitized return methodology data	
NAV	Total NAV and/or NAV per unit
Units	Number of units issued
Distributions (dividends)	Distributions/ dividend details, fees*
Vehicle Capital flows	Capital invested, capital returned
Currency	Exchange rates **
Modified Dietz return methodology data	
NAV	Total NAV
Weighted average equity	Weighted average equity
Appreciation	NAV Appreciation adjusted for vehicle capital flows
Investment income	Investment income before and after fees
Fees	Fund Management Fees
Currency	Exchange rates**

Data category	Data used for calculating index returns
Time-Weighted Return (TWR)	
NAV	Total NAV
Distributions (dividends)	Distributions/dividend details on a day-dated basis
Investment income	Investment income before and after fees
Vehicle Capital flows	Capital invested and capital returned on a day-dated basis
Fees	Fund management fees, incentive fees (capital account and expense account)
Currency	Exchange rates**

**Fees are not mandatory for all indexes but are required for calculating gross and net of fees returns.*

***Sourced from WM Refinitiv*

In addition to the data required to calculate their performance, MSCI uses fund-reported allocations and classifications data to assign funds to sub-indexes or to provide aggregated index characteristics. Examples of this category of data are described below.

Data category	Examples of data used for classification of funds
Property type allocation	Sector allocation
Geography allocation	Country allocation
Vehicle Structure	Open/closed
Vehicle Strategy	Core/Non-Core

More information on data definitions can be found in the MSCI Global Data Standards for Real Estate Investments. In addition, any market specific requirements, including NAV, are highlighted in the methodology documents specific to the individual property fund index.

4 Index Calculation Methodology

Most of the calculations described below are applicable to individual funds as well as the index.

4.1 Modified Dietz

4.1.1 Gross Total Return

Modified Dietz methodology defines total return (gross of fees) as:

$$Gross\ Fund\ Return_t = \left(\frac{Appreciation_t + NIY_t}{AvWtdEq_t}\right) * 100$$

Where:

$$AvWtdEq_t = NAV_{t-1} + \sum_{i=1}^{n} \left[Days_{i,t} * NCI_{i,t}\right]$$

And:
NIY_t is the Net Investment Income in month t;
$AvWtdEq_t$ is average weighted equity;
$Days_{i,t}$ is the number of days as a portion of the number of days in the month;
$NCI_{i,t}$ is the net capital invested.

'*Appreciation*', or the capital component of the numerator, is defined as the net appreciation/depreciation of all assets and interests, both realized and unrealized, not caused by capital expenditure. This includes properties, mark-to-market debt and any other investments or liabilities. The realized and unrealized capital components are adjusted to offset the inclusion of distributed income in Net Investment Income.

Net Investment Income is the income net of interest expenses that is reported by the investment during the period. Net Investment Income is gross of advisory fees and incentive fees, and includes both distributed and retained income.

In the 'Average Weighted Equity', Contributions and capital distributions are added to the start period NAV. Both are weighted to reflect the number of days they have been in the fund.

4.1.2 Net Total Return

Net of fees fund level return is defined as:

$$Net\ Fund\ Return_t = \left(\frac{Appreciation_t + NIY_t - Fees_t}{AvWtdEq_t}\right) * 100$$

Where:

fees are restricted exclusively to those applied at fund-level (management fees including any incentive fee) but exclude property management costs

4.1.3 Index Return

The index return, is calculated at gross and net of fund-level fees, and is defined as:

$$Gross\ Total\ Return\ Index_t = \left(\frac{\sum_{i=1}^{n}\left(Appreciation_{i,t} + \sum NIY_{i,t}\right)}{\sum_{i=1}^{n}\left(AvWtdEq_{t_{i,t}}\right)}\right) * 100$$

Where:

n is the number of funds in the index sample;
$Appreciation_{i,t}$ is the realized/unrealized appreciation/depreciation (not caused by capital expenditure/receipt) of all assets and interests for fund i in month t;
$NIY_{i,t}$ is the Net Investment Income gross of fees of fund i in month t;
$AvWtdEq_{i,t}$ is the average weighted equity of fund i in month t;

$$Net\ Total\ Return\ Index_t = \left(\frac{\sum_{i=1}^{n}\left(Appreciation_{i,t} + \sum NIY_{i,t} - \sum Fees_{i,t}\right)}{\sum_{i=1}^{n}\left(AvWtdEq_{t_{i,t}}\right)}\right) * 100$$

Where:

n is the number of funds in the index sample;
$Appreciation_{i,t}$ is the realized/unrealized appreciation/depreciation (not caused by capital expenditure/receipt) of all assets and interests for fund i in month t;
$NIY_{i,t}$ is the Net Investment Income gross of fees of fund i in month t;
$Fees_{i,t}$ include fund level management fees and incentive fees and excludes property management costs
$AvWtdEq_{i,t}$ is the average weighted equity of fund i in month t;

4.2 Unitized

4.2.1 Total Return

For Unitized return methodology, total return is calculated as the movement in month-end NAV per unit, net of new capital invested plus any distributions accrued/declared for the current month ("ex-dividend" distributions), expressed as a percentage of the capital employed on a per unit basis, as shown below. If no ex-dividend distribution information is provided or estimated, the distributions included will be those actually made ("as paid").

Capital employed is defined as the previous month-end NAV per unit multiplied by the number of units in issue.

Multi-period measures of performance and index values are time weighted and calculated by the chain-linked compounding of single monthly-period percentage measures.

4.2.2 Fund Return

At the fund level, for the Unitized return methodology, total return is defined as:

$$Fund\ Return_t = \left(\frac{UtNAV_t - UtNAV_{t-1} - UtNCI_t + UtDist_t}{UtNAV_{t-1}}\right) * 100$$

Where:
$UtNAV_t$ is the net asset value per unit in month t;
$UtNCI_t$ is the net capital invested per unit in month t;
$UtDist_t$ is the distribution per unit in month t.

All fund total return calculations are undertaken using the NAV, distribution and net capital invested per unit. Applying the components of the total return on a per unit basis ensures that the performance of open-ended and closed-ended funds can be incorporated together in a uniform and consistent structure, making comparisons fairer and allowing for the more accurate incorporation of any corporate actions (rights issues, open offers, etc.) that might otherwise dilute actual fund total returns.

In practice, applying total return components on a per unit basis means that open-ended and closed-ended structures have slightly different return formulas within the MSCI Property Fund Indexes.

4.2.3 Open-ended Fund Total Return Formula - Unitized

For open-ended funds, the change in the number of units from month to month reflects capital flows into and out of the fund. In the fund (NAV) total return calculation, there may be a risk of double counting capital cash flows should a change of units and net capital investment (NCI) be combined in the same calculation. Therefore, net capital investment is not included in the total return calculation for open-ended funds. However, NCI data is required by MSCI as it could be used as part of the validation process.

$$TR_{\text{open fund}} = \frac{NAV_{\text{per unit},t} - NAV_{\text{per unit},t-1} + Dist'n_{\text{per unit},t}}{NAV_{\text{per unit},t-1}} \times 100$$

4.2.4 Closed-ended Fund Total Return Formula - Unitized

Closed-ended funds are not structured to allow for continuous changes in the size of their ownership base and are assumed to have a fixed number of units issued. In cases where closed ended funds do not have a unitized structure, MSCI assumes that the fund comprises a default 1000 units. For closed-ended funds, NCI is included in the total return calculation as the number of units in circulation is not expected to change from month to month, with any return on investment adjusted for capital flows. Although closed-ended funds do not generally take in new money, it is normal for them to periodically draw down committed capital during the investment phase of the fund's life and gradually return capital as it nears the termination date. Including NCI accounts for this process.

$$TR_{\text{closed fund}} = \frac{NAV_{\text{per unit},t} - NAV_{\text{per unit},t-1} - NCI_{\text{perunit},t} + Dist'n_{\text{per unit},t}}{NAV_{\text{per unit},t-1}} \times 100$$

4.2.5 Index Return

To ensure that the weight of each fund, in terms of NAV, is reflected in the overall index total return, each fund's per unit numerator and denominator is multiplied by the number of units in existence at the start of the month. Funds included in the index are weighted according to their NAV at the beginning of the month in all cases except Australia, where they are weighted according to their NAV at the end of the month.

The index return is then calculated as:

$$Index\ Return_t = \left[\frac{\sum_{i=1}^{n}\left(UtR_{i,t} * Units_{i,t-1}\right)}{\sum_{i-1}^{n}\left(UtNAV_{i,t-1} * Units_{i,t-1}\right)}\right] * 100$$

Where:
n is the number of funds in the index sample;
$UtR_{i,t}$ is the return per unit in month t of fund i;
$UtNAV_{i,t-1}$ is the net asset value per unit in month t-1 of fund i; in Australia the net asset value per unit in month t is used;
Units are the current number of units in issue by each fund in the universe, less cross-holdings (U.K. and Australia only).

4.2.6 Interpolation of Data for Unitized Indexes

As stated above, regardless of the frequency of the index, monthly returns are calculated. This may require the interpolation of provided data, and assumptions about the timing of cash flows.

For funds included in indexes where no data is received monthly:

- the NAV per unit of the previous period is held down (kept unchanged) and the new data is used only at quarter end.
- distributions provided are included in the calculation at the end of the quarter.

However, the MSCI France OPPCI Biannual Property Fund Index follows a different interpolation method which is based on whether the outstanding number of fund units are changing over the period of review or not. Although in most cases fund managers may execute capital flows at any point during the month (or period of data provision), this methodology aims to simplify data provision and allow for fund comparisons on a like-for-like basis.

4.2.7 Cross Holdings for unitized indexes in Australia and the UK

When one fund in a Property Fund Index has an interest in another included in the same index (the cross-held fund), the second fund's performance will be over-weighted unless an adjustment is made. That is, the fund which is cross-held will contribute directly at a weight of 100% as well as indirectly by the ownership percentage of the fund that holds an interest. As a result, the performance of the cross-held fund would be weighed at over 100% of its total NAV in the overall index.

MSCI adjusts for cross holdings in its U.K. and Australia Property Fund Indexes[2] by reducing the weight of the cross-held fund by the amount held by other funds. In all other markets no correction is made for cross holdings.

For the MSCI/AREF UK Quarterly Property Fund Index, MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index and The Property Council of Australia/MSCI Australia Unlisted Retail Quarterly Property Fund Index, data is collected for the investments in other funds that are parts of that same index, and the above-described adjustment is made.

This same adjustment is made for all the sub-indexes within the MSCI/AREF UK Quarterly Property Fund Index, whether or not the cross holding occurs within the same sub-index. For the sub-indexes of the MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index and The Property Council of Australia/MSCI Australia Unlisted Retail Quarterly Property Fund Index, the adjustment is only made where the cross holding occurs within the sub-index, which therefore deviates from the UK practice.

[2] Until June 2021, MSCI has adjusted for cross-holdings in the MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index and all the sub-indexes within MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index as well as in The Property Council Of 'Australia/MSCI Australia Unlisted Retail Quarterly Property Fund Index.

4.3 Time-Weighted Return (TWR)

The Time-Weighted Return Methodology with adjustment for daily-weighted external cash flows are being calculated at the property fund level on a monthly basis.

4.3.1 Net Total Return

At the fund level, for the TWR methodology, Net Total Return is defined as:

$$Net\ Fund\ Total\ Return_t = \left(\frac{Appreciation_t + \sum NIY_t}{WtdEq_t}\right) * 100$$

Where:

$$\mathrm{WtdEq_t} = \mathrm{NAV_{t-1}} + \sum_{i=1}^{n}\left[\mathrm{Days_{i,t}} * \mathrm{NCI_{i,t}}\right] - \sum_{i=1}^{n}\left[\mathrm{Days_{i,t}} * \mathrm{Dist_{i,t}}\right]$$

$$\mathrm{Appreciation_t} = \mathrm{NAV_t} - \mathrm{NAV_{t\text{-}1}} - \sum \mathrm{NCI_t} - \left(\sum \mathrm{NIY_t} - \sum \mathrm{Dist_t}\right)$$

And:

$Appreciation_t$ after fees in month t;
NIY_t is the Net Investment Income after fees in month t;
$WtdEq_t$ is weighted equity (capital employed) in month t;
NAV_{t-1} is the net asset value at the end of the previous month t-1;
NAV_t is the net asset value at the end of the month t;
$Dist_t$ is the distribution for the Period;
$NCI_{i,t}$ is the net capital invested.
$Days_{i,t}$ = the weight of external cash flow i in month t, expressed as the number of days the cash flow is invested in a fund as a portion of the total number of days in month t.

Asuming that external cash flows occur at the start of the day, the weighting factor for each external cash flow is calculated as follows:

$$Days_{i,t} = \frac{D_t - D.cf_t + 1}{D_t}$$

where
D_t = the total number of calendar days in month t;
$D.cf_t$ = the number of calendar days from the beginning of month t to the date of external cash flow i

4.3.2 Net Income Return

The Net Fund Income Return is calculated based on the Net Investment Income after fees generated in a month. There could be a deviation with the distributed income due to a time difference of the net investment income generation and the distribution as well as due to the fact that all or some of the income might be retained within the fund. At the fund level Net fund Income Return is defined as:

$$Net\ Fund\ Income\ Return_t = \left(\frac{\sum NIY_t}{WtdEq_t}\right) * 100$$

Where:

NIY_t is the Net Investment Income after fees in month t;
$WtdEq_t$ is weighted equity (capital employed);

4.3.3 Net Capital Return

The Net Fund Capital Return is calculated based on the Net Asset Value change after fees adjusting it for net capital invested as well as for the net income retained (Net Invest Income minus Distributions) within the fund in a month. At the fund level Net Fund Capital Return is defined as:

$$Net\ Fund\ Capital\ Return_t = \left(\frac{Appreciation_t}{WtdEq_t}\right) * 100$$

Where:

$Appreciation_t$ after fees in month t;
$WtdEq_t$ is weighted equity (capital employed) in month t;

4.3.4 Gross Total Return

At the fund level Gross Fund Total Return is defined as:

$$Gross\ Fund\ Total\ Return_t = \left(\frac{Appreciation_t + \sum NIY_t + Fees_t}{WtdEq_t}\right) * 100$$

Where:

$Appreciation_t$ after fees in month t;
NIY_t is the Net Investment Income after fees in month t;
$Fees_t$ is the total fees (management + incentive) in month t;

$WtdEq_t$ is weighted equity (capital employed) in month t;

4.3.5 Gross Income Return

At the fund level Gross Fund Income Return is defined as:

$$Gross\ Fund\ Income\ Return_t = \left(\frac{\sum NIYBF_t}{WtdEq_t}\right) * 100$$

Where:

$NIYBF_t$ is the Net Investment Income before fees in month t;
$WtdEq_t$ is weighted equity (capital employed) in month t;

4.3.6 Index Return

The index return, calculated net of fund-level fees, is defined as:

$$Index\ Return_t = \left(\frac{\sum_{i=1}^{n}\left(Appreciation_{i,t} + \sum NIY_{i,t}\right)}{\sum_{i=1}^{n}\left(WtdEq_{t\,i,t}\right)}\right) * 100$$

Where:

n is the number of funds in the index sample;
$Appreciation_{i,t}$ after fees of fund i in month t;
$NIY_{i,t}$ is the Net Investment Income after fees of fund i in month t;
$WtdEq_{i,t}$ is weighted equity (capital employed) of fund i in month t;

4.3.7 Interpolation of Data for TWR Indexes

As stated above, regardless of the frequency of the index, monthly returns are calculated. This may require the interpolation of provided data, and assumptions about the timing of cash flows.

For data included in indexes where no data is received monthly:

- the NAV will be interpolated by using the latest available NAV, adjusted for the external cash-flows (Capital invested, Capital returned and Distributions) and non-distributed income (Net Investment Income – Distribution for each month).

  Where:

  $$NAV_t = NAV_{t-1} + NCI_t + NIY_t - Dist_t$$

  And:

NAV_t is the net asset value at the end of the month t;
NAV_{t-1} is the net asset value at the end of the previous month t-1;
NIY_t is the Net Investment Income after fees in month t;
$Dist_t$ is the distribution in the month t;
NCI_t is the net capital invested in the month t.

- the Net Investment Income both before and after fees as well as the fees will be equally spread across the months.

For data included in indexes where no data is received on a day-dated basis:

- the external cash flows (new capital invested, capital returned and distributions) will be equally spread over the months and timed at the middle of the month.

4.4 Longer Term Returns

4.4.1 Index Values

Starting from a base value of 100, each successive index value is calculated by multiplying the preceding index value by (1+monthly return):

$$\text{Index}_{t=0} = 100$$

$$\text{Index}_t = \text{Index}_{t-1} \times \left[1 + \frac{\text{TR}_t}{100}\right]$$

Where:

TR_t is the total return for the period t-1 to t, expressed as a ratio

4.4.2 Multi-period Time-weighted Total Return

The basis for calculating all annual and quarterly performance measures is time-weighted. Annual measures are calculated by compounding twelve monthly figures and annual figures are shown only when twelve months' figures are available. These measures gives an equal weight to each month. To calculate quarterly and annual returns it is necessary first to construct an index from monthly values.

The 12-month return, for example, is calculated as the percentage change in the index (X_t) over the relevant 12 months.

$$12 \text{ Month Total Return} = \left[\frac{\text{Index}_t}{\text{Index}_{t-12}} - 1\right] \text{x } 100$$

4.4.3 Annualized Rate

The annualized rate is the geometric mean of the individual annual rates of change for a series of years. It is calculated as the n^{th} root of the final indexed score converted back into a percentage:

$$\text{Annualized Rate} = \left[\left(\frac{\text{Index}_t}{\text{Index}_{t=0}}\right)^{1/n} - 1\right] \text{x } 100$$

Where:

n is the number of years

Index_t is the final indexed score.

$\text{Index}_{t=0}$ is the initial indexed score.

4.5 Rules for Performance Reporting

4.5.1 Fund Confidentiality Rules

In order to protect the confidentiality of the fund level data provided, MSCI applies strict confidentiality rules, which set the minimum number of constituents necessary to permit the reporting of an index. In any aggregate, the minimum acceptable number of funds is three.

However, if all data providers to an index have agreed to disclose individual fund results, an exception may be made.

4.5.2 Fund Dominance Rules

In order to avoid the possibility of the weight of one portfolio dominating the representativeness of an index, MSCI employs investor dominance rules when determining the composition of an index.

When calculating an index, a maximum weight for any single contributing fund is calculated based on NAV. When the weight of a contributor in any index series exceeds 75% of index or sub-index NAV, the results will not be reported.

However, if all data providers to an index have agreed to disclose individual fund results, an exception may be made.

4.6 Ranking/Distributions of Returns

A percentile measure indicates the value below which a given percentage of a group of observations fall. For example, the 20th percentile is the value (or score) below which 20 percent of the observations may be found. The term percentile and the related percentile rank are often used to report scores describing performance levels, and are therefore very popular in summarizing a fund's return position within a peer group. For example, if a score is on the 86th percentile, it is higher than 86% of the other scores. In MSCI property fund return reporting, the minimum sample required for showing percentile distributions at any aggregate level is at least 3 funds.

The 25th percentile is also known as the first quartile (Q1), the 50th percentile as the median or second quartile (Q2) and the 75th percentile as the third quartile (Q3). In general, percentiles and quartiles are specific types of quantiles.

In computing the weighted average of a compounded measure over longer than one month, a different sample of funds may be included as the period lengthens. When calculating percentiles, only those funds that have contributed in every underlying period are included. Therefore, the ranked sample may be smaller than the weighted aggregate results sample.

4.7 Frozen History Reporting

For most listed asset classes, price data is generally easily available for (almost) the full market, and index histories do not change with the availability of new data. However, MSCI relies on the voluntary provision of private data. New data providers often provide historical data which improves the representativeness of indexes historically.

As a result, most MSCI Property Fund Indexes are subject to historical restatement when new funds with historical data become available (or corrections are made), in order to maximize the market coverage, robustness and accuracy of the reported historical results (unfrozen history).

However, for some indexes, when the sample size for a market is large and the impact of including additional data contributors is relatively small, value may be gained from freezing historical results. A key advantage of frozen (fixed) histories is that they provide a much more robust base for manager remuneration.

Frozen indexes currently include:

- MSCI/AREF UK Quarterly Property Fund Index:
  The index was originally frozen in June 2005. From this date, funds can only contribute from their first submission that meets MSCI eligibility requirements.

In December 2012, due to exceptional circumstances, the index was restated to Q3 2012. At this point, historic fund contributions were refreshed to allow for the correction of data errors. The time periods for which each fund contributes remain unchanged.
In January 2019 the index was restated to Q3 2018, due to minor corrections including certain inputs to cross holdings and to back-calculating the index on a new technology platform.

- MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index: The index was last restated in June 2011, when it was restated to May 2011 results. MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index and all its sub-indexes are based on frozen methodology.
- MSCI Germany SFIX Quarterly Property Fund Index and its sub-indexes are frozen as of December 2023

MSCI reviews each unfrozen national market index regularly to decide whether these indexes potentially should also be frozen.

A proposal to freeze an index history is based on an analysis of the likelihood of future changes to historical data, including availability of new data, including:

- Index coverage level: The higher the ratio of MSCI data coverage to the estimated total real estate investment market, the greater is the likelihood that historical index results will remain unchanged through the addition of new funds to the dataset.
- Review of historical restatement impacts: Comparing the difference between published results and results including any newly submitted data gives an indication of the consistency of historical results.
- Trends in numbers of portfolios joining the dataset and their perceived likelihood of supplying historical data.

A proposal to freeze the history of any MSCI index will trigger a public consultation with local market participants. If a decision is taken to freeze an index, that decision will be announced to the public before implementation as per the Methodology and Index Consultation Policy described in the “MSCI Real Estate – Index Policies” document.

4.8 Currency Conversion

MSCI multinational Property Fund Indexes may have constituents which report its data in currency other than the one in which the index is denominated. Therefore, the calculation of these indexes requires values to be converted to a common currency.

Depending on the usage of the output, this calculation is either performed on a fixed ("local currency") or variable exchange rate. For all country level indexes, the standard currency is always the local currency.

4.8.1 Fixed Rate Conversion

Fixed rate conversion is applied to remove the impact of currency on measure calculations. A monthly fixed rate method is applied to eliminate the need for historical changes. The application of this methodology for different performance measures is as follows:

- For monthly compounded growth measures, MSCI converts the relevant data using the exchange rate of the base month. For example, the data required for December 2022 growth measures are converted at the November 2022 exchange rate.
- For all spot measures – such as Net Asset Value, Gross Asset Value and Debt – with data collected as at month-end, values are converted using the corresponding month-end exchange rate. For example, December 2022 Net Asset Value is converted using the December 2022 exchange rate.
- Similarly, for spot ratios, such as the gearing ratios , the appropriate month-end exchange rate is used to convert both the numerator and denominator values in the calculation.
- For measures calculated by summation over time, such as 12-month net capital invested or 12-month distribution yield (where the numerator is calculated by summation), all values are converted using the exchange rate as at the end of final month of computation.

4.8.2 Variable Rate Conversion

Performance measures based on variable rates include the impact of monthly changes in exchange rates. For variable rate reporting, each data item is converted using the corresponding month-end mid-rate, defined as the median of the bid and offer rates on the last day of the month. An exception to this is Capital Invested data, which is converted using the previous month rate.

For 1994 and later data, MSCI uses exchange rates from WM Refinitiv. For earlier data, rates from EcoWin and others are used.

4.9 Index Composites: Market Size Rebalancing

MSCI's multinational composite Property Fund Indexes aggregate the performance of a set of countries. No re-weighting based on market sizes is applied to MSCI Property Fund Indexes in producing multinational Property Fund Indexes (In contrast to MSCI Property Indexes). Therefore, multinational Property Fund Indexes reflect the weight of the underlying samples as measured by MSCI.

4.10 Other Market Information Reporting

4.10.1 Gearing

Gearing, or leverage, measures the level of debt in a fund and can be expressed in the following ways:

- Net debt as a percentage of NAV

$$Net\ Debt\ over\ NAV_t = \left(\frac{Gross\ Debt_t - Cash_t}{NAV_t}\right) * 100$$

- Gross debt as a percentage of NAV

$$Gross\ Debt\ over\ NAV_t = \left(\frac{Gross\ Debt_t}{NAV_t}\right) * 100$$

- Gross debt as a percentage of GAV (GAV is being derived as the summation of the Debt and the Net Asset Value, except where the GAV is being provided.)

$$Gross\ Debt\ over\ GAV_t = \left(\frac{Gross\ Debt_t}{GAV_t}\right) * 100$$

4.10.2 12-month Distribution Yield or Gross Yield (Unitized)

Gross yield is the historic distribution yield. Except where there is an indication to the contrary, a fund's gross yield is the sum of its distributions per unit over 12 months as a percentage of its net asset value per unit at the end of that period. The distributions included in the calculation are those earned/accrued, rather than paid, during the 12 months, are gross of tax and include capital distributed/returned to investors.

$$Gross\ Yield_t = \left(\frac{\sum_{t=1}^{12} Distributions\ per\ unit_t}{NAV\ per\ unit_t}\right) * 100$$

4.10.3 12-month Distribution Yield or Gross Yield (TWR)

Gross yield is the historic distribution yield. Except where there is an indication to the contrary, a fund's gross yield is the sum of its distributions over 12 months as a percentage of its net asset value at the end of that period. The distributions included

in the calculation are those earned/accrued, rather than paid, during the 12 months, are gross of tax and include capital distributed/returned to investors.

$$Gross\ Yield_t = \left(\frac{\sum_{t=1}^{12} Distributions_t}{NAV_t}\right) * 100$$

4.10.4 Bid/Offer Spread (UK Only)

Bid/offer spread is calculated as the difference between the latest bid and offer prices of a fund, expressed as a percentage of the latest offer price.

$$Bid/Offer\ Spread_t = \left(\frac{Offer\ Price_t - Bid\ Price_t}{Offer\ Price_t}\right) * 100$$

5 Appendix: Glossary of Terms

Accruals accounting principle	The assumption that payment is timed to the due date rather than to the date of monetary transfer.
Arithmetic mean	The sum of numbers in a series divided by the count.
Balanced fund/Diversified fund	Fund that has an exposure or investment strategy to allocate their portfolio into more than one property sector and / or geography. The criteria for the classification of funds may differ between indexes.
BMR Benchmark	BMR Benchmark is an MSCI Private Real Estate Index for which MSCI Limited has provided written permission in each instance to its client to be used for a BMR regulated use. A BMR Benchmark may be a Standard Index or an index automatically calculated from a Standard Index using pre-configured specifications
Bid/offer spread	Difference between the bid and offer prices.
Drawdowns	Capital returned to investors (redemptions) by the fund.
Cross holding	For real estate funds, the holding of a financial interest in another fund.
Development	Property under construction or land where construction is planned.
Direct investment/holding	For real estate, properties held within an investment portfolio or fund, either individually or as a group, as distinct from any financial structures that may support them.
Distribution yield	Unitized: The sum of a fund's distributions per unit over a 12-month period expressed as a percentage of its net asset value per unit at the end of the 12-month period. TWR: The sum of a fund's distributions over a period of 12 months expressed as a percentage of its net asset value at the end of the 12-month period.
Fixed rate currency conversion	For multinational real estate reporting, a monthly fixed rate method is applied in which monthly fixed rates are used.
Frozen index history	The case where all historical results are fixed, so that the addition of new data into the relevant dataset will not affect the results stated for earlier periods.

Fund	A financial structure, usually in the form of a co-ownership vehicle, by which investors come together to hold real estate. The performance of a fund as obtained by its unit-holders derives not only from the properties it contains, but also from the effects of debt (gearing/ leverage), cash holdings and fees.
Gearing	A measure of the extent to which a fund is indebted or ”leveraged”, usually shown as the ratio of gross or net debt to net asset value (NAV), expressed as a percentage.
Geometric mean	The nth root of the product of a series of numbers (where n is the count of the numbers). Geometric means are generally used for calculating average rates of growth.
Gross debt	The total outstanding amount of unpaid debt in a fund, in money terms.
Gross yield	See distribution yield (used in fund reporting).
Index	In real estate reporting, a statement of the performance of a real estate market.
Indirect investment/holding	In real estate, investment in a fund or other financial structure which holds property assets.
Mid-rate	For currency conversion, the mid-point of bid and offer rates.
Methodology Set	The set of methodology and policy documents that describe the methodology used to determine MSCI Private Real Estate Indexes, including BMR Benchmarks
Modified Dietz methodology	A time-weighted method of calculating gross fund level returns, by which the capital employed is modified by the addition of contributions and capital distributions to start-period NAV. This calculation method is currently used by MSCI for fund returns in the U.S. and Canada
Multinational	In MSCI reporting, covering two or more national markets.
Net asset value (NAV)	The total value of all the assets held in a fund, less the capitalized value of any outstanding liabilities.
Net debt	The total outstanding amount of unpaid debt in a fund, in money terms, less any cash holdings.
Net Investment Income	Total investment income that was reported by the vehicle during the period net of fund operating costs, and net of any

	advisory and incentive fees (unless the incentive fees are netted off the capital side).
Number of units in issue	The number of units issued to investors in a fund since its inception that are as yet unredeemed.
Portfolio	A group of properties or other assets managed as an entity on behalf of an investor or investors.
Professional investor	A professional investor is either a per se professional client or an elective professional client. Often referred to as an institutional investor or wholesale investor in Australia.
Real Estate Index Committee (REIC)	The Real Estate Index Committee (REIC) is responsible for overseeing the development and interpretation of methodologies and data collection for real estate indexes.
Relative return	The ratio of the return on a portfolio, segment or individual asset, to that of a benchmark, expressed as a percentage.
Retail investor	An investor who is not a professional investor or an eligible counterparty. Often referred to as non-institutional.
Sector specialist	Fund that has an exposure or investment strategy to allocate a large proportion of their portfolio into one property sector. The criteria for the classification of funds may differ between indexes.
Standard Index	A Standard Index is the MSCI Private Real Estate Index for a country or region with the broadest market coverage, for a specific index methodology and for a specific reporting frequency.
Time-weighted	For performance measures, those in which returns generated for different time periods are weighted equally in producing returns for longer periods, irrespective of the amount of capital employed in each period.
Time-Weighted Return (TWR) methodology	A Time-Weighted Return Methodology with adjustment for daily-weighted external cash flows are being calculated at the property fund level based on the underlying data on a monthly basis.
Total return	The most important measure of overall investment performance used to compare different assets across time periods. It incorporates both capital and income elements,

	and is calculated as the percentage value change plus net income accrual, relative to the capital employed.
Unitized methodology	Under the unitized return methodology, total return is calculated as the movement in month-end NAV per unit, net of new capital invested plus any distributions accrued/declared for the current month ("ex-dividend" distributions), expressed as a percentage of the capital employed on a per unit basis.
Universe	A dataset covering a whole investment market for the purposes of an index or for benchmarking. For real estate this is normally defined as a national market area.
Variable rate currency conversion	For multinational real estate reporting, converting all currencies throughout the performance history at the exchange rates in effect at the end of each month.
Volatility	Portfolio or asset risk, defined as the standard deviation of the series of returns around the arithmetic mean.

6 Appendix: Versioning Table

Version	Publication Date	Key Changes
V1.0	January 2019	First release of separate document, which was previously included in the MSCI Global Methodology Standards for Real Estate Investments.
V1.1	June 2019	Changed the name of the methodology from MSCI Methodology for Property Fund Indexes into MSCI Property Fund Indexes Methodology. Updated the wording of several sections in the document.
V1.2	February 2020	Section 4.2.6 INTERPOLATION OF DATA FOR UNITIZED INDEXES has been corrected to reflect the current practice which was documented incorrectly in the previous version. Section 4.8.1 GEARING has been extended to explain how the GAV is sourced. Updated the wording of several sections in the document.
V1.3	May 2020	Section 4.3 Time-Weighted Return (TWR) has been added.
V1.4	December 2020	Section 3: Update to the table on data used for calculating index returns has been amended
V1.5	December 2021	Section 4.8: Added new section on currency conversion
V1.6	March 2023	Section 4.1.3: Index return documented for both Gross Total return and Net Total return Section 4.7: Changes based on conclusion of consultation to freeze PFI sub-indexes of MSCI/Mercer Australia Core Wholesale Monthly Property Fund Index Updated the wording of several sections in the document
V1.7	October 2023	In section 4.6 amended the criteria on minimum sample requirement for showing percentile distributions from 10 funds to 3 funds
V1.8	February 2024	Section 4.3: Clarification to Time-weighted return calculation

		Section 4.7: Changes based on conclusion of consultation to freeze MSCI Germany SFIX Property Fund Index and corresponding sub-indexes.

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