

GLOBAL METHODOLOGY STANDARDS FOR REAL ESTATE INVESTMENTS



MSCI



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INTRODUCTION

The **Global Methodology Standards for Real Estate Investment** outline how MSCI produces and computes property market return measures and performance benchmarks to address the needs of real estate and multi-asset class investors. It describes the main procedures, methods and rules which govern MSCI's definition and computation of the IPD indexes and benchmarks. The objective of these indexes is to provide more transparency to the real estate investment market, with the aim of matching best practice in mainstream investment measurement and performance assessment across all asset classes.

In **Section 1**, the baseline input data requirements are outlined, alongside the framework of rules which govern the processes of data submission, screening, validation and formal acceptance for inclusion in MSCI real estate investment databases. This section is intended to complement the more detailed account of data specification and field definitions reported in the **Global Data Standards for Real Estate Investment**.

The indexes and benchmarks created from these databases cover both asset and fund-level performance. Asset level reporting encompasses all real estate investment interests that are portfolio structured and professionally managed. It therefore includes properties held in insurance and pension funds, sovereign wealth funds, listed property companies including REITs, unlisted pooled funds, charitable trusts, traditional landed estates, and by large private property owners. Fund-level indexes are more narrowly restricted to unlisted pooled structures, since the returns to listed vehicles are covered by equity indexes, and those to segregated private mandates are not normally made public.

The principles, methods and procedures deployed in the computation of performance measures at both of these two levels are explained in **Section 2**. This key section also details the main exploratory and analytic techniques that are exploited in helping to explain real estate portfolio performance variation and risk exposure.

Finally, **Section 3** outlines the data rules invoked in the publication and private reporting of these performance measures. These are designed first and foremost to ensure that the granular confidentiality of the input data – both at asset and fund levels – is rigorously protected.

The **Appendices** provide overviews of some of the core policies which inform index governance and offer a glossary of the technical terms used in the body of the document.

SECTION 1: DATA DEFINITIONS, INPUTS, SOURCES AND VALIDATION

The individual property and fund data provided by contributors for the purposes of index construction and benchmarking are governed by MSCI real estate data definitions, which form a framework for the consistent recording of property data for use in all IPD indexes and benchmarks. A mandatory core set of data, used for the calculation of total investment returns (see Section 1) is required in all markets, to render the IPD indexes and benchmarks comparable across borders. In addition, non-mandatory data, often specific to individual national markets, can be provided if available to allow for more detailed analyses. These non-mandatory data are currently being reviewed and where possible standardized by MSCI across geographic markets. Full definitions of all data required from contributors are shown in the data requirements form for real estate, which varies by geographic market and is sent to all data contributors.

All contributors to the IPD indexes and benchmarks are required to comply with the **Data Submitter Code of Conduct**, which covers the internal systems and controls within the contributing firm around the preparation of data submission, in order to comply with MSCI's quality and integrity standards.

REAL ESTATE DATA REQUIREMENTS

MSCI measures direct portfolio level investment performance bottom-up from records of individual property assets, while fund investment performance is constructed top-down from the financial records of real estate investment funds. The real estate data required by MSCI depend on the level of investment return being measured:

- Portfolio level performance: data are required for all direct properties that form part of the investment portfolio including foreign properties, indirect investments in property related products, and cash and debt that can be directly related to the assets.
- Fund level performance: data are required for all financial interests and fund level costs where they form part of the overall property investment vehicle.

Data contributors to MSCI are required to provide external or independent professional valuations, in accordance with international or local valuation standards, for each of their assets. Valuation reports should be provided to MSCI to the frequency at which the investments are being measured, at least once annually. Details of the valuation requirements are provided in the next section.

Property data should be supplied in the local currency of the property's physical situation. MSCI converts valuation, income and expenditure figures into the contributor's reporting currency where required.

For properties where the ownership is shared with another investor, all data must be provided for the percentage share owned by the portfolio, except for the floor space of the property, for which the full area should be provided.

MSCI performance measurement is standardized in accordance with the accruals accounting principle rather than on a cash-paid basis. This means that costs are recorded for the period when the liability was incurred, while rents are recorded on a receivable basis.

Capital and revenue data should be allocated to individual properties. Where they cannot be allocated, they should nevertheless be submitted and recorded in a separate identifiably linked record.

MSCI uses two types of data for the purpose of calculating performance measures: valuation data, including lease details; and accounting data, principally capital expenditure and operating costs. These data are often provided by the contributor from two or more independent sources.

Valuation and tenancy data are sometimes provided to MSCI directly by the valuer of the property on behalf of the contributor. However, valuation data are frequently read into in-house management software, either by the property's owners or their managing agents, and then forwarded to MSCI.

Accounts data are provided either by in-house accounts teams or by external managing agents, using real estate management and accounting software.

For the IPD property fund indexes, data are required for the whole fund as well as for the individual assets it holds. Data are compiled for fund level Net Asset Values (NAVs), prices and distributions, and a range of intermediate fund level financial information including costs, fees, taxes, cash and debt.

All data must be provided electronically, either in an MSCI template, or in an industry standard file format.

VALUATION REQUIREMENTS

For mainstream financial asset classes, investment performance measurement is normally based upon transaction prices. By contrast, direct real estate is well known for being an illiquid and heterogeneous investment asset, which renders the establishment of purely price-based indexes problematic.

In order to overcome these obstacles, since 1985 MSCI have provided indexes predominantly based on professionally sourced open market valuations. Valuations are price estimates based on a set of market process assumptions and as much recent transaction evidence as is available and deemed relevant.

Within these limits, the IPD indexes aim to track actual agreed transaction prices as closely as possible. Therefore, it is of critical importance to provide users of the IPD indexes a clear and precise definition of the sorts of valuation which should be provided by investors and managers for use in those indexes, and enable users to gauge to what extent this goal is achieved, by computing and disclosing fair indicators of valuation to price movements for assets which are tested through open market trading.

The valuations which are provided for use in the IPD indexes and benchmarks must be produced in accordance with the following key principles:

- They must be conducted at least once a year for each and every separate investment asset or liability held within the contributing portfolio, including recent acquisitions and all assets under development or refurbishment, as well as retained investments. A higher frequency may be required for some indexes, and it should be noted that the Global Investment Performance Standards (GIPS) now require formal updating (internal or external) at least once a quarter. Such a regime is also recommended, though not required, by MSCI.

- They should be undertaken by professionally qualified and (where appropriate) nationally accredited valuers, in accordance with the objective of determining the open market value of each asset. An internationally recognized definition of Market Value as determined by the International Valuation Standards Committee (IVSC) and adopted by the RICS, the Appraisal Institute and many other national real estate standards organizations is as follows:

“THE ESTIMATED AMOUNT FOR WHICH AN ASSET OR LIABILITY SHOULD EXCHANGE ON THE VALUATION DATE BETWEEN A WILLING BUYER AND A WILLING SELLER IN AN ARM'S LENGTH TRANSACTION AFTER PROPER MARKETING AND WHERE THE PARTIES HAD EACH ACTED KNOWLEDGEABLY, PRUDENTLY AND WITHOUT COMPULSION.”

- Neither formal accreditation nor the explicit adoption of the IVS is required by MSCI, though its use is recommended. However, a consistent approach, preferably in accordance with a national or international market valuation standard and definition, which aims to provide timely best estimates of asset market values, is essential.
- The estimates may be produced internally rather than outsourced, provided that they meet the above specification and are formally reported to MSCI. However, it should be noted that the Global Investment Performance Standards (GIPS) now require outsourcing at least once a year, and this target is also recommended, though not required, by MSCI.
- Although internal valuations are accepted, if MSCI's data quality assessment raises doubts about the quality of valuations (see Data Validation and Screening below), MSCI may request documented evidence from contributors. If no evidence is provided, MSCI may take the decision to exclude the relevant property from any aggregate.
- For the computation of the Korean index, where valuations are not available from data contributors, a third party professionally qualified valuer with international exposure and experience provides MSCI with valuations for the period under consideration. These valuations are not signed off by the asset owners.
- No single operational valuation methodology, such as income capitalization or IRR, is prescribed for the conduct of these valuations.

In order to enable users to gauge to what extent these goals are achieved, and more specifically, to measure each index's price/value synchronization, on a regular annual basis, MSCI compares professionally generated valuations against subsequent transaction prices on a sample restricted to properties traded out of fully measured portfolios in each given period. Although values and transaction prices may differ noticeably at the individual transaction level, the MSCI tests are designed to quantify, at the aggregate level, average spreads and any tendency for valuations to consistently under- or over-state market movements. These Valuation and Sale Price Comparison Reports are available to all on the MSCI website in accordance with International Organization of Securities Commissions (IOSCO) regulatory principles.

It may be necessary, particularly in the early stages of market and/or index development, to exclude certain highly specialized real estate investment sectors, principally those where regular open market trading is rare (such as infrastructure) or difficult to delineate (social housing), from some of the above principles. Such sectors or segments will not be combined into broader national or international real estate investment indexes until a mainstream open market valuation regime is in place.

DATA SUBMITTER CODE OF CONDUCT

The quality of data inputs is reinforced through data providers' compliance with a Data Submitter Code of Conduct, developed and published by MSCI.

Data contributors are responsible for compliance with the standards set out in the Data Submitter Code of Conduct. The Code of Conduct covers internal systems and controls within the contributing firm for preparing data submissions, in order to comply with MSCI quality and integrity standards. It also conforms to the principles set out in the IOSCO Principles for Financial Benchmarks.

Non-compliance with the standards that is not corrected or properly addressed may result in the rejection of a data submission or the removal of a contributor's data from databases and the relevant IPD index/benchmark.

CONTRIBUTOR INCLUSION AND EXCLUSION CRITERIA

To facilitate the task of the Real Estate Index Committee in deciding whether a contributor's data can be accepted for the IPD indexes and benchmarks, the following criteria for including and excluding contributors have been established:

RULES FOR INCLUSION

- New funds to be included in any service must have their historical data recorded and verified by MSCI before the established update period.
- Where the above rule has not been met, there must be proof that adequate time has been spent with contributors to explain data requirements, submission templates and data deadlines.
- Contributors should comply with the Data Submitter Code of Conduct and are reminded of this requirement in Fund Output Reports, provided at each data submission.
- Contributors must have submitted all mandatory data fields (or those required for headline returns and key components of index/benchmark outputs) for their portfolios to be included in standard IPD indexes and benchmarks.

RULES FOR EXCLUSION

Contributor data will risk exclusion from standard IPD indexes and benchmarks, at the discretion of the Real Estate Index Committee, in the following circumstances:

- Breach of the Data Submitter Code of Conduct with respect to data quality, completeness, timeliness or collusion.
- Submission of new data for an entire portfolio or significant part of a portfolio, less than five working days before data universe sign off. This applies for all service frequencies except monthly, for which data must be provided at least two days before sign-off.
- Failure to respond to queries regarding anomalous data for a significant part of a portfolio, which would lead to a material difference in universe capital value, were it to be excluded.
- The Real Estate Index Committee has sufficient evidence of gross misconduct by a contributor.

DATA VALIDATION AND SCREENING

Data quality and consistency are both integral to the IPD indexes and benchmarks.

MSCI runs an internal data quality assessment process during every data update period for the purpose of identifying errors that may have been missed by data contributors, as well as unusual or unexpected changes in values over the period. For this purpose, each national service has produced a set of exception criteria appropriate for its market, against which the data are checked. Exceptions include omitted data, illogical data and data outside specified numerical ranges. Acceptable ranges are based on local market conditions and previous results.

MSCI works continually to improve the validation process. As new data issues arise and are identified, they are added to the exception criteria.

If any of the exception criteria are triggered in the quality assessment, the data will not be added to the database until the issue is explained or resolved.

Once each portfolio has been processed in the database, a Fund Output Report is produced for each portfolio, which is checked for accuracy by MSCI. MSCI confirms that headline results are in the expected range or that valid explanations have been provided for out-of-range data. Performance measures for the portfolio's history are also checked with the aim of ensuring that no unexpected changes have occurred. The Fund Output Report is distributed to the contributor for verification that the results are accurate and complete. MSCI expects contributors to review the Fund Output Report.

After contributor review, individual portfolios are compiled into a universe dataset which is checked for extreme observations in the context of overall universe averages.

DATA EXCLUSIONS

MSCI runs a data quality assessment process during every data update, for the purpose of identifying errors that may have been missed by data contributors as defined by the MSCI Global Data Standards for Real Estate Investment (“bad data”). If these errors cannot be corrected in time for index calculation, the relevant assets are excluded.

DATA QUALITY REVIEW

Following each data update cycle, MSCI operates a quality scoring mechanism based on several criteria including accuracy, completeness and timeliness. Portfolios with low scores are selected for a data quality review.

The aim of the review is to allow for an open discussion between MSCI and contributors in order to understand why perceived areas of weak data supply are occurring, and to provide recommendations to help bring contributors in line with best practice. It also allows MSCI to examine contributors’ internal data submission processes and assess their compliance with the Data Submitter Code of Conduct.

In addition to improving contributors’ understanding of MSCI data requirements and methodologies, the review process helps MSCI better to understand contributors’ difficulties in reconciling source data with the MSCI template.

Following the review, MSCI provides the contributor with an action plan outlining recommendations, with proposed target dates. The contributor is given the opportunity for input and comment. MSCI subsequently tracks the plans to ensure follow-up at later updates.

PUBLIC DATA COLLECTION

In some rare situations, MSCI may incorporate data from public sources into its indexes. In such cases, MSCI collects the data itself but applies the same quality and inclusion criteria as it does for contributed data.

SECTION 2: PERFORMANCE MEASURE CALCULATIONS

MSCI distinguishes between **direct real estate indexes and benchmarks**, which measure the performance of aggregates of individual property assets held within investment portfolios, and **fund indexes and benchmarks**, which measure the performance of fund vehicles in their entirety. The latter reflect not only underlying property assets, but also the effects of cash holdings, leverage and fund operating costs.

DIRECT REAL ESTATE RETURN INVESTMENT COMPUTATION METHODS

Direct real estate performance measurement may be carried out at property, portfolio or market level, or for any other grouping of property assets.

The headline market returns reported in the IPD indexes are based solely on directly owned standing investments in completed and lettable properties; these returns exclude assets held indirectly through investment funds and the impacts of debt, fund management fees, taxation and cash. Market measures are intended to reflect underlying market trends over the period of analysis. Some properties, such as those occupied by their owners, are screened out of market measures in all periods.

Portfolio and benchmark returns include all investment properties within the portfolio, including those bought, sold, and under development or major refurbishment during the measurement period. Performance measures therefore allow the comparison of property and portfolio investment returns relative to an appropriate benchmark, either for the whole investment market or a relevant sub-group of portfolios or properties.

The headline measures which are most widely relied upon and used to document the investment performance of commercial real estate are total return and its income and capital components. MSCI calculates these measures monthly and time-weights (chain-links) them over longer periods. They are value-weighted measures for each measurement period, meaning that the contribution of each asset is in proportion to its monetary weight.

INTERPOLATION AND HELD DOWN TREATMENT OF VALUATIONS

In the case of markets where the valuation dates of contributing properties are synchronized, MSCI calculates estimated capital and rental values for the intervening months for assets that are not valued every month. This interpolation process spreads capital and rental value changes across the period between two genuine data points. Interpolation is linear for most MSCI services, except in the case of the UK where values are adjusted in proportion to changes in the values underlying the IPD UK Monthly Property Index.

In markets where the valuation dates of contributing properties are not synchronized to a common date, MSCI either holds values constant from the most recent valuation date to the next reporting date, or interpolates retrospectively between genuine valuations and uses data from the most recent measurement period to adjust the entire sample.

In all cases, capital value interpolation is adjusted for reported intervening capital expenditure.

APPORTIONMENT OF EXPENDITURE

Capital expenditure, which is deducted from the change in capital value when calculating total return and capital growth measures, is apportioned equally across measurement periods if only available in aggregate for a longer period. This procedure is also applied to non-recoverable revenue expenditures, which are deducted from the gross asset income. For properties bought or sold over the period, any capital expenditures are divided equally over the months concerned, excluding the month when the transaction took place; for these properties, revenue expenditures are divided equally over the months, with a half-month allocation made to the purchase or sale month.

TOTAL INVESTMENT RETURN

As the most widely recognized ‘bottom line’ figure, total return is 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. It is recognized by GIPS (the Global Investment Performance Standard set out by the Chartered Financial Analyst Institute) as the standard composite measure of investment performance.

With respect to a single month, total return is defined as:

$$TR_t = \frac{(CV_t - CV_{t-1} - CExp_t + CRpt_t + NI_t)}{(CV_{t-1} + CExp_t)} * 100$$

Where:
TR_t is the total return in month t;
CV_t is the capital value at the end of month t;
CExp_t is the total capital expenditure (includes purchases and developments) in month t;
CRpt_t is the total capital receipts (includes sales) in month t;
NI_t is the day-dated rent receivable during month t, net of property management costs, ground rent and other irrecoverable expenditure.

TOTAL RETURN 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):

$$\begin{aligned} Index_{t=0} &= 100 \\ Index_{t+1} &= Index_t * (1 + TR_{t+1} / 100) \end{aligned}$$

Where:
TR_{t+1} = total return in month t+1 expressed as a ratio.

MULTI-PERIOD TIME-WEIGHTED TOTAL RETURN

All annual and quarterly performance measures are time-weighted. Annual measures are the result of compounding 12 months’ figures and are only shown when all 12 months’ figures are available. The measure gives an equal weight to each month. To calculate quarterly and annual returns it is necessary first to construct an index from the monthly values.

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

$$12\text{-month Total Return} = [(X_{t=12} / X_t) - 1] * 100$$

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 nth root of the final indexed score converted back into a percentage:

$$\text{Annualized Rate} = [(X_t / 100)^{1/n} - 1] * 100$$

Where:
n is the number of years and X_t is the final indexed score.

CAPITAL GROWTH

Capital growth or indirect return, measures the change in asset capital value over a period of time, relative to the capital employed. This measure of the ‘growth’ component of performance is based on the change in value for properties held at the start and end of an analysis period.

Capital growth also takes account of actual transaction prices for bought or sold assets. The calculation is net of any capital expenditure and receipts over the period.

With respect to a single month capital growth is defined as:

$$CG_t = \frac{(CV_t - CV_{t-1} - CExp_t + CRpt_t)}{(CV_{t-1} + CExp_t)} * 100$$

Where:
CG_t is the capital growth in month t;
CV_t is the capital value at the end of month t;
CExp_t is the total capital expenditure (includes purchases and developments) in month t;
CRpt_t is the total capital receipts (includes sales) in month t.
Monthly figures are compounded, as described for total return, over 12 months to give an annual rate.

INCOME RETURN

Income return or direct return, measures the income receivable in relation to the capital employed over a period. This measure is calculated net of all irrecoverable costs incurred by the investor – which will depend upon the terms of the tenant lease contracts in place.

With respect to a single month, income return is defined as:

$$IR_t = \frac{NI_t}{(CV_{t-1} + CExp_t)} * 100$$

Where:
IR_t is the income return in month t;
CV_t is the capital value at the end of month t;
CExp_t is the total capital expenditure (includes purchases and developments) in month t;
NI_t is the day-dated rent receivable during month t, net of property management costs, ground rent and other irrecoverable expenditure.
Monthly figures are compounded over 12 months to give an annual rate.

SEPARATION OF INCOME AND CAPITAL COMPONENTS

The components of total return are calculated separately using chain-linked time-weighted rates of return. Multi-period capital growth and income return do not sum perfectly to total return, due to the cross product that occurs when capital and income returns are combined within compounded total returns.

OTHER DIRECT REAL ESTATE MEASURES: RENTS, YIELDS AND COST RATIOS

MARKET RENTAL VALUE (MRV) GROWTH

The increase in the market rental value, expressed as a percentage of MRV at the beginning of the month.

MRV Growth_t =
$$\frac{(MRV_t - MRV_{t-1})}{(MRV_{t-1})}$$

Monthly figures are compounded over 12 months to give an annual rate.

GROSS INCOME (GI) GROWTH

The increase in gross rent passing (GI) less ground rent (GR), expressed as a percentage of (GI - GR) at the beginning of the month.

GI Growth_t =
$$\frac{(GI_t - GR_t) - (GI_{t-1} - GR_{t-1})}{(GI_{t-1} - GR_{t-1})}$$

YIELD MEASURES

Initial yield

The rent passing net of ground rent (NR) expressed as a percentage of the gross capital value (GCV) at the same date.

Reversionary yield

The market rental value net of ground rent (NMRV) expressed as a percentage of the gross capital value (GCV) at the same date.

Reversionary Yield_t =
$$\frac{NMRV_t}{GCV_t}$$

Equivalent yield

Only used in the UK and Ireland, the discount rate which equates future income flows to the gross capital value. This is calculated on a quarterly in advance (true equivalent yield) basis. The equivalent yield discounts the current rental value in perpetuity beyond the last review date recorded for the tenancies in the subset.

Equivalent yield is calculated by solving the equation iteratively for the rate *r*:

GCV_t =
$$\frac{NR_{Y1} / 4}{(1+r)^0} + \frac{NR_{Y1} / 4}{(1+r)^{0.25}} + \frac{NR_{Y1} / 4}{(1+r)^{0.5}} + \frac{NR_{Y1} / 4}{(1+r)^{0.75}} + \frac{NR_{Y1} / 4}{(1+r)^1} + ...$$
$$+ \frac{FCF / 4}{(1+r)^{9.75}} + \frac{FCF / 4}{(1+r)^{10} * (1 - (1 + r)^{-0.25})}$$

Where:
GCV_t is the capital value gross of purchasers' costs in month *t*;
NR is the net projected rental income; *r* is the equivalent yield;
FCF is the final cash flow in the tenth year.

COST RATIOS

In markets where real estate owners face heavy outgoings from their gross income, such as the Nordic region, the Netherlands and South Africa, it is important to benchmark income lost through non-recoverable operating costs.

Comparison of the operating expenses of similar properties can be made through the following measurements to assess the impact on overall returns:

- Total gross operating costs (both irrecoverable and recoverable) as a percentage of gross income.
- Total gross operating costs per square metre.
- Total net operating costs (irrecoverable) as a percentage of gross income.
- Total net operating costs per square metre.

These cost ratios can be further analyzed by comparing each type of cost such as utilities, insurance, taxes, maintenance, management and letting, with the operating income and with floor space. Cost ratios may also be sub-divided into fixed and variable costs.

DIRECT REAL ESTATE EXPLORATORY TECHNIQUES

ATTRIBUTION ANALYSIS AND WEIGHTED CONTRIBUTIONS TO RETURNS

Attribution analysis is a powerful technique for understanding the reasons for a portfolio's outperformance or underperformance of a benchmark. It breaks down the relative return into structure-specific and property-specific scores, allowing the influences of sub-market allocations and asset selection to be clearly distinguished.

This section explains the computation of attribution analysis scores, together with the statistical components that underlie those calculations.

Relative return

The ratio of the return of the portfolio, segment or individual asset, to that of the chosen benchmark, expressed as a percentage.

RR_t =
$$\left[\frac{(1 + PtRet_t / 100)}{(1 + BmkRet_t / 100)} \right] * 100$$

Where:
RR_t is the relative return in month *t*;
PtRet_t is the portfolio return in month *t*;
BmkRet_t is the benchmark return in month *t*.

Average capital employed

For a single month, capital employed is calculated as the sum of the start-month capital value of all assets covered and the capital expenditure over the month. This is the denominator of the monthly total return, capital growth and income return measures.

For a period of more than one month, there is no single figure for annual capital employed. In such cases (for example for one year), average capital employed is the arithmetic mean of the capital employed for each month in the period.

Where:
WTC_t is the weighted contribution for set k;
AtNum_{k,t} is the asset numerator from set k in month t;
PtDen_t is the portfolio denominator in month t.

Weighted contribution to absolute portfolio return

The weighted contribution of an individual asset or group of assets (set k) to the return of the portfolio over a defined period (n months) is its money return over the reporting period (the sum of monthly total return numerators) expressed as a percentage of the portfolio average capital employed for the period.

$$WTC_k = \frac{\sum_{k=1}^m \sum_{t=1}^n AtNum_{k,t}}{(\sum_{t=1}^n PtDen_t) / n} * 100$$

Weighted contribution to relative portfolio return

This is a measure of the contribution of an individual asset or group of assets to the relative return on the portfolio to the benchmark over a defined period.

It is calculated for a single month as the relative return of an asset weighted by that asset’s capital employed (to give a money numerator of the asset’s relative return), expressed as a percentage of the whole portfolio’s capital employed.

Over a period of more than one month, the weighted contribution is calculated as the sum of the monthly relative return numerators as a percentage of the whole portfolio’s average capital employed for the period.

Where:
WTCRR_t is the weighted contribution to relative return in month t;
RR_{k,t} is the relative return from set k in month t;
AtDen_{k,t} is the asset denominator from set k in month t;
PtDen_t is the portfolio denominator in month t.

$$WTCRR_k = \frac{\sum_{k=1}^m \sum_{t=1}^n [RR_{k,t} * AtDen_{k,t}]}{(\sum_{t=1}^n PtDen_t) / n} * 100$$

Attribution of relative returns

Attribution analysis distinguishes that part of the relative return derived from the portfolio’s abnormal weightings in strong or weak sectors of the market (structure score), from that part derived from the exceptional performance of the assets in the portfolio within each segment of the market (property score). The analysis is performed month by month.

Structure score - The portion of relative return attributable to the weighting of the portfolio relative to the benchmark in each of the segments used in the analysis. It is calculated on a monthly basis as:

Where:
SS_t is the structure score in month t;
PtSegW_t and **BmkSegW_t** are the portfolio segment weight and benchmark segment weight (as a proportion of capital employed) respectively;
BmkSegR_t is the benchmark segment return;
BmkR_t is the overall benchmark return;

$$SS_t = (PtSegW_t - BmkSegW_t) * \left[\frac{(1 + BmkSegR_t / 100)}{(1 + BmkR_t / 100)} \right] - 1$$

Thus, if a portfolio has an above-average weighting in a strongly performing segment of the market, the structure score for the segment is positive. Conversely, an above-average weighting in a poorly performing segment of the market results in a negative structure score.

Monthly scores are chain linked to calculate quarterly and annual structure scores.

Property score - The portion of relative return attributable to the performance of the portfolio’s properties relative to the benchmark for each segment. It is calculated as:

$$PS_t = SAW_t * \left[\frac{(1 + PtSegR_t / 100)}{(1 + BmkSegR_t / 100)} - 1 \right]$$

*SAW_t is calculated thus: $SAW_t = PST_t * \left[\frac{(1 + BnkSegR_t / 100)}{(1 + \sum_{seg=1}^L PtSegW_t * BmkSegW_t)} \right]$

Thus, if a portfolio’s properties have recorded above-average returns relative to the benchmark in a segment of the market, the resultant property score is positive; if their performance is below-average, the score is negative. Monthly scores are chain-linked to calculate quarterly and annual property scores.

Where:
PS_t is the property score in month t;
SAW_t (segment adjusted weight) is the proportion of capital employed in the portfolio, adjusted by the growth rate of the segment relative to the benchmark*.
PtSegW_t and **BmkSegW_t** are the portfolio segment weight and benchmark segment weight (as a proportion of capital employed) respectively;
PtSegR_t is the portfolio segment return;
BmkSegR_t is the benchmark segment return.

DECOMPOSITION OF CAPITAL GROWTH

The data collected by MSCI allow the underlying drivers of capital growth to be identified, isolating the separate effects of changes in market rental values and changes in valuation yields or capitalization rates.

Changes in open market values – and therefore in capital growth rates – generally depend on changes in levels of market rents and investment yields, each sifted through lease structure effects on income. For analytical purposes, relative capital growth for a property, sector or fund is explained in terms of three components: the rate of rental value growth, the yield impact and a residual term, all computed on a consistent set of standing investment properties.

Consistent set

Properties are generally only included in these measures where they satisfy the following conditions during the month:

- They are not a purchase, sale or development in the month.
- They have had a previous actual valuation as a standing investment.
- They have an open market rental value at both the start and the end of the month.
- They have a yield at both the start and end of the month.

Market rental value (MRV) growth

The increase in the market rental value, expressed as a percentage of MRV at the beginning of the month, as defined above.

Monthly figures are compounded over 12 months to give an annual rate.

Yield impact

This measure indicates the effect of yield change on capital growth. It is calculated monthly as the ratio of the month-start to month-end yield with the sign reversed, so that a rise in yields is shown as a negative impact and vice versa.

Where:
SYld_t is the yield at the start of month t;
EYld_t is the yield at the end of month t.

$$\text{Yield Impact}_t = \left[\frac{\text{SYld}_t - \text{EYld}_t}{\text{EYld}_t} \right] * 100$$

The monthly figure is calculated on a consistent set of properties and compounded over the relevant period.

Residual

In the analysis of capital growth, the residual is that part of the change in value that is not attributable to either MRV growth or yield impact, for those standing investments with complete rental value and yield data. This is normally due to unanticipated changes in income from new lettings or vacancies, abnormal lease terms or over-renting, that may distort the impact of changes in market rental values.

Yield measures – the measures of initial yield, reversionary yield and equivalent yield are defined earlier in this section.

INCOME PROJECTIONS

Income projections play an important role in the calculation of capital values used in performance measures (see above).

MSCI income projections and related measures are constructed from tenancy level data on lease terms, rent passing and market rental value, where available.

Income projections are based on the following assumptions:

- **Letting of vacancies and developments** – Vacant units and developments are assumed let from the actual or estimated rent start date. The anticipated rent start date for developments is taken to be the rent commencement date under a pre-let agreement or the date a developer guarantee takes effect. Otherwise the portfolio manager’s expected rent start date is taken. If the expected rent start date is not known, MSCI assumes a letting date for developments at the end of a 30 month construction phase. If the letting date is not known for vacant completed properties, units are assumed to be let after 18 months.

- **Contracted rent passing** – Throughout the income analysis, all measures related to top slice (see below) and future income growth prospects are based on the contracted tenant rent.

Over-renting – Where open market rental values are below current tenant rents, properties are termed ‘over-rented’.

Top slice income – Where current rent is above open market rental value, the excess income is termed ‘top slice’ income.

Income growth potential – Two measures of income growth potential are available, the conventional reversionary potential and yield ratio.

Reversionary potential – the ratio of current market rental value to rent passing (both gross of ground rent), expressed as a percentage.

Yield ratio – the ratio of equivalent yield to the reversionary yield. This is only available for markets where equivalent yield can be calculated.

Vacancy – a vacant unit is defined as having:

- No lease.
- No previous lease holding over.
- No temporary contract in place.
- Any previous lease has been disclaimed.

Vacancy does not apply to tenants in administration where leases are technically in place.

Vacancy rate – this is calculated in terms of both market rental value and floor area:

- The sum of market rental value in vacant units as a percentage of total market rental value excluding development units.
- The sum of vacant floor area in completed properties as a percentage of total lettable floor area. Floor area is scaled down by the ownership share.

PORTFOLIO RISK ANALYTICS

MSCI measures real estate portfolio risk using standard statistical measures, and analyses the sources of risk based on a wide variety of factors specific to real estate assets.

MSCI reports the volatility of returns using the following traditionally defined measures:

Risk or volatility – Portfolio or asset risk is defined as the standard deviation of the series of annual returns around the arithmetic mean.

Tracking error – The standard deviation of the arithmetic difference computed between the return of the portfolio and that of the benchmark. The tracking error shows the extent to which a portfolio’s returns move in line with its benchmark over a given time period.

Risk adjusted return – The ratio of the arithmetic average return over the period to the volatility of returns measured by the standard deviation.

Where:
 σ is the standard deviation of the monthly relative returns over the period.

Sharpe Ratio – The ratio of risk premium, defined as the average return less the risk free rate of return (assumed to be that of medium to long term government bonds) to the total risk of the portfolio (measured by the standard deviation).

Risk adjusted relative return – The volatility or risk adjusted relative return is the ratio of the arithmetic mean of a portfolio's relative return over a defined number of periods to the standard deviation over the same number of periods.

$$\text{Risk Adjusted Relative Return}_t = \text{Relative Return}_t / \sigma$$

PERFORMANCE AND RISK ANALYTICS: METHOD SPECIFICATIONS

In addition to the above, and primarily for the purpose of investigating the sources of volatility, MSCI breaks down portfolio and benchmark risk into 10 constituent factors, identifying where the strengths and weaknesses of a portfolio lie. Analyses also explore the relationship between performance and risk.

At asset level, measurement extends to the risk derived from covenants, lease length, vacancy and development exposure.

At portfolio level, analyses focus on concentration risks (asset, location and tenant concentrations), exposure to risky markets and income risk.

At fund level, the debt profile is added to give a complete picture of risk.

Asset risk factors

- **Development exposure** – Percentage of capital employed in developments at period-end. The higher the development exposure, the riskier the portfolio's structure.
- **Vacancy rate** – Sum of market rental value in vacant units as a percentage of total market rental value. The vacancy rate calculation excludes developments. The higher the vacancy rate, the riskier the portfolio's structure.
- **Unexpired lease term** – Average number of years left to expiry. The longer the unexpired lease term, the safer the portfolio's structure.
- **Risky covenants** – Rent exposure to risky covenants. Risky covenants are defined as tenants whose Risk Band is High Risk or Maximum Risk (derived from Dun & Bradstreet data). The higher the exposure to risky covenants, the riskier the portfolio's structure.

Portfolio risk factors

- **Asset concentration** – Percentage of a portfolio's capital value that is held in its five largest assets. The higher the asset concentration, the more vulnerable the portfolio is to events affecting those assets.
- **Location concentration** – The five locations to which the portfolio is the most exposed (by capital value). Standard MSCI regions are used to define the locations. The higher the concentration, the riskier the portfolio's structure.

- **Company Concentration** – Percentage of a portfolio's contracted rent that is derived from its 10 largest companies. A company is the aggregation of all the tenants with the same name. The higher the company concentration, the riskier the portfolio's income profile.
- **Structural difference** – The extent to which a portfolio's structure differs from the benchmark structure, in terms of capital value in each market segment. A score of zero indicates that the portfolio structure matches that of the benchmark exactly. The higher the score, the more different is the portfolio structure to the benchmark structure. The higher the difference score, the riskier the portfolio's structure.

$$\text{Structural Difference}_t = \sum_{\text{seg}=1}^L (\text{PtSegCV}_t - \text{BmkSegCV}_t)^2$$

Where:
 PtSegCV_t is the segment proportion of portfolio capital value in month t ;
 BmkSegCV_t is the segment proportion of benchmark capital value in month t .

- **Segment volatility exposure** – The degree of portfolio exposure to the more volatile segments of the market. Volatility is measured by a weighted beta. Where available, 15-year beta coefficients are calculated for each market segment against the benchmark all property return. The portfolio level weighted beta is calculated by weighting each segment by capital value exposure. The higher the weighted beta, the riskier the portfolio's structure.
- **Income return** – 12-month income return calculated as the net income receivable for the year, expressed as a percentage of the capital employed over the year. This measure is preferred to a forward-looking yield as it does not incorporate future (uncertain) income, and to initial yield as it is a measure of actual income collected rather than potential income. Though not commonly used as a measure of risk, it is included because the income component of total return is invariably more secure and less volatile than the capital component. Therefore the assumption is that the higher the income return, the safer the portfolio's structure.

SPECIALIST PERFORMANCE MEASURES: TRANSACTION LINKED INDEXES

In recent years, MSCI has developed a hybrid index methodology which combines transaction information with standard valuation data in order to give a more robust measure of the volatility in direct real estate markets. The methodology, which falls into four distinct stages, is summarized below.

Stage 1 – Create dataset

The dataset used to create transaction linked indexes is the same as that used to produce standard IPD valuation-based indexes. Some filtering is required so that the model is not distorted by extreme cases and that an adequate valuation history is available.

All Continental European countries with a statistically sufficient sample are modelled together using data specified in Euros and then converted to local currency. The UK has an independent model as its data series extends back further than that used to generate Continental European transaction linked indexes.

Stage 2 – Regression on sale sample

For each quarter’s model, sales from the preceding six months are identified. This reflects the fact that, owing to the low liquidity of property investments, there are usually insufficient sales in a single quarter for stable models to be estimated.

A reference set of valuations for each sale sample is defined using valuations two quarters prior to the quarter being analyzed. This aims to ensure that the valuations are not influenced by sale negotiations. In the case of national markets with biannual or annual valuations, interpolated figures are used for dates between actual valuations.

Once the relevant sales and their reference valuations are defined, the natural log of the sale price and the capital value in each case are computed. Meanwhile, dummy variables are created to identify the main property type and the country of each asset in the dataset. The dummy variables are defined to strike a balance between disaggregation and representation, such that sales for each category are observed in the majority of periods.

An Ordinary Least Squares (OLS) regression is then run for every quarter in the time period. The regression model has the following form:

Where:
t identifies a particular quarter;
j identifies a country and D_j is a vector of country dummies;
k identifies a sector and D_k is a vector of sector dummies;
P is the gross sale price and
V is the most recent uninfluenced capital valuation (t-3).

$$\ln P = \alpha + \beta_1 \ln V + \beta_2 D_j + \beta_3 D_k + \varepsilon$$

Stage 3 – Mass appraisal of all assets

The coefficients from the regressions are used to predict sale prices for assets that were not traded. Two predictions are made for properties held in each quarter. First, a start price is predicted using coefficients from the regression on the sale sample for the preceding period.

Second, an end price is predicted from the output for the regression on the sale sample for the current period. So, for Q4, predicted start prices are derived from the regression on Q2-Q3 sales and predicted end prices are derived using the regression on Q3-Q4 sales.

These predicted prices are in log form rather than the cash terms that are required for generating indexes. The predicted log prices are transformed in the following manner to correct for bias:

Where:
σ² is the Mean Squared Error of the regression generating the predicted price.

$$\hat{P} = \exp(\ln \hat{P}) * \exp\left(\frac{\hat{\sigma}^2}{2}\right)$$

Stage 4 – Generation of index

The transformed start and end prices are then each summed for all assets within a particular country or sector. The difference between these two totals, in percentage terms, represents a value-weighted capital return derived from transaction evidence.

These rates of change are chain-linked quarter-on-quarter to produce time series by country and sector.

FUND INVESTMENT RETURN COMPUTATION METHODS

All of the above methods build up from the level of the individual assets (or liabilities) and seek to report the performance of investment portfolios and markets which comprise large and small aggregations of these assets. The financial overlays which characterize the investment vehicles in which the assets are held are deliberately excluded.

The IPD fund indexes compliment these more granular analyses by working from the top down, treating the funds themselves rather than the assets they hold, as the investment products. They measure the performance of unlisted real estate investment funds. These indexes take account of the performance of the properties held within the fund structure, together with the impacts of non-property assets, cash holdings, debt, and fees, to produce an overall investment return. MSCI produces fund indexes for many national markets, either annually or more frequently. The IPD fund indexes can be used for both market measurement and performance benchmarking purposes (see Section 1).

MSCI uses a monthly time-weighted return (Method 1) for all fund indexes, except in the US where it uses the quarterly Modified Dietz methodology (Method 2), to address client requirements. For global reporting, US data are converted in order to allow a time weighted return to be computed in a uniform manner.

It should be noted that the calculations described below are applicable to individual funds as well as to the whole market as covered by an index.

MONTHLY TIME-WEIGHTED RETURN (METHOD 1)

The total return on the Net Asset Value (NAV) is calculated as the current month-end NAV less the previous month-end NAV, plus any distributions accrued/declared for the current month (‘ex-dividend’ distribution), expressed as a percentage of the capital employed. If no ex-dividend distribution information is provided or estimated, the distributions included will be the actual distributions made (‘as paid’).

The capital employed is defined as the previous month-end NAV multiplied by the number of units in issue.

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

The funds included in the index are weighted according to their NAV at the beginning of the measurement period.

To avoid double counting, where a constituent of the UK index has an investment in another constituent, the NAV of that investment is deducted from the NAV weighting in the index of the investee fund.

Monthly market total return

In broad terms, month-end fund (NAV) market total returns are calculated by aggregating the return on investment (numerator) and capital employed (denominator) components of each fund’s per unit total return together, for all funds contributing to a fund universe.

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.

The following steps are undertaken when calculating fund (NAV) total returns for use in property fund indexes:

$$\text{Fund Return}_t = \left[\frac{\text{UtNAV}_t - \text{UtNAV}_{t-1} - \text{UtNCI}_t + \text{UtDist}_t}{\text{UtNAV}_{t-1}} \right] * 100$$

Before being incorporated into an aggregate market measure, each fund's per unit numerator and denominator is multiplied by the number of units in existence at the start of the month. This process is applied for the purpose of ensuring that the weight of each fund, in terms of NAV, is reflected in the overall market total return.

Where:

n is the number of funds in the market sample;
UtR_{i,t} is the return per unit in month t of fund i;
UtCapEmp_{i,t} is the capital employed per unit in month t of fund i;
Units are the current number of units in issue by each fund in the universe, less cross-holdings (UK only).

$$\text{Market Return}_t = \left[\frac{\sum_{i=1}^n (\text{UtR}_{i,t} * \text{Units}_{i,t-1})}{\sum_{i=1}^n (\text{UtCapEmp}_{i,t-1} * \text{Units}_{i,t-1})} \right] * 100$$

Annualized rates of return

For any period longer than a quarter, investment return is shown in fund outputs as an annualized rate of return. This is the geometric mean of the individual rates of return for a series of years. It is calculated as the nth root of the final index value, converted back to a percentage:

$$\text{Annualized Rate} = [(X_t / 100)^{1/n} - 1] * 100$$

OTHER FUND MEASURES

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

$$\text{Net Debt over NAV}_t = \left(\frac{\text{Gross Debt}_t - \text{Cash}_t}{\text{NAV}_t} \right) * 100$$

- Gross debt as a percentage of NAV

$$\text{Gross Debt over NAV}_t = \left(\frac{\text{Gross Debt}_t}{\text{NAV}_t} \right) * 100$$

- Gross debt as a percentage of GAV

$$\text{Gross Debt over GAV}_t = \left(\frac{\text{Gross Debt}_t}{\text{GAV}_t} \right) * 100$$

12 month distribution yield or gross yield

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, and are gross of tax.

$$\text{Gross Yield}_t = \left(\frac{\sum_{t=1}^{12} \text{Distributions}_t}{\text{NAV}_t} \right) * 100$$

Bid/offer spread

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.

$$\text{Bid/Offer Spread}_t = \left(\frac{\text{Offer Price}_t - \text{Bid Price}_t}{\text{Offer Price}_t} \right) * 100$$

MODIFIED DIETZ METHODOLOGY (METHOD 2)

Modified Dietz Methodology fund level returns are used exclusively in the US and Canada. Gross of fees fund level return is defined as:

$$\text{Gross Fund Return}_t = \left(\frac{\text{Appreciation}_t + \text{NIY}_t}{\text{AvWtdEq}_t} \right) * 100$$

Where average weighted equity is: AvWtdEq_t = NAV_{t-1} + $\sum_{i=1}^n [\text{Days}_{i,t} * \text{NCI}_{i,t}]$

The capital component of the numerator is defined as the net appreciation of all assets and interests both realized and unrealized. The realized and unrealized capital components are adjusted to offset the inclusion of distributed income in net investment income. This includes both distributed and retained income.

Where:

NIY_t is the net investment income in month t;
AvWtdEq is average weighted equity*
Days_{i,t} is the number of days;
NCI_{i,t} is the net capital invested.

In calculating capital employed a Modified Dietz methodology is applied: contributions and capital distributions are added to the start of the period NAV. They are both weighted to reflect the number of days they have been in the fund.

Net of fees fund level return is defined as:

$$\text{Net Fund Return}_t = \left(\frac{\text{Appreciation}_t + \text{NIY}_t - \text{Fees}_t}{\text{AvWtdEq}_t} \right) * 100$$

Where fees are restricted exclusively to those applied at fund level.

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

Where:
 $\text{WtdAvFdEq}_{i,t}$ is the weighted average equity of fund i in month t;
 WtdAvIndEq_t is the weighted average index equity in month t;
 $\text{FdR}_{i,t}$ is the weighted average return of fund i in month t;

$$\text{Index Return}_t = \sum_{i=1}^n \left(\frac{\text{WtdAvFdEq}_{i,t}}{\text{WtdAvIndEq}_t} * \text{FdR}_{i,t} \right)$$

RECONCILING ASSET-LEVEL AND FUND-LEVEL RETURNS

As well as calculating fund-level performance, MSCI measures the impact of each financial layer of the fund on its overall return. Starting from the asset level, each fund financial overlay (debt, cash, etc) is successively added to the return on the underlying assets to widen the scope of the calculation of fund-level performance. The arithmetic difference between two successive return levels (before and after a new layer has been added) shows the impact of a given layer.

SECTION 3:
DATA RULES FOR PERFORMANCE REPORTING

REPORTING ROBUSTNESS

ASSET, PORTFOLIO AND FUND CONFIDENTIALITY RULES

In order to protect the confidentiality of both asset and fund level data provided by each contributor, MSCI applies strict confidentiality rules which set the minimum number of constituents necessary to permit the reporting of a sample dataset. In any aggregate, the minimum acceptable number of portfolios and assets is respectively three and five.

INVESTOR AND VALUER DOMINANCE RULES

In order to avoid the possibility of the overwhelming weight of one portfolio or valuer compromising the representativeness of an index or benchmark, MSCI employs investor and valuer dominance rules and guidelines when determining the composition of an index or benchmark.

MSCI monitors portfolio and valuer dominance in all countries and sectors of the market. When calculating an index, maximum weights for single contributing portfolios and valuers are calculated based on capital value. In the UK and Southern Europe, when the weight of a contributor in an index exceeds 50% of capital value, MSCI contacts the relevant contributor and requests approval to publish the index, or changes market segmentations if these are influenced by dominance issues. Dominance in other countries is also monitored and action is taken based on local market conditions and the knowledge and experience of MSCI in the country. Most cases where an individual portfolio or valuer appears to be dominant are resolved by changing segmentations.

ASSET, PORTFOLIO AND FUND COMPLETENESS AND ADEQUACY RULES

In order to avoid “cherry picking” results and to provide a more accurate and fair assessment of market performance, each contributor has an obligation to provide data relating to all the assets held within each reported portfolio, that are complete at the individual property, and, where appropriate, portfolio and fund level. To confirm this, MSCI checks that all mandatory fields are provided and applies statistical and logical tests to the data received (see Section 1 above).

VALUATION ACCURACY CHECKS

Although valuations often differ markedly from the prices achieved in subsequent individual transactions, MSCI assumes that at the aggregate level, open market valuations are unlikely to differ systematically from transacted prices.

Once a year, in all countries where this is feasible, MSCI monitors the average spread between valuations and transacted prices in order to assess the extent to which headline indexes reflect transaction price variations. To do this, MSCI reviews all properties that have been bought or sold during the year and examines the difference between the transacted price and the preceding valuation, adjusted for estimated sector market value changes that occur between the valuation and transaction dates.

Properties where valuations were conducted less than three months before a transaction are not included in the analysis, as they may have been valued with knowledge of the agreed sale price, and thus bias the conclusion.

Assessment of the representativeness of market reports

Where MSCI publishes market reports, it checks that the dataset employed is representative of that market in its entirety. In order to assess its representativeness, the aggregate value of all properties in the reporting dataset is compared with independently published reports and assessments of the size and structure of the relevant full real estate investment market. Most of the evidence used in these assessments is collated as part of MSCI's annually updated Market Size surveys for the real estate product line (see below).

REPORTING SAMPLE COMPOSITION

EXCLUSIONS FROM INDEXES AND MARKET REPORTING

MSCI runs a data quality assessment process during every data update, for the purpose of identifying errors that may have been missed by data contributors ("bad data"). If these errors cannot be corrected in time for index calculation, the relevant assets are excluded.

"Bad data" comprises:

- Missing data (not provided).
- Data that does not comply with MSCI Data Standard definitions.
- Contradictory data: classifications or values which are inconsistently reported within or across asset records.
- Questionable results, including exceptional period-to-period movements, outliers, and illogical movements in relation to other measures or asset classifications, for which no explanation has been provided by the data contributor.

This change is consistent with the application of automatic and thus non-discretionary exclusion rules, agreed after consultation, as appropriate for specific markets. These rules will continue to be applied to the market indexes published for the UK and Ireland with regard to:

- Assets with capital expenditures or receipts equivalent to at least 10% of capital value.
- Short leasehold properties.
- Long leasehold/fixed rent properties.
- Changes in ownership share.
- Properties with OMRV of zero.
- Ireland (Republic) and Channel Island assets.
- Owner occupied properties.

RULES FOR INCLUSION IN BENCHMARKS

All properties within constituent portfolios are included in the performance benchmarks for a particular geographical location. Benchmarks are designed to reflect actual investor returns in real estate including profits/losses from active management and the particular risks and costs associated with investment in a real asset. Benchmarks measure actual manager performance and include all properties, including those subject to development, refurbishment, transactions and extreme or unusual events.

Properties that have been subject to active management, resulting in their exclusion from indexes, are included in benchmarks.

RULES FOR EXCLUSION FROM BENCHMARKS

Complete portfolios or individual assets may be excluded from benchmarks for a particular period. Before this is done, a thorough examination of the validity of the exclusion is carried out. A portfolio or asset may be excluded from a benchmark for the following reasons:

- Incomplete mandatory data (see Section 1 above) for the period under analysis.
- Anomalous/apparently inaccurate data that cannot be confirmed with contributors before the formal release of results.
- Historical records of properties held in portfolios newly joining the benchmarking service. These records are excluded from frozen composition benchmarks.
- Historical records of portfolios for which valuations are irregular in frequency or data are otherwise incomplete or unsatisfactory.
- Historical data for properties of specific types that pre-date the existence of complete records for a portfolio: e.g., partial data on UK agricultural properties prior to 1970.
- In the case of merged or split portfolios, historical records prior to the split or merger to avoid double counting.
- Where the same property interest might be included in two portfolios, e.g., a pension fund and the management house that oversees that pension fund to avoid double counting.

INDEX AND BENCHMARK COMPOSITES: MARKET SIZE REBALANCING

The IPD multinational composite indexes aggregate the performance of a set of countries, requiring the results from each country to be re-weighted in a consistent way. As MSCI is unable to provide 100% market coverage due to the voluntary basis of data submission, meaning that the level of coverage varies from country to country, results from each country must be re-weighted to reflect their underlying market sizes as accurately as possible.

MSCI undertakes an annual Market Size survey to estimate the overall extent of each national property investment market for which it publishes an index. In this context, a national market is confined to professionally managed investment interests held in portfolio structures. Lists of real estate funds are compiled by MSCI client consultants based in each region and then processed by MSCI to identify the total unlevered direct real estate holdings in each country, including those held within any new real estate funds that have been formed over the past year.

The results of this analysis, in terms of year end capital value, are used for weighting individual markets in composite indexes such as:

- IPD Global Annual Property Index.
- IPD Pan-Europe Annual Property Index.
- IPD Nordic Annual Property Index.
- IPD Iberia Annual Property Index.

From 2016, the weights will be calculated from estimates of the investment capital employed in each included market. To adjust capital value to estimate capital employed, we will assume the same level of activity in the market as we have recorded within the universe data. The ratio of capital employed to capital value for each month in the universe data will be applied to the estimated market capital value, to approximate the market capital employed.

CURRENCY CONVERSION

Many IPD multi-national indexes and benchmarks cover more than one currency area. As the underlying property or fund data are always collected in local currency terms, the calculation of these indexes and benchmarks 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.

FIXED RATE CONVERSION

For fixed-rate reporting, all historic data are converted at a single exchange rate as at the end of the most recent reporting period, with the result that no currency impact is seen in the reported results. All assets covered by this method of conversion display their original home currency performance. This method is currently used for clients requiring local currency reporting and is applied to benchmark reports and to national digest products.

The current method of using a single fixed rate to eliminate the impact of exchange rate fluctuations from asset performance leads to a systematic restatement of results when the exchange rate is periodically reset to the latest month in the analysis. From 2015, we have introduced a new method to generate 'local currency' reporting, in place of the single fixed rate conversion described above. Monthly fixed rates are used instead for converting the raw data, eliminating the need for restatement.

The monthly fixed rate method has so far only been applied to the Multinational Intel product, but will be used in all products from 2016. The application of this methodology for different performance measures is as follows:

- For growth measures, we convert the relevant data using a single exchange rate, that of the base month. For example, the data required for December 2014 growth rates are converted at the November 2014 exchange rate.
- For all spot measures – such as capital value, rent passing, rental value and capital expenditure – with data collected as at month-end, we convert values using the corresponding month-end exchange rate. For example, December 2014 rent passing is converted using the December 2014 exchange rate.

- Similarly for spot ratios, such as initial yield, the appropriate month end exchange rate is used to convert both the numerator and denominator values in the calculation.
- For measures which are calculated by summation over time, such as 12-month net investment or net income per square metre (where the numerator is calculated by summation), conversion is performed at the end month rate for the final month. Note that in 2016 these kinds of measures will be calculated using a variable rate (see below).

VARIABLE RATE CONVERSION

For variable rate reporting, each data item is converted using the corresponding month-end midrate, defined as the median of the bid and offer rates on the last day of the month. Performance measures based on variable rates include the impact of monthly changes in exchange rates.

From 1994, MSCI has used exchange rates from WM Reuters, and before that from EcoWin and others.

FROZEN HISTORY REPORTING

In most cases, the IPD indexes and benchmarks are subject to historical restatement when new data become available or corrections are made, in order to maximize the robustness and accuracy of the reported historical results. However, when the sample size for a market is large and the impact of including additional data contributors is therefore relatively small, value may be gained from fixing ("freezing") historical results. A key advantage of fixing the reported index history is to simplify the creation of derivatives and other synthetic products which are linked to the index. The decision to freeze an index is made only after discussion with local market consultative groups.

Frozen indexes currently include:

- The major indexes published for the UK, France and the Netherlands.
- The AREF/IPD UK Quarterly Property Fund Index.
- The Mercer/IPD Australia Monthly Property Fund Index - Core Wholesale.

Historical total return, income return and capital growth results are frozen for headline indexes and the all property, retail, office, industrial, residential and other sectors of a frozen index. More granular performance series based on property type, geography and other criteria remain "unfrozen", as the impact of new data contributors may be significant for these groupings, with any one data contributor potentially representing a large weight within the total.

MSCI reviews each unfrozen national market index annually in consultation with local market participants, to decide whether these indexes should also be frozen.

This decision is based on the likelihood of future revisions to historical data, which will depend on:

- Market coverage level: The higher the ratio of MSCI data coverage to the estimated total real estate investment market, based on the annual real estate Market Size survey (see above), the greater is the likelihood that historical market results will remain unchanged through the addition of new portfolios to the dataset.
- Review of historical restatement: Comparing the difference between published results and results including any newly submitted data gives an indication of the consistency of historical results.
- Trends in valuation frequency: Changing portfolio valuation frequencies will affect the number of portfolios available to contribute to a particular index.
- Trends in numbers of portfolios joining the dataset and their perceived likelihood of supplying historical data.

If a decision is taken to freeze an index, that decision will be made by year-end, announced to the public and implemented in the following annual index update cycle.

POLICY AND PROCEDURE FOR CHANGES IN CONTRIBUTORS

MSCI's goal is to cover the largest possible proportion of each professionally managed real estate investment market. We therefore make continual efforts to increase data coverage, from both existing and new portfolios. MSCI requests that contributors supply data for the entire life of a portfolio. However, in some circumstances, such as the liquidation of a portfolio, MSCI may not receive the information required.

The composition of each index is reviewed in advance of each reporting date and significant changes are communicated to the market. As part of this review, the dominance of any single contributor (see Section 3) is checked before the publication of each index.

A document on the MSCI website contains a statement of transparency for each index, detailing the number and total value of constituent portfolios in each market sector.

The recruitment of new contributors and withdrawal/termination of existing contributors are normal events in the production of the IPD indexes; there is no formal policy to announce these changes unless the change is deemed material. In situations where the composition change is considered material by the Real Estate Index Committee, an index announcement detailing the change will be published on the MSCI website.

PROCEDURE FOR HISTORICAL DATA SCREENING

MSCI requests a full historical data record for any portfolio entering its databases for the first time. As detailed historical data may in practice be difficult to provide or may not even exist, MSCI will accept a contributor's assessment of the data history. All such data are checked using standard MSCI procedures (see Section 1 above). The impact on the relevant index of the additional data will be reviewed internally prior to their inclusion.

REPORTING METHODOLOGY ISSUES

POLICY AND PROCEDURE FOR CHANGES IN METHODOLOGY

MSCI takes a considered approach to methodology changes, involving both internal and external consultation, a formal internal sign off procedure and the public communication of final decisions concerning the implementation of changes.

Major changes to the IPD index or benchmark methodology are infrequent. In many cases the need for such changes stems from changes to the real estate investment regulatory environment or a shift in industry norms. The former may necessitate a rapid change in methodology while the latter may be a reaction to a more gradual shift in the industry consensus.

The first step taken by MSCI in considering major methodology changes is usually to consult informally with external entities such as clients, consultants, academics and regulators. Their views are distilled and debated internally by MSCI personnel with relevant expertise, who then pass on their findings to the Real Estate Index Committee for consideration. After discussion by the committee, the proposed change in methodology is presented to the MSCI user base through a formal consultation.

The formal consultation takes place over a fixed but sufficient period of time, with a proposal document available for review. Having given the opportunity for comment and feedback, MSCI then consults individually with a cross section of key stakeholders. All feedback is consolidated and a final course of action agreed internally by the Real Estate Index Committee. The final methodology change is then publicly released, both on the MSCI website and at individual and group stakeholder meetings.

SECTION 4: REAL ESTATE INDEX USAGE

Indexes and benchmarks are created and may be used for a variety of purposes ranging from research through portfolio analysis to investment products, and by a variety of market participants including asset owners, portfolio managers, broker/dealers, researchers. Not all indexes and benchmarks are appropriate for all potential uses. Market participants should use their judgment when selecting an index for a particular purpose.

Real estate indexes and benchmarks and the effectiveness of their methodologies can be affected by a number of factors, most of which are beyond MSCI's control. These may include structural changes to the underlying market, including decrease in the size and liquidity of relevant market segments, loss of voluntary data contributions, geo-political events, and regulatory changes. Some of these may result in a material change to composition or even in the termination of an index/benchmark or methodology. If financial product issuers choose to use an IPD real estate index as the basis of an index linked financial product, they should consider this possibility.

APPENDIX 1:

MSCI POLICIES FOR THE IPD INDEX AND BENCHMARK DETERMINATION

INTRODUCTION

MSCI policies and procedures for the determination processes of the IPD indexes and benchmarks are designed to provide consistency in decisions and avoid ambiguity in how particular events are addressed.

The key policies and procedures are described below, under the following headings:

- Universe Change Policy
- Correction Policy
- Methodology Change Policy
- Consultation Policy
- Index Termination Policy

UNIVERSE CHANGE POLICY

INTRODUCTION

Changes in the composition of a data universe can result from various types of event, including the inclusion of a new contributor, missing mandatory input data resulting in the exclusion of whole or part of a contributor's data, and the departure of an existing contributor, and significant shifts in investment strategies.

The aim of this policy is to define and address material impacts resulting from changes in a data universe.

POLICY

Guidelines are provided to data collection and validation teams as to when a change to a universe should be deemed material. These are based primarily upon the resulting overall impact on the universe capital value, but other factors including sector or segment rebalancing and contributor dominance can be relevant. However, the final determination in all cases rests with the Real Estate Index Committee. Any such change, once agreed as material, will be subject to a formal public announcement.

The data histories of departing contributors will be retained. Portfolios with missing mandatory input data for the period concerned will be included in historical universe datasets, while assets with partial information will be excluded only from the current analysis period.

SCOPE

The policy applies only to data universes supporting full indexes, not to consultative indexes.

IMPLEMENTATION

Once a material change in a universe has been identified as such by MSCI, the Real Estate Index Committee reviews and validates it and an announcement is prepared and published on the MSCI website.

CORRECTION POLICY

INTRODUCTION

This policy outlines the way in which MSCI corrects data errors and applies those corrections to indexes, a process described hereafter as "restatement", and communicates these restatements to interested parties.

POLICY

MSCI corrects errors in individual contributor portfolio data once they have been identified, so that reports delivered to clients on their own holdings always reflect the latest-known data. MSCI will restate indexes (frozen and unfrozen) if errors were made over the previous 36 months which were material to the index, as defined below. Such restatements will be published on the MSCI website with an explanation of the corrections made.

Consultative indexes, being in early stages of development, are not subject to this time limit and will be restated at any point following error detection.

SCOPE

This policy addresses the correction of errors, rather than historic index changes due to the addition of historic data from new constituents in the universe. Typical errors include:

- Incorrect capital values or net asset values.
- Incorrect net income on direct properties.
- Incorrect distributions recorded in fund data.
- Incomplete information on capital invested.
- The omission of whole properties or funds.

CORRECTION PERIOD

MSCI applies a 36-month correction period, calculated retrospectively from the date when the error was detected.

For frozen indexes, errors relating to data more than 36 months past are not considered as relevant to index restatement. For unfrozen indexes, outdated errors are reflected in the index history when it is next published, but are not considered relevant for index restatement.

MATERIALITY

Guidelines are provided, both for frozen and unfrozen indexes, to data collection and validation teams as to when a restatement to an index or universe measure should be deemed material. These are based primarily upon the resulting overall impact on the index or universe return, but other factors including capital and income component scores can be relevant. However, the final determination in all cases rests with the Real Estate Index Committee. Any such restatement, once agreed as material, will be subject to a formal announcement.

IMPLEMENTATION

Upon identification of an error, MSCI assesses the impact on the relevant universe. If the error is not material, only contributor data is modified. If the error is material but outdated, contributor data is modified and unfrozen indexes are restated accordingly in the subsequent release. If the error is material and has occurred within the correction period, the error is announced and the index corrected and restated.

SUMMARY OF CASES

	MATERIAL		NOT MATERIAL	
	WITHIN CORRECTION PERIOD	OUTDATED	WITHIN CORRECTION PERIOD	OUTDATED
Frozen	Restate/ announce	No restatement required	No restatement required	No restatement required
Unfrozen				
Error discovered during current calculation cycle	Announce	No restatement required	No restatement required	No restatement required
Error discovered between calculation cycles	Restate/ announce	No restatement required	No restatement required	No restatement required

METHODOLOGY CHANGE POLICY

INTRODUCTION

MSCI methodology changes may arise, among other things, as a response to changes in the regulatory environment or a shift in industry norms. The former may require a rapid change in methodology while the latter is likely to represent the response to a gradual evolution of opinion.

POLICY

MSCI takes a considered approach to methodology changes, involving:

- Internal consultation.
- A formal internal recommendation by the Real Estate Index Committee, taking account of any statistically quantifiable impacts of the proposed change.
- External consultation in all affected markets.
- Consideration of stakeholder feedback.
- Public communication on final decision at least one month before implementation of change.

MSCI does not retain the ability to reproduce historical results based on an old methodology.

IMPLEMENTATION

Proposals for changes to a methodology may be received from various parts of the MSCI business, including Research, Product Management and Client Coverage, or from index users.

The Real Estate Index Committee reviews any proposal, requesting further information if necessary, including an assessment of the practicality of implementation. If the methodology change is considered material and requires the application of significant resources it is presented to the real estate Project Governance Committee for scheduling. If approved, the proposal will be made available for consultation. The Real Estate Index Committee will consider stakeholder feedback and the proposal will be amended accordingly.

Public communication of the planned change will be made well before implementation. This communication will include an explanation of the rationale for the change.

CONSULTATION POLICY

INTRODUCTION

Stakeholder feedback is important and MSCI consults interested parties as appropriate before introducing any changes to methodology.

POLICY

Stakeholder consultation will be undertaken in the case of:

- Material changes in methodology related to the determination of indexes and benchmarks, such as changes to headline performance measures, attribution analysis and risk analysis. Such material changes are determined by the Real Estate Index Committee.
- Decisions to create and discontinue indexes and benchmarks.

MSCI may consult stakeholders at other times on any other issues.

IMPLEMENTATION

Once a proposed change has been agreed by the Real Estate Index Committee, consultation will take place with interested parties as appropriate, including consultative groups for affected national markets. Proposals will be set before affected stakeholders for comment and amended accordingly.

Feedback will be provided publicly on the results of the consultation and on how they have been used in shaping the final change.

INDEX TERMINATION POLICY

INTRODUCTION

The aim of this policy is to establish the conditions under which MSCI will consider discontinuing an index and to describe the steps and precautions taken in these instances.

When a termination is deemed essential, it will not normally be possible to provide or advise of a robust alternative. For this reason, all licensees of the indexes that may seek to develop long or medium term financial products linked to an IPD index must make provisions for the early termination of any such products in such *force majeure* circumstances.

POLICY

Following each annual review of index market coverage ('Market Size' survey), the Real Estate Index Committee will consider discontinuing an index if it is no longer broadly representative of the investment market it aims to support and there appears to be no prospect of this situation improving in the foreseeable future.

Guidelines are provided to data collection and validation teams as to when an adverse change to a universe may require an index termination. These are based primarily upon the resulting impact on overall market coverage, but other factors including sector viability, reduction in data quality to below MSCI standards, and contributor dominance may be relevant. However, the final determination in all cases rests with the Real Estate Index Committee.

SCOPE

This policy applies only to published indexes (not consultative indexes) and universe benchmarks.

IMPLEMENTATION

If the conditions under which MSCI will consider discontinuing an index have been identified, MSCI will investigate any opportunities to remedy the situation, including making efforts to increase the universe size and improve data quality. If after these attempts, MSCI concludes that the situation cannot be remedied, the question of the termination of the index will be brought to external consultation. As part of this consultation process, alternative indexes, benchmarks and market reporting options will be reviewed, as appropriate, although such alternatives are unlikely to be available, at least in the short term (as noted above).

After consultation, the Real Estate Index Committee will consider all feedback and make a final determination with regards to terminating the index. When a decision is taken to terminate the index, it will be publicly announced together with an explanation of the reasons which necessitated the termination.

MSCI will endeavor to provide users and other interested parties with reasonable notice of the change, to the extent possible within the context of the review process.

APPENDIX 2: GLOSSARY OF TERMS

Accruals accounting principle – the assumption that payment is timed to the due date rather than to the date of monetary transfer.

Active management – management that results in significant alteration to the physical condition or letting situation of a property.

Appraisal – see **Valuation**.

Arithmetic mean – the sum of numbers in a series divided by the count

Attribution analysis – technique used to calculate that part of a portfolio's relative return derived from its relative weighting in the strong or weak sectors of the market (structure score) and that part which is due to the exceptional performance of the portfolio's own assets within each segment of the market (property score).

Benchmark – the average against which the performance of a portfolio or group of properties is measured. For MSCI, benchmarks cover all assets and investment holdings including purchases, sales, developments, indirect holdings and where appropriate, other financial assets and liabilities.

Bid/offer spread – difference between the bid and offer prices.

Capital employed – the denominator of the total return, capital growth and income return measures, which is calculated as the sum of the start-period capital value of all assets covered and the capital expenditure over the period.

Capital expenditure – expenditure on purchase, development, refurbishment or major improvement of property.

Capital growth (also known as indirect return) – the increase in the value of a property or group of properties net of capital expenditure, expressed as a percentage of the capital employed.

Capital receipts – receipts for changes in the owner's interest in a property.

Consultative index – an IPD index, usually for a market where MSCI services are in an early stage of development, for which the available data are of insufficient quantity or quality to produce a full index.

Covenant (lease) – in real estate risk analysis, an estimation of the level of a property tenant's credit worthiness. This is usually derived from information from a leading credit rating agency.

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.

Direct return – see **Income return**.

Distribution yield – the sum of a fund's distributions per unit over a period expressed as a percentage of its net asset value per unit at the end of the period.

Equivalent yield – the discount rate which equates future income flows to the current gross capital value.

Fixed rate currency conversion – for multinational real estate reporting, converting all currencies throughout the performance history at a single exchange rate.

Frozen index history – for an IPD index, 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.

Fund Checking Report – report provided by MSCI to contributors showing the detailed performance of their direct property portfolio. This report is used for final review and sign-off of input data by the contributor.

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.

GIPS – Global Investment Performance Standards, created and administered by the CFA Institute.

Gross debt – the total outstanding amount of unpaid debt in a fund, in money terms.

Gross yield – see **Distribution yield** (used in fund reporting).

Ground rent – the rent payable for the use of a site for a fixed period.

Income return (also known as direct return) – the net income receivable for a property expressed as a percentage of the capital employed.

Index – in real estate reporting, a statement of the performance of a real estate market. The IPD indexes are based exclusively upon standing investments in completed and lettable properties, and exclude properties that are purchased, sold or under development or major refurbishment during the measurement period.

Indirect investment/holding – in real estate, investment in a fund or other financial structure which holds property assets.

Indirect return – see **Capital growth**.

Initial yield – the rent passing, net of ground rent, for a property expressed as a percentage of the gross capital value.

International Valuations Standards (IVS) – internationally agreed standards for the valuation of real estate, as established by the International Valuations Standards Council (IVSC).

IOSCO – the International Organization of Securities Commissions.

Irrecoverable expenditure – non-rental costs incurred for the day-to-day operation of a property, which cannot be recovered from its tenants.

Lettable – the state of a property in which it is able to be leased, fully or partially, to tenants.

Market capital value – value of the property as defined by the International Valuation Standards Committee, being “the estimated amount for which a property should exchange on the date of valuation, between a willing seller and a willing buyer in an arm’s-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion”.

Market rental value – the rental income estimated to be achievable were a property or occupational unit to be newly leased, assuming a normal market lease contract.

Market Size Survey – annual survey by MSCI of the value and structure of a national real estate market.

Mid Rate – for currency conversion, the mid-point of bid and offer rates.

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 used by MSCI for fund returns in the US.

Money-weighted – for performance measures, those in which returns generated by different assets or groups of assets are weighted in proportion to their monetary value. All real estate performance measures are money-weighted over monthly periods.

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 income receivable – income receivable on a property from rental contracts or any other sources by the owner over a defined period, less any irrecoverable operating expenditure incurred.

Number of units in issue – the number of units issued to investors in a fund since its inception that are as yet unredeemed.

Open market capital value – see **Market capital value**.

Operating costs – non-rental costs incurred for the day-to-day operation of a property.

Over-renting – for let property units where the open market rental value is less than tenant rent payable, the difference.

Portfolio – a group of properties or other assets managed as an entity on behalf of an investor or investors.

Property management cost – cost incurred by the owner for administering a property, including rent reviews and lease renewals, but excluding portfolio management costs.

Property score – in Attribution Analysis, the portion of the relative return of a portfolio attributable to the performance of its properties relative to their benchmarks in each market segment.

Relative return – the ratio of the return on a portfolio, segment or individual asset, to that of a benchmark, expressed as a percentage.

Rent passing – income receivable annually on rental contracts in place, as at the end of a defined period.

Rent receivable – income receivable on rental contracts from a property by the owner over a defined period.

Reversionary potential – the ratio of current market rental value to rent passing (both gross of ground rent), expressed as a percentage.

Reversionary yield – the open market rental value of a property expressed as a percentage of the gross capital value.

Risk-adjusted return – the ratio of the arithmetic average return over the period to the volatility of returns, measured by the standard deviation.

Sharpe Ratio – the ratio of the risk premium, defined as the average return less the risk free rate of return, to the total risk of the portfolio, measured by the standard deviation.

Standing investment – properties are treated as standing investments following their first actual valuation after completion of development, or after purchase in the case of investment properties, and continue to be included as standing investments until their final valuation prior to sale.

Structure score – in Attribution Analysis, the portion of the relative return of a portfolio attributable to its weightings relative to the benchmark in each market segment.

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.

Top slice income – For property units where current rent is higher than open market rental value, the difference.

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.

Tracking error – the standard deviation of the difference in return between a portfolio and a benchmark. The tracking error shows the extent to which portfolio returns move in line with its benchmark over a given time period.

Transaction linked index – a hybrid market index published by MSCI in which transactions and open market capital values are linked to produce measures of market return. These capture more of the true volatility of real estate markets than is possible using capital values alone.

Unexpired lease term – the period of time remaining until the current lease contract ends.

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.

Vacancy – MSCI defines a vacant unit as one with no lease, no previous lease holding over and no temporary contract in place, and where any previous lease has been disclaimed. Vacancy does not apply to tenants in administration where leases are technically in place.

Vacancy rate – calculated as both the sum of market rental value in vacant units as a percentage of total market rental value excluding development units, and the sum of vacant floor area in completed properties as a percentage of total lettable floor area.

Valuation – the process by which an estimation of market capital value is made for an investment property. The valuation process also generates a large amount of supporting data which is used by MSCI in its analysis of portfolios and markets.

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.

Weighted Contribution to return – measure of the contribution of an individual asset or group of assets to the return of the portfolio over a defined period. The weighted contributions of all the assets in a portfolio sum to its return.

Yield – the ratio of income to capital value expressed as a percentage.

Yield impact – the impact of a change in yield on capital value, expressed as a percentage.

Yield ratio – the ratio of equivalent yield to the reversionary yield. This is only available for markets where equivalent yield can be calculated.

APPENDIX 3: VERSIONING TABLE

VERSION	PUBLICATION DATE	KEY CHANGES
V1.0	March 2016	<p>Clarification of valuation requirements: valuations that are external and compliant with international valuation standards are preferred, but internal valuations and values compliant with a local professional standard are accepted, provided they are Market Values.</p> <p>Change to the Asset Exclusion Policy: reflects the decision to discontinue discretionary asset exclusion and not to exclude assets for reasons other than insufficient data quality.</p> <p>Change to the Correction Policy: correction period extended from 12 to 36 months.</p>
V1.1	June 2016	<p>Added section 4 on the real estate index usage which was left out in the March 2016 edition due to an administrative error and was included in previous versions of the methodology documents.</p>

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