# MSCI GLOBAL METHODOLOGY STANDARDS
## FOR REAL ESTATE INVESTMENT

## MSCI

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# INTRODUCTION

The **MSCI Global Methodology Standards for Real Estate Investment** outline how MSCI produces and computes real estate indexes, market information and 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, market information 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. Any exceptions to these rules are reviewed and approved by the MSCI Real Estate Index Committee and are publicly announced in advance of the implementation.

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 **MSCI Global Data Standards for Real Estate Investment**.

The indexes 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**.

**Section 3** outlines the data rules invoked in the publication 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.

For MSCI's private real estate analytics products, there are some additional methods and measures. These are detailed in **Section 4** along with some limited exceptions to the rules and procedures in Sections 2 and 3. **Section 5** on real estate index usage highlights risks and limitations of using a real estate index, market information and benchmark for a particular purpose.

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.

# 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. A mandatory core set of data, used for the calculation of total investment returns (is required in all markets, to render the IPD indexes comparable across Markets. 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 should submit performance data to MSCI in accordance 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.

## 1.1 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 financial data must be provided for the percentage share owned by the portfolio. Floor space data must however be submitted as full 100% amounts.

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 MSCI approved file format.

## 1.2 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 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 externally, 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 external valuations to be performed by an independent external professionally designated, certified, or licensed commercial property valuer/appraiser 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 DCF, 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.

## 1.3 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 and is available on the MSCI website.

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 aims 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.

## 1.4 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, the following criteria for including and excluding contributors have been established:

### 1.4.1 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 Checking 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.

### 1.4.2 RULES FOR EXCLUSION

Contributor data will risk exclusion from standard IPD indexes, 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 workings 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. Specific rules for inclusion in indexes with specific index requirements i.e. open-end core fund indexes or core and diversified fund indexes.

## 1.5 DATA VALIDATION AND SCREENING

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

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 aims to continually 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 Checking 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 Checking Report is distributed to the contributor for verification that the results are accurate and complete. MSCI expects contributors to review and sign-off the Fund Checking 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.

## 1.6 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.

## 1.7 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. For the computation of the Pan-Asian index, including national level reporting on China, Hong Kong, Indonesia, Malaysia, Singapore, Taiwan and Thailand, additional data is being used from the public data to increase the coverage in those markets. The data derived from the public domain isn't signed off by the asset owners.

# 2. PERFORMANCE MEASURE CALCULATIONS

MSCI distinguishes between direct real estate indexes, which measure the performance of aggregates of individual property assets held within investment portfolios, and fund indexes, 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.

The 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 month, meaning that the contribution of each asset or fund is in proportion to its monetary weight.

## 2.1 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.

*All Assets:*

The returns on all assets include all investment properties within the portfolio, including those bought, sold and under development or major refurbishment during the measurement period as well as owner occupied properties. Indexes of all assets 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. Performance measures therefore allow the comparison of property and portfolio investment returns relative to an appropriate index, either for the whole investment market or a relevant sub-group of portfolios or properties. These returns exclude assets held indirectly through investment funds and the impact of debt, fund management fees, taxation and cash.

*Standing investments:*

Standing investment measures are intended to reflect underlying market trends over the period of analysis. The returns on standing investments reported in the IPD indexes are based solely on directly owned standing investments in completed and lettable properties and excludes any (part) transaction activity. Some properties, such as those occupied by their owners, are screened out in all periods, as are short leaseholds (mostly prevalent for U.K., Ireland and defined as those assets owned on a leasehold interest with less than 30 years to expiry) and freehold ground rent assets (mostly prevalent in U.K., Ireland). Standing investment returns exclude assets held indirectly through investment funds and the impact of debt, fund management fees, taxation and cash as well as assets under development.

An asset's inclusion in the standing investment sample within IPD indexes in part depends upon the valuation frequency of the assets and the frequency of data submission. An asset is deemed to be a standing investment, if it has no transaction or development activity throughout the period between two valuations, and is not under development at the time of either of those valuations. In scenarios where there are (part) transaction or development activities recorded during valuation intervals, the assets will be excluded from the standing investment sample for the corresponding valuation intervals and be included in the remaining part of the measure aggregation period.

For instance, a quarterly valued asset may have contributed three, six, nine, or 12 months to a 12-month standing investment return subject to the number of quarters the asset was held as a standing investment.

***Non-Operating Assets:***

Non-operating assets are those bought, sold, under development/major refurbishment during the measurement period. They incorporate any assets not included in the standing investment index for the period.

***Same Store:***

The same store sample is a sub set of 'all assets' that have existed in a portfolio over a full filter period. It applies a different set of exclusion rules from standing investments. To qualify for inclusion in the same store sample, the asset must not have, for the full duration of the filter period:

- Had any development activity
- Had any part transaction activity
- Been Owner Occupied
- Been a short leasehold (mostly prevalent for U.K., Ireland) or freehold ground rent asset (U.K., Ireland).

Same Store filters ensure a consistent sample of assets across a measurement period, based on the asset management status of the property. All assets in the same store sample have been present in the portfolio at both the start and the end of the measurement period, and have not undergone any (re-) development or had any part transactions. This filter is particularly relevant for operating measures.

Key differences between same store and standing investment samples:

- Qualifying time periods for standing investments are based on the valuation periods of assets, while same store samples are based on the asset measurement period. Therefore, based on an annual measurement period, a quarterly-valued asset might qualify as a standing investment for some quarters and a development for the rest of the year, but would not qualify at all for the same store sample for the year.

- The same store sample is only defined by activity during the measurement period, not the status at the end of the previous period. Assets under development at the previous valuation date are not treated as standing investments for the subsequent valuation interval, even if there is no development activity in that period. However, assets with no development activity would qualify as same store, whatever their status at the end of the previous period.

- For example, an annually valued asset which was under development at December 2014 but had no development activity or part transactions during 2015, would qualify for the 12-month same store sample for 2015, but not the standing investment sample for 2015.

### 2.1.1 INTERPOLATION AND HELD DOWN TREATMENT OF VALUATIONS

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.

A globally consistent approach to interpolation is applied with the aim of using the best available market evidence of capital growth throughout the year. Values will be linearly interpolated for all quarterly indexes. Annual indexes in markets where a quarterly index is published use the quarterly returns to shape the interpolation of the annual index. In these markets, the one exception to using shaped interpolation is for those assets in multinational funds with data that is not submitted domestically. Unless quarterly valuations are available, these assets will be subject to linear interpolation. All other annual indexes will adopt linear interpolation.

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

The interpolation applied to analytics products can differ from the above – please see 8.1.1

### 2.1.2 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.

### 2.1.3 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.

**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 rent receivable during month t, net of property management costs, ground rent and other irrecoverable expenditure.

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

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

## 2.1.4 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):

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

$$\text{Index}_{t+1} = \text{Index}_t * (1 + TR_{t+1} / 100)$$

Where:

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

## 2.1.5 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.

$$\text{12-month Total Return} = [\ (X_{t=12} / X_{t=0}) - 1\ ] * 100$$

## 2.1.6 ANNUALIZED RATE

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

$$\text{Annualized Rate} = [\ (X_t / X_0)^{1/n} - 1\ ] * 100$$

Where:

n is the number of years and $X_t$ is the final indexed score. $X_{t=0}$ is the start indexed score.

## 2.1.7 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.

### 2.1.8 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:

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

### 2.1.9 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.

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

### 2.2.1 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.

### 2.2.2 GROSS RENT PASSING GROWTH

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

$$GRP\ Growth_t = \frac{(GRP_t - GR_t) - (GRP_{t-1} - GR_{t-1})}{(GRP_{t-1} - GR_{t-1})}$$

### 2.2.3 YIELD MEASURES

*Net Reversionary Yield*

The market rental value net of all non-recoverable operating costs (NMRV) expressed as a percentage of the net capital value (NCV) at the same date.

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

### Net Initial Yield

Annual Rent Passing plus 12-months Turnover Rents and Other Income, less 12 months non-recoverable Operating costs expressed as a percentage of the net capital value (NCV) at the same date.

### Net Income Receivable Yield

Net Income over the preceding 12 months expressed as a percentage of the net capital value (NCV) at the period end date.

### Gross Rent Passing Yield

Gross Rent Passing at end of period expressed as a percentage of the net capital value (NCV) at the same date.

### Gross Rent Receivable Yield

Rent as Invoiced for the period (including Turnover Rent) Gross of Ground Rent expressed as a percentage of the net capital value (NCV) at the same date.

### Gross Reversionary Yield

Market Rental Value at period end expressed as a percentage of the net capital value (NCV) at the same date.

### Equivalent Yield

Only used in the U.K. 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.

MSCI derives the gross capital value for the U.K. market based on the gross capital adjustment, in cases where no gross capitals have been submitted. The gross capital adjustment is based on the stamp duty and the other cost assumptions. The table below lists the old assumptions reflected in the April 2015 results for Scotland and in the March 2016 results for the rest of the U.K. and in all subsequent reporting for the U.K..

| PROPERTY OR LEASE PREMIUM OR TRANSFER VALUE (GBP) | STAMP DUTY LAND TAX (%) | GROSS CAPITAL ADJUSTMENT (%) |
|---|---|---|
| Old rates | 4.00% | 5.75% |
| **CHANGE SINCE APRIL 2015 FOR SCOTLAND** | | |
| Up to £150,000 | Zero | 1.75% |
| The next £200,000 (the portion from £150,001 to £350,0000 | 3.00% | 4.75% |
| The remaining amount (the portion above £350,000) | 4.50% | 6.25% |

| PROPERTY OR LEASE PREMIUM OR TRANSFER VALUE (GBP) | STAMP DUTY LAND TAX (%) | GROSS CAPITAL ADJUSTMENT (%) |
|---|---|---|
| **CHANGE SINCE MARCH 2016 FOR THE REST OF THE U.K.** | | |
| Up to £150,000 | | |
| The next £100,000 (the portion from £150,001 to £250,0000 | 2.00% | 3.75% |
| The remaining amount (the portion above £250,000) | 5.00% | 6.75% |

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

**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.

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

$$+ \frac{FCF/4}{(1+r)^{9.75}} + \frac{FCF/4}{(1+r)^{10} * (1 - (1+r)^{-0.25})}$$

The yield measures used in analytics products can differ from the above – please see 8.1.4.

### 2.2.4 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.

MSCI derives the base (property) management fees for the U.K., Irish and French market based on a percentage of the rent receivable, in the case no base management fees have been submitted. The fees are based on the base management fees of the clients that have submitted their data. The assumptions are made at sector level and will be reviewed by the REIC on an annual basis. The table below lists the assumptions reflected in the July 2016 results of the U.K. Monthly Property Index and in all subsequent reporting for the U.K.. For the U.K. annual index, the old rates will be used up to June 30 2016, after which the new rates will come into effect. The same will apply for the France bi-annual index, but for the France annual index the new rates will apply to the whole year, effectively from January 1st 2016 onwards.

| | OFFICES | RETAIL | INDUSTRIAL | RESIDENTIAL | OTHER |
|---|---|---|---|---|---|
| U.K. | 0.8% | 1.2% | 1.4% | 6.9% | 1.8% |
| Ireland | 1.1% | 1.5% | 0.9% | 6.9% | 1.8% |
| France | 3.2% | 3.2% | 2.2% | 8.2% | 3.8% |

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 meter (based on the owned area, which is the total floor space of the asset adjusted for the ownership share).

- Total net operating costs (irrecoverable) as a percentage of gross income.

- Total net operating costs per square meter (based on the owned area, which is the total floor space of the asset adjusted for the ownership share).

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.

## 2.2.5 VACANCY RATE

MSCI produces two vacancy rates:

- Floor space Vacancy, which is based on the vacant floor space (based on the owned area) divided by the total floor space (based on the owned area).
- Financial Vacancy, which is based on market rental value (MRV) of the vacant units divided by the total market rental value (MRV).

## 2.2.6 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.

$$Yield\ Impact_t = \left[ \frac{SYld_t - EYld_t}{EYld_t} \right] * 100$$

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.

## 2.3 INDEX RISK CHARACTERISTICS

MSCI's private real estate indexes are Valuation Based Indexes (VBIs) and therefore they incorporate an element of appraisal smoothing which makes them not fully suitable for risk measurement. Nevertheless MSCI does calculate variation measures. These are the following traditionally defined measures:

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

**Sharpe Ratio** – Defined as the average return less the risk free rate of return (short term interest rates) to the total risk of the portfolio (measured by the standard deviation).

**Semi deviation** – The semi (downside) deviation aims to calculate the deviation of returns below the expected return, and ignore above average deviation. The expected return (h) is the geometric mean of the income return on real estate over the whole period. The semi deviation is the square root of the variance.

**Where:**

**SD** is the semi deviation

**n** is the number of periods

**h** is the geometric mean of the income return on real estate over the whole period

$X_i$ is total return in a period

$$SD = \frac{1}{n-1} \ x \ \sum_{i=1}^{n} \left[ (x_i - h)^2 , x_i \leq h \right]$$

## 2.4 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 2) for all fund indexes, except in the U.S. and Canada where it uses the quarterly Modified Dietz methodology (Method 1), to address client requirements. For global reporting, U.S. 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.

### 2.4.1 MODIFIED DIETZ METHODOLOGY (METHOD 1)

Modified Dietz Methodology fund level returns are used exclusively in the U.S. 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:**

$\text{NIY}_t$ is the net investment income in month t;

$\text{AvWtdEq}$ is average weighted equity*

$\text{Days}_{i,t}$ is the number of days;

$\text{NCI}_{i,t}$ is the net capital invested.

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

The capital component of the numerator ($\text{Appreciation}_t$) 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.

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:

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

### 2.4.2 MONTHLY TIME-WEIGHTED RETURN (METHOD 2)

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 U.K. 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.

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.

$$\text{Market Return}_t = \left[ \frac{\sum_{i=1}^{n} (UtR_{i,t} * Units_{i,t-1})}{\sum_{i=1}^{n} (UtCampEmp_{i,t-1} * Units_{i,t-1})} \right] * 100$$

### 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 $n^{th}$ root of the final index value, converted back to a percentage:

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

## 2.4.3 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.

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

### 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.

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

## 2.4.4 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.

# 3. DATA RULES FOR PERFORMANCE REPORTING

## 3.1 REPORTING ROBUSTNESS

### 3.1.1 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.

### 3.1.2 INVESTOR DOMINANCE RULES

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

MSCI monitors portfolio dominance in all countries and sectors of the market. When calculating an index, maximum weights for single contributing portfolios are calculated based on capital value. When the weight of a contributor in any index series exceeds 75% of capital value the results will not be available.

The investor dominance rules are not applicable to analytics products – please see 8.1.2.

### 3.1.3 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).

### 3.1.4 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 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).

## 3.2 REPORTING SAMPLE COMPOSITION

### 3.2.1 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 Global Data Standards 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.

### 3.2.2 INDEX 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 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.

For deriving the market size estimate the following process is applied:

1   The values of the market size estimates are to be set as the period start market size. These estimates are denominated in domestic currency. The start market size estimates will be announced in May of the index year based on MSCI market size estimate (i.e. in May 2017 the index weights the start value being used in the reweighting of 2017 year performance).

2   Intervening month-end market sizes are to be derived by applying domestic currency capital growth (denominated in local currency) to period start estimates. In order to ensure consistent weights for both quarterly and annual indexes, capital growth is computed from quarterly and biannual indexes where such indexes are available.

3   Estimated market capital values are to be converted into estimated capital employed by applying capital employed adjustment ratios, the ratio of capital employed to capital value in MSCI's sample.

4   Currency conversion is to be applied to the intervening month-end capital employed estimates at the month-end currency rate.

The rebalancing applied to analytics products can differ from the above – please see 8.1.5.

## 3.3 CURRENCY CONVERSION

Many IPD multi-national indexes 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 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.

### 3.3.1 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 to national digest products.

A monthly fixed rate method is applied in which monthly fixed rates are used eliminating the need for restatement. 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 gross rent passing 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 meter (where the numerator is calculated by summation), conversion is performed every month.

The fixed rate conversion applied to analytics products can differ from the above – please see 8.1.3.

### 3.3.2 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. An exception to this is the capital expenditure data items which are weighted to the start of the month in the growth measures are converted on the prior month rate.

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

### 3.4 FROZEN HISTORY REPORTING

In most cases, the IPD indexes 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 is that it allows fixed index results for manager remuneration, for instance if that is defined including an out performance fee. You would not want the historical series to change. Another 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 dataset is made only after discussion with local market consultative groups. The indexes for Japan, New-Zealand and Australia will be restated on an ongoing basis due to asynchronous valuation regimes in those markets.

Frozen indexes currently include:

- The major indexes published for the U.K. (annual, quarterly and monthly), France (annual) and the Netherlands (annual).

- The AREF/IPD® UK Quarterly Property Fund Index.

- The Mercer/IPD® Australia Monthly Property Fund Index - Core Wholesale.

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.


## 3.5 SECTOR REPORTING

Property types are one critical element for segmentations. Property types are used to define groups of assets which share common physical forms relating to their use. Property types exclude other features that are used to create property segmentations: location, size, tenure, age, lease terms, occupancy. For frozen indexes the original provided property type classification will be kept historically for unfrozen indexes the property type and corresponding sector reporting will be changed historically. MSCI defines six sectors globally: retail (shopping centers, unit shops, supermarkets, retail warehouses, etc.), offices, industrial (warehouses, industrial, self storage, data centers, etc), residential (single and multi-family), hotels and other (including: education, leisure, land, healthcare, garage/parking, mixed-use properties, service stations, etc.). If sectors results don't meet the requirements for dominance and confidentiality those sectors won't be available. Those results won't be included in the sector other but will be included in the all property results.

## 3.6 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 is checked before the publication of each index.

A document on the MSCI website contains a statement of transparency with the database profile 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.

## 3.7 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.

## 3.8 REPORTING METHODOLOGY ISSUES

### 3.8.1 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.

## 3.9 GEOGRAPHIC REPORTING

Real estate performance is directly impacted by geographic boundaries. Because subnational geography is administered differently in every country, it poses obstacles for establishing global standards of comparability. To address this, MSCI outlines and defines up to ten levels of standard comparability below the global level. The number of levels available in a given country is dependent on the physical scale of the national territory as well as the concentration of investment assets within the country's boundaries. For assigning the levels, MSCI matches, to the extent possible, each asset's physical address (as reported to us by our clients) against recognized external sources of national and subnational definitions. These sources include, among others, the International Standards Organization (ISO); the Organization for Economic Cooperation and Development (OECD); Eurostat; national statistical agencies; and national postal services. The definitions of the geographic levels are as follows:
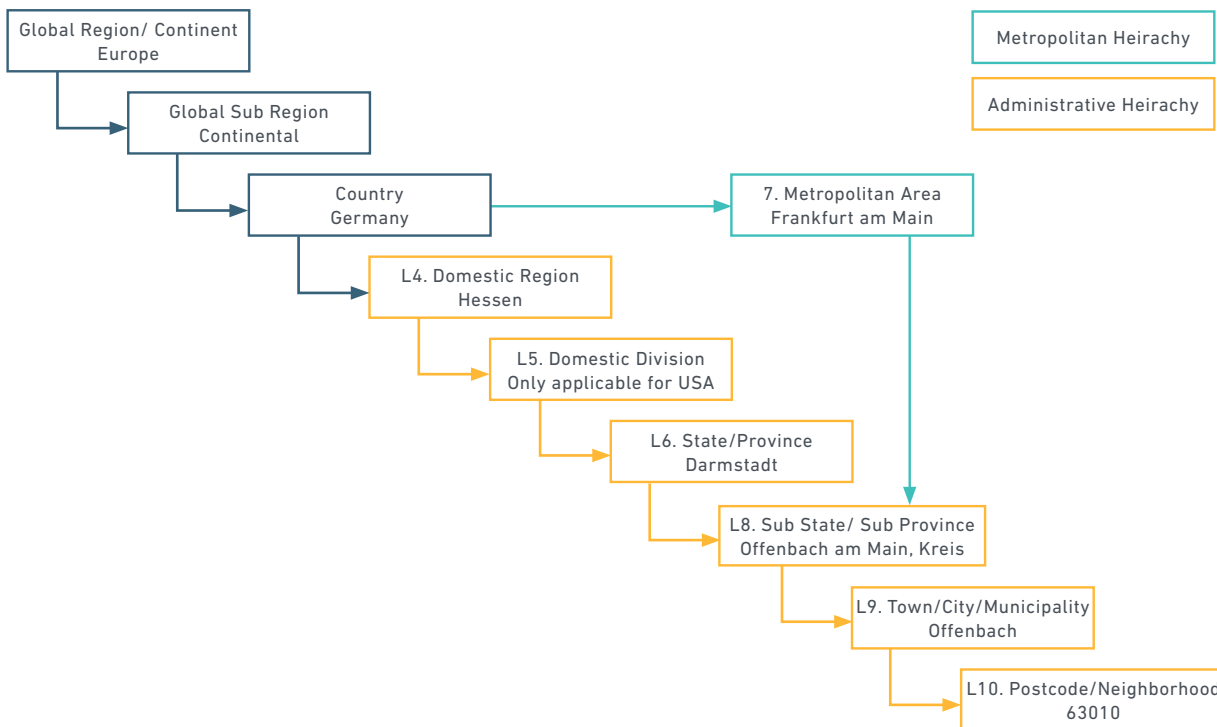


The number of levels available differs across countries due to (1) the physical scale of the national territory and (2) the complexity of subnational administrative layers. The administrative hierarchy differs both in structure as well as in naming conventions. The table below highlights each of the ten geographic levels, including the general description as well as examples to show how each level is applied in practice.

*Overview of the administrative geographic hierarchy*

| Name | Description | Examples: |
|---|---|---|
| Global Region | The Global Region is typically continental or pan-continental | Europe, Africa, Asia Pacific, the Americas |
| Global Sub Region | The Global Sub Region is a smaller grouping of national markets within a Global Region. | Southern Europe and Northeast Asia |
| Country | Country definitions equate directly to the geographic boundaries of MSCI's national indexes. | Canada, Germany, Australia, South Africa |
| Domestic Region | In larger countries, a Domestic Region is typically defined as a grouping of constituents from the highest subnational layer of government administration. In most countries, this means a group of provinces, states, or prefectures. | In Europe NUTS1 level[1] |
| Domestic Division | The Domestic Division is only applicable in the U.S. where Domestic Regions are further disaggregated, while still using the same underlying constituents as the Domestic Region Level. | For example, the U.S. Mountain States and Pacific States are two groupings that together form the larger Domestic Region defined as the U.S. West at the Domestic Region Level. |
| State/Province | The State/Province Level is typically the highest level of subnational government administration | For example, this level can be a state, as in Australia or the U.S.; a province, as in Canada or China; or a prefecture, as in Japan. In Europe, this level is typically defined as NUTS2. |
| Sub State/Sub Province | The Sub State/Sub Province tier is typically the second level of government administration below the Country level. | In the U.S., for example, this would be a county; in Europe, the equivalent is the NUTS3 level. |
| Town/City/Municipality | The Town/City/Municipality level is typically a form of municipal administration, though definitions vary from country to country. In some countries, it is the closest equivalent definition available to a town, city, or municipal government. | In the U.S., this level is equivalent to what the national statistical agency defines as the "Place" level. In most of Europe, it is the LAU1 or LAU2 level[1]. |
| Postcode/Neighborhood | The Postcode/Neighborhood is intended to be a level of administration below the Municipal level. In most countries, this level is a postal delivery area with distinct boundaries that can closely, if not perfectly, nest within higher levels of geography. | In a few countries, a sub-municipal neighborhood definition has been used instead of a postcode. Reasons for substitution may include: lack of any national postcode administration (as in Hong Kong); lack of a formal postal mapping with statistical geography (as in South Africa); or the existence of a widely recognized and applicable system of sub-municipal boundaries (as in Japan's ward, or "ku" system). |

[1]  Eurostat uses various widely recognized acronyms for its geographic standards, including NUTS (Nomenclature of Territorial Units for Statistics) and LAU (Local Administrative Unit).

*Metropolitan Hierarchy*

The **Metropolitan Area** differs from other subnational definitions in that it is *not* typically an administrative level of government, nor is there any existing or widely used global standard for setting metropolitan boundaries. Nevertheless, the Metropolitan level is a crucial unit of comparability that is vital to the understanding of real estate performance. For its Metropolitan Hierarchy, MSCI leans heavily on national and pan-national statistical agencies to determine metropolitan boundaries. Although Metropolitan Areas are assigned to MSCI's geographic hierarchy they can, in some countries, cross administrative boundaries of the Domestic Region and State/Province levels. In Europe, metropolitan definitions are sourced from Eurostat based on groupings of Sub State/Sub Province levels. In the U.S., the official definitions of Metropolitan Areas are set by the Office of Management and Budget (OMB) and are based on groupings of counties. In many countries, no authoritative methodology exists for defining metropolitan boundaries. Where this is the case, MSCI has used reasonable endeavors to align metropolitan boundary assumptions with well-regarded methodologies used in other countries such as the Core-Based Statistical Area (U.S.), the Functional Urban Region (Europe), the Census Metropolitan Area (Canada), the Major Metropolitan Area (Japan), and the Greater Capital City Statistical Area (Australia).

**Inconsistencies, Limitations, and Exceptions**. In developing standards of geographic comparability, MSCI was required to make reasonable assumptions to compensate for limitations, exceptions, and inconsistencies in available sources. Examples of such situations are provided below.

- A full ten levels of geography could not be provided in all countries. The *number* of levels in each country and the *level* to which the available layers were assigned in the MSCI hierarchy depended on (1) how subnational territories were administered within each country and (2) how national statistical agencies classified and segmented subnational areas.

- In some cases, the geographic segmentations used by postal agencies did not align with administrative or statistical boundaries. In other cases, postal delivery areas, statistical areas, and administrative areas did not always share the same names, even when these areas overlapped.

- Geographic boundaries are never static. Postcodes are added and retired. Metropolitan areas grow and sprawl and extend their zones of influence. Municipalities and counties merge. New provinces are carved out of existing ones. Cities deemed to be significant have their administrative status reclassified. MSCI recognizes that geographic definitions are fluid, and that a global standard requires ongoing maintenance to remain valid

# 4. ANALYTICS - DIRECT REAL ESTATE EXPLORATORY TECHNIQUES

## 4.1 ATTRIBUTION ANALYSIS AND WEIGHTED CONTRIBUTIONS TO RETURNS

Attribution analysis is a powerful technique for understanding the reasons for a portfolio's outperformance or underperformance against 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.

### 4.1.1 RELATIVE RETURN

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

**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.

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

### 4.1.2 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.

### 4.1.3 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.

**Where:**

$WTC_k$ 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.

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

### 4.1.4 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.

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

## 4.1.5 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:

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

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:

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

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

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.

## 4.2 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.

## 4.3 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.

**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.

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

Where:

$\sigma$ is the standard deviation of the monthly relative returns over the period.

### 4.3.1 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.

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.

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

- **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.

# 5. REAL ESTATE INDEX POLICIES

## 5.1 REAL ESTATE INDEX DESIGN GUIDELINES

MSCI calculates a wide variety of asset-level and fund-level private real estate indexes, both as standard outputs as well as on a custom basis at the client's requests. MSCI's primary private real estate index methodologies are detailed in this document. MSCI private real estate indexes, including custom indexes, are in general derived and maintained with the principles set out in this document.

MSCI follows these guidelines in the development and maintenance of all private real estate indexes:

- The aim of all MSCI private real estate indexes is to appropriately represent a particular market or strategy. MSCI private real estate indexes should be constructed and maintained with the prime objectives of representativeness and accuracy in mind; and

- MSCI private real estate index methodologies should be monitored on an ongoing basis with the aim of ensuring that they continue to reflect their objectives, as the underlying market or strategy evolves.

For custom indexes, the prime objective of the index is determined in conjunction with the client and its composition (e.g. based on property type or geographic area, weighting) is as agreed with the client.

## 5.2 NOTICE OF 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 index as the basis of an index linked financial product, they should consider this possibility.

# 6. APPENDIX: 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 U.K. 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:

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

**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).

### 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:**

$\sigma^2$ 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.

# 7. APPENDIX: MSCI POLICIES FOR THE IPD INDEX AND BENCHMARK DETERMINATION

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.

## INTRODUCTION

MSCI policies and procedures for the determination processes of the IPD indexes and 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

## 7.1 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.

### 7.1.1 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.

### 7.1.2 SCOPE

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

### 7.1.3 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.

## 7.2 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.

### 7.2.1 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.

### 7.2.2 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.

### 7.2.3 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.

### 7.2.4 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.

### 7.2.5 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.

### 7.2.6 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 |

## 7.3 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.

### 7.3.1 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.

### 7.3.2 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.


## 7.4 CONSULTATION POLICY

### INTRODUCTION

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

### 7.4.1 POLICY

Stakeholder consultation will be undertaken in the case of:

- Material changes in methodology related to the determination of indexes, 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.

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

### 7.4.2 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.

## 7.5 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.

### 7.5.1 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.

### 7.5.2 SCOPE

This policy applies only to published indexes.

### 7.5.3 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, 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.

# 8. APPENDIX: METHODOLOGY DEVIATIONS FOR ANALYTICS PRODUCTS

In a few instances, MSCI's private real estate analytics products deviate in their methodology from what is outlined in Section 2 and Section 3. These exceptions and deviations are outlined below.

### 8.1.1 INTERPOLATION AND HELD DOWN TREATMENT OF VALUATIONS

The interpolation applied to analytics products differs from that detailed in 2.1.1.

For analytics products, interpolation is linear for most MSCI services, except in the case of the U.K. 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.

### 8.1.2 INVESTOR DOMINANCE RULES

The dominance rules set out in 3.1.2 are not applicable to analytics products but the standard asset, portfolio and fund confidentiality rules (3.1.1) are.

### 8.1.3 FIXED RATE CURRENCY CONVERSION

The fixed rate conversion applied to analytics products differs from that detailed in 3.3.1.

For fixed-rate reporting in analytics reports, 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.

The analytics 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.

### 8.1.4 YIELD MEASURES

The yield measures applicable to analytics products differ from those detailed in 2.2.3.

For the calculation of the initial and reversionary yield in the analytics products  the gross capital value is being used instead of the net capital value.

### 8.1.5 INDEX COMPOSITES: MARKET SIZE REBALANCING

The market size reweighting used for analytics products can differ from the reweighting detailed in 3.2.2.

Some custom benchmarks are not reweighted using capital employed. Instead they are reweighted using capital value.

# 9. APPENDIX: GLOSSARY OF TERMS

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

**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. 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 but could also cover receipts such as surrender premiums which can be capitalized where the loss has an impact on the value of the asset.

**Covenant (lease)** – in real estate risk analysis, an estimation of the level of 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 $n^{th}$ 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 to the freehold owner of the land for the right to the operating income and control of the asset by the lessee.

**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.

**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 net 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 net capital value.

**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.

**Standard deviation** – the ratio of the arithmetic average return over the period to the volatility of returns, 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.

**Same store** – same store is a subset of all Assets and ensures a consistent sample of assets across the measurement period without any part transactions or development activity.

**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.

# 10. APPENDIX: VERSIONING TABLE

| VERSION | PUBLICATION DATE | KEY CHANGES |
| --- | --- | --- |
| V1.0 | March 2016 | 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.<br><br>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.<br><br>Change to the Correction Policy: correction period extended from 12 to 36 months. |
| V1.1 | June 2016 | 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. |
| V2.0 | July 2016 | Several methodological enhancements impacting the results are implemented.<br><br>• Discontinuation of discretionary flagging<br><br>• Introduction of a new global interpolation method<br><br>• Implementation of a global dominance rule<br><br>• Amended currency conversion<br><br>• New index reweighting<br><br>• Standardization of global yields<br><br>• New "same store" index type<br><br>• Revised assumptions on property management fees<br><br>• New global market size reweighting |

V2.1          February 2017    Several amendments have been made to the document:

- Paragraph 3.9 is added on Geographic Reporting which explains the geographical hierarchy within our reporting.

- Paragraph 2.1 text on the direct real estate return investment computation methods is amended to give more clarity on the definition and the difference between the samples.

- Paragraph 5.1 is added on the real estate index design guidelines.

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