

MSCI LIQUID REAL ESTATE INDEXES METHODOLOGY

Index Construction and Maintenance Methodology for the MSCI
Liquid Real Estate Indexes

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1 INTRODUCTION

The MSCI Liquid Real Estate Indexes are multi-asset class indexes aiming to achieve a risk/return profile similar to direct real estate indexes using liquid instruments. The construction methodology for these indexes seeks to address key differences between listed and direct real estate indexes:

- The broad listed real estate opportunity set such as the one defined by the Real Estate sector within the Global Industry Classification Standard (GICS®) includes companies that are not directly exposed to typical properties found in direct real estate indexes, such as Real Estate Services companies
- Listed real estate indexes have higher volatility and equity beta than direct real estate indexes
- Performance of listed real estate companies reflects leverage whereas direct real estate indexes are calculated on an unlevered basis

These indexes are constructed by combining the Parent Index, MSCI Core Real Estate Volatility Tilt Indexes (the “Parent Index”) with the Markit iBoxx inflation-linked indexes. Historically¹, they have demonstrated the following characteristics:

- Lower volatility and maximum drawdown than pure equity listed real estate indexes
- Higher correlation with direct real estate indexes than pure equity listed real estate indexes
- Similar performance to direct real estate indexes
- Lower beta to the equity market than pure equity listed real estate indexes

As of July 2015, MSCI calculates the following MSCI Liquid Real Estate Indexes:

- The MSCI USA IMI Liquid Real Estate Index
- The MSCI UK IMI Liquid Real Estate Index
- The MSCI Europe ex UK IMI Liquid Real Estate Index

¹ Based on historical simulations of the MSCI USA IMI Liquid Real Estate Index, the MSCI UK IMI Liquid Real Estate Index and the MSCI Europe ex UK IMI Liquid Real Estate Index. Past performance is not indicative of future results, which may differ materially.

2 INDEX CONSTRUCTION METHODOLOGY

The construction of an MSCI Liquid Real Estate Index involves the following steps:

1. Constructing the MSCI Core Real Estate Volatility Tilt Index
2. Combining the MSCI Core Real Estate Volatility Tilt Index with the Markit iBoxx short-duration inflation linked index

2.1 CONSTRUCTING THE MSCI CORE REAL ESTATE VOLATILITY TILT INDEX

The construction of the MSCI Core Real Estate Volatility Tilt Index is described in sections 2 and 4.1 of this document.

2.2 COMBINING THE MSCI CORE REAL ESTATE VOLATILITY TILT INDEX WITH MARKIT IBOXX SHORT-DURATION INFLATION LINKED INDEX

The MSCI Liquid Real Estate Index is constructed by deleveraging the MSCI Core Real Estate Volatility Tilt Index.

Deleveraging aims to reduce the impact of leverage used by listed real estate companies on the index and achieve a return closer to the unlevered return on the underlying properties. It is based on the following financial statement analogy:

$$Return(Listed Real Estate) = Leverage \times Return(Physical Property) - Cost of Debt$$

Leverage is determined by the index level debt-to-price ratio of the MSCI Core Real Estate Volatility Tilt Index and is calculated as follows

$$\frac{D}{P} = \sum_i \omega_i \times \left(\frac{D}{P}\right)_i$$

where

- ω_i is the weight of the constituent i in the MSCI USA IMI Core Real Estate Volatility Tilt Index
- $\left(\frac{D}{P}\right)_i$ is the debt-to-price ratio for constituent i

All data is taken as of the end of month preceding the Index Review date (for example, as of April end for the May index review). Securities with no debt-to-price ratio are assigned the median debt-to-price ratio of the constituents for which data is available.

The MSCI Liquid Real Estate Index is finally derived by combining the MSCI Core Real Estate Volatility Tilt Index with the Markit iBoxx short-duration inflation linked index in the following proportions:

- Weight of Fixed Income = $\left[\left(\frac{D}{P} \right)^{-1} + 1 \right]^{-1}$
- Weight of Equity = 1 – Weight of Fixed Income

These weights are reset semi-annually, coinciding with the May and November Semi-Annual Index Reviews. In between index reviews, the weights of the two components are allowed to fluctuate with the performance of each component.

As of July 2015, the following Markit iBoxx indexes are used for the construction of the MSCI Liquid Real Estate Indexes:

- The Markit iBoxx TIPS Inflation-Linked 1-5 year Index for the MSCI USA IMI Liquid Real Estate Index.
- The Markit iBoxx UK Gilt Inflation-Linked Short Index for the MSCI UK IMI Liquid Real Estate Index.
- The Markit iBoxx EUR Government Inflation-Linked Euro-Inflation Short TRI_Nominal for the MSCI EUROPE ex UK IMI Liquid Real Estate Index.

In case index levels for any of the above Markit iBoxx indexes are not available on given days (for example Christmas Day and New Year Day), the previous business day's index levels are used.

3 MAINTENANCE OF THE MSCI LIQUID REAL ESTATE INDEXES

The maintenance of the MSCI Liquid Real Estate Indexes includes:

- Quarterly and Semi-Annual Index Reviews coinciding with the Parent Index reviews in February, August, May and November
- Semi-Annual Liquidity Review of Parent in May and November
- Annual Eligibility Review of Parent in May
- Ongoing event-related changes

For more information on the maintenance of the Parent Index, please refer to Section 4 of the MSCI Core Real Estate Indexes methodology book available at www.msci.com.

The impact of the Quarterly and Semi-Annual Index Reviews of the Parent Index on the MSCI Liquid Real Estate Indexes is announced nine business days before the effective date.

3.1 SEMI-ANNUAL INDEX REVIEWS

The weights of the MSCI Liquid Real Estate Index which is derived by combining the MSCI Core Real Estate Volatility Tilt Index with the Markit iBoxx short-duration inflation linked index, as described in Section 2, are reset semi-annually coinciding with the May and November Semi-Annual Index Reviews. The reset weights are announced nine business days before the effective date.

3.2 CUTOFF DATE FOR MARKET CAPITALIZATION AND PRICES USED FOR THE REBALANCING

The cutoff date for market capitalization and prices used for the rebalancing of the MSCI Liquid Real Estate Index is nine business days before the end of February, May, August and November.

3.3 ANNOUNCEMENT POLICY

The pro forma results of the rebalancing of the MSCI Liquid Real Estate Index are announced nine business days before the effective date of each Semi-Annual Index Review and Quarterly Index Review.

3.4 ONGOING EVENT-RELATED CHANGES

The Parent Index is updated to reflect ongoing event-related changes in accordance with the MSCI Global Investable Market Indexes methodology. Ongoing event-related changes in the Parent Index are reflected in the MSCI Liquid Real Estate Indexes at the time of the implementation of the event in the Parent Index.

The impact of other ongoing event-related or GICS-related changes to the Parent Index is typically deferred to the next Index Review with the exception of changes in REIT status that are implemented simultaneously with the GICS classification change.

With the exception of the treatment as described herein, the MSCI Liquid Real Estate Index follows the event maintenance of the Parent Index. Details regarding the treatment of corporate events not covered below can be found in the MSCI Corporate Events Methodology Book, available at: <http://www.msci.com/index-methodology>

METHODOLOGY BOOK TRACKED CHANGES

The following sections have been modified since September 2017:

Section 2.2: Combining the MSCI Core Real Estate Volatility Tilt Index with Markit iBoxx short-duration inflation linked index

- Added clarification

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