Infrastructure Indices Methodology Standards

Unlisted Equity & Private Infrastructure Debt

EDHEC*infra*

building benchmarks
for infrastructure investors

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Contents

Introduction

The **EDHEC*infra* Unlisted Infrastructure Indices Methodology Standard** outlines the approach used to design and compute indices of unlisted infrastructure investments. It describes the main procedures, methods, and rules governing the EDHEC*infra* definition and computation of these indices, the aim of which is to provide a transparent view of the unlisted infrastructure market, matching best practices in mainstream investment measurement and performance assessment across asset classes.

Unlike most private investment indices, EDHEC*infra* indices are not contributed but *calculated* indices. Contributed indices simply aggregate reported performance measures provided by asset owners and managers to an index provider. With unlisted infrastructure, reported metrics are often considered unreliable and difficult to compare and aggregate. Contributed indices face significant data paucity and cannot provide index users with metrics allowing meaningful comparisons across asset classes. A calculated index of private infrastructure investments can avoid sample biases and deliver better risk and performance measurement. Methodological robustness is paramount to this approach.

Producing a calculated index requires computing the financial performance of each index constituent using a unified methodology, as described in the EDHEC*infra* **Unlisted Infrastructure Asset-Pricing Methodology**, relying on International Financial Reporting Standards (IFRS) guidance, industry practices, and academic principles, thus providing adequate measures of performance and risk for the purpose of computing a market index. This approach is summarised in the appendix.

In **section 1**, the rules used to sample and build a representative set of asset-level performance data are described, including the criteria used for national-market as well as individual-constituent inclusion in the broad market universe. These criteria are designed to create a market proxy representing the *principal market* as defined under the IFRS 13 standard of fair-value measurement.

Section 2 describes the EDHEC*infra* index families, which were designed after conducting a wide-ranging survey of asset owners and managers about their preferred segmentation of the infrastructure asset class . The choice of broad market indices and subindices reflects the major, most relevant segments of the global market for investable infrastructure. This section also relies on the taxonomy detailed in EDHEC*infra*'s **Global Infrastructure Company Classification Scheme**, or *GICCS*®.

Section 3 describes the process used to collect and use data from public and private sources, including the rules applied to ensure the confidentiality of any privately provided data as well as privately contributed data inclusion criteria into the calculation of index constituents' performance. This process is further detailed in EDHEC*infra*'s **Global Infrastructure Investment Data Standard** and its **Data Contributor Code of Conduct**. **Section 4** describes the different weighting schemes available within each EDHEC*infra* index family. **Section 5** details the computations used to produce index results and analytics. Finally, **section 6** outlines the rules and policies used in the calculation of EDHEC*infra* indices, including the risks and limitations of using an unlisted infrastructure index or benchmark for a specific purpose.

1. Investable Universe

This section describes how the investable universe of unlisted infrastructure represented by EDHEC*infra* indices is defined and sampled to determine the constituents of the broad market index.

EDHEC*infra* indices are designed to represent the risk-adjusted performance of the unlisted infrastructure market, that is, to embody the *principal market* in the sense of IFRS 13 and fair-value accounting.

Indeed, the notion of fair value is a *market-based measurement rather than an entity based measurement*, that is, it is concerned with how *average* prices are formed in the most representative markets. In the language of academic finance, fair value is about *betas*, that is, the combined exposure of each firm to priced risk factors, but not *alpha*, which represents market outperformance and is the result of private information.

The principal market is therefore the one allowing the best possible measurement of the average prices found in unlisted infrastructure investments.

This point has direct implications for the definition of the relevant broad market universe used to compute the EDHEC*infra* broad market indices. The choice of universe for a broad market reference index aims to include those markets that are representative of the price preferences of independent, knowledgeable, and willing buyers and sellers on the measurement date.

In effect, a "broad market" index aims to represent the principal market: a market with enough knowledgeable participants and transactions to reveal fair price signals. In other words, **the broad market is the principal market** that best represent the preferences of buyers and sellers of unlisted infrastructure investments.

The **investment universe** that is relevant to measuring performance in the principal market is defined in two steps:

1. **National-market inclusion**: Relevant national markets are determined on the basis of national-level index inclusion criteria, including the level of activity (number and frequency of transactions and market participants) and relative size, but also minimum data availability.
2. **Individual-company inclusion**: Within the markets that qualify under these criteria, potential index constituents, whether they are equity or debt issuers, are also required to meet a set of minimum inclusion criteria, including investability, age, and minimum data availability.

Once the investment universe is defined, in a third step, a **sampled universe** is built that meets certain minimum-representativity criteria. The sampled universe is then used as the basis for defining the constituents of the global broad market index. Broad market index constituents are further filtered according to minimum-size and time-to-maturity filters (see section 6 for details).

Table 1: Minimum National Market Inclusion Criteria

Criteria	Minimum Threshold (On Measurement Date)
Size	Cumulative primary and secondary dealflow since 2000 represents at least 0.5% of the total value of all identified markets **AND**
Market Activity	Market turnover ratio* - at least 20% by number of transactions **OR** - at least 20% by transaction volume **OR** - the country is part of the European Union+
Financial Information	Availability of basic procurement and financial information including incorporation and financial close dates, book values, etc.

*Ratio of secondary to primary market activity. +The European Union is a homogenous procurement market and can be considered a single market in comparison with other parts of the global market.

1.1 National-Market Minimum Inclusion Criteria

National markets that are principal markets and can be included in the broad market universe should exhibit a minimumn level of activity in terms of number of transactions, contribution to the global market, and level of ongoing secondary market activity. The measurement of this activity should also be possible, hence a minimum level of transaction information should be available, lest this market be completely opaque.

Inclusion criteria for indiviual national markets include:

- a minimum number and volume of primary or secondary market activity, indicating that more than a few isolated transactions took place on each measurement date;
- a minimum size (expressed in book value) relative to the existing broad market universe, suggesting that the addition of the market in question would increase the information content of a broad market index; and
- a minimum level of audited financial information about the relevant investable infrastructure companies in the market.

The minimum thresholds used by EDHEC*infra* are reported in table 1. These criteria are based on EDHEC*infra*'s comprehensive study of the global investable infrastructure market, which includes 107 countries. Market selection is dependent on a **turnover ratio**, defined as the ratio of secondary to primary market activity. A high turnover ratio indicates that a market is active and that primary investments are not only held to maturity (primarily by construction companies and banks) but actually traded and priced by the range of investors active in the infrastructure sector.

As of 2018, the markets that meet these criteria included, for the most part, a majority of OECD countries and a few so-called emerging markets. Infrastructure markets are national markets by nature; however, we treat the European Union as one unified market, given its level of regulatory and market integration. Table 2 lists the 25 markets that can be included in the EDHEC*infra* global index in late 2018.

1.2 Individual-Constituent Minimum Inclusion Criteria

The investable universe is documented in each market by drawing a list of uniquely identified firms at the company-registration level. EDHEC*infra* uses a bottom-up approach to identify investable companies in the universe. The list of investable infrastructure projects is aggregated from various sources, including government disclosures, infrastructure databases, news articles, and privately contributed information.

Table 2: 25 National Markets Meeting the Global Index Inclusion Criteria in Late 2018

Country	Turnover (Number)	Turnover (Volume)	Share of Global Dealflow
Australia	39.40%	41.24%	7.05%
Austria	23.81%	29.36%	0.08%
Brazil	6.4%	20%	3.4%
Canada*	55.22%	53.52%	2.74%
Chile	45.83%	46.76%	1.01%
Germany	31.98%	64.60%	4.05%
Spain	11.08%	26.80%	3.97%
Finland	29.73%	90.85%	0.48%
France	19.69%	68.50%	3.30%
United Kingdom	54.95%	43.89%	11.55%
Hungary*	41.67%	83.64%	0.32%
Ireland	24.04%	32.66%	0.41%
Italy	25.07%	30.23%	2.28%
Malaysia	37.25%	44.11%	1.18%
Netherlands	29.29%	30.93%	1.03%
Norway	65.00%	70.61%	0.24%
New Zealand	125.00%	127.11%	0.22%
Philippines	120.93%	51.01%	0.68%
Poland	29.73%	23.99%	0.64%
Portugal	12.65%	24.59%	1.04%
Russia*	23.81%	11.33%	1.77%
Singapore	54.55%	10.94%	0.5%
Slovakia	62.50%	11.42%	0.15%
Sweden	75.00%	80.90%	0.35%
USA*	72.32%	57.03%	17.29%

* To be included in the global EDHEC*infra* indices in 2019.

Eligibility rules have been defined to ensure the systematic manner in which companies are identified and included in the universe. To be considered as investable unlisted infrastructure investments in countries that meet the market-inclusion criteria, individual companies must themselves meet a number of criteria:

- **Investability**: An infrastructure companies is considered "investable" if it is majority owned by the private sector and all or part of its equity capital can be sold to a third party. Likewise, private infrastructure borrowers are companies that have issued private debt instruments that are "available for sale" under IFRS 9 or US GAAP.
- *GICCS*® **qualification**: An investable infrastructure company or borrower can be fully classified under the four-pillar Global Infrastructure Company Classification Standard (GICCS).
- **Infrastructure revenues**: The overwhelming majority (more than 70%) of an infrastructure company's revenue comes from infrastructure-related activities as defined under the *GICCS*® second pillar, which lists relevant industrial activities considered to correspond to infrastructure activities.
- **Minimum available data**: Companies (borrowers) must be uniquely identified and named, and key start dates must be available (incorporation, financial close).

A detailed presentation of the *GICCS*® classification can be found on the EDHEC*infra* website.

1.3 Sampled-Universe Minimum-Representativity Criteria

Once relevant national markets and investable infrastructure companies have been determined, a sample of each market's investable infrastructure is built that meets the following minimum-representativity criteria **over time**.

The **sampled universe** of unlisted infrastructure investments for identified investable infrastructure companies/issuers in countries that meet the market-inclusion criteria is created using a final set of inclusion criteria.

The sampled universe is designed to be representative of the underlying universe and should:

1. achieve at least 50% coverage of market size estimated by total asset book value expressed in USD;
2. be representative by country, broad industrial sector, and business-model share of the universe; and
3. meet the two criteria above in each calendar year.

Sampling criteria also reflect the possibility of applying a valuation methodology that is in line with the valuation guidance and principles discussed in EDHEC*infra*'s **Unlisted Infrastructure Asset Pricing Methodology**.

They include:

1. Minimum available data: Unlisted infrastructure investments are only included in the process used to evaluate index constituents if they meet all the following criteria:
   - Basic data: Companies (borrowers) must be uniquely identified and named, and key dates must be available (incorporation, investment start, operation start, expected end, etc).
   - Level-2 input data: Documented initial and secondary market prices or credit spreads must be available.
   - Level-3 input data: Audited accounts including a complete description of the company's financial structure over time must be available.
2. Minimum age: Early stage investments present specific issues when valuating private assets. In the case of infrastructure investments, early life predictability is improved by the nature of the underlying business as well as the structuring and monitoring mechanisms created by project financing. Nevertheless, a minimum-age criteria (typically five years post operation start) is necessary to ensure sufficiently robust estimates of the future cash flows on which the valuation approach relies. Early years–or greenfield–performance can only be computed once companies have reached a certain age.

Companies that fulfill the above rules are then ranked from the most to least relevant and representative. The ranking is based on a/ total asset size in USD and b/ number of years post incorporation date. Companies with a larger size and incorporated for more than five years receive a higher rank.

In most markets, especially advanced markets, all the above criteria can be met to build a representative sample of the investable infrastructure universe over each of the past 20 years. In some cases however, this bottom-up sample strategy cannot be implemented due to the lack of available data. In this case the 50% market coverage constraint is dropped and replaced by a filter selecting the 20 largest transactions in the country for which the other criteria can be met.

The data collected, including the minimum required, are discussed in EDHEC*infra*'s **Global Data Standard**. Once individual companies have been identified to be included in the sampled universe representing the broad unlisted infrastructure market, detailed individual company data is collected, as described in section 3.

2. Index Families

The definition of EDHEC*infra* index families starts with the identification of an **investable universe** meeting the *principal-market minimum inclusion criteria* discussed in section 1 and the construction of a **representative sample** of this universe using constituents meeting the index-constituent minimum inclusion criteria also presented in section 1.

There are two investable universe covered by EHDEC*infra* indices: unlisted equity and private debt.

Index families are created by applying filters to each sampled universe, for example, geographic, sectoral, or other filters.

Thus, an **index family is defined by its constituents**, that is, the filters applied to the sampled universe. Within each family, multiple indices can be computed using a range of weighting schemes (discussed in section 4) and reporting currencies (described in section 6).

In 2018, following a survey of major infrastructure investors (Amenc & Blanc-Brude 2018), EDHEC*infra* put forward a taxonomy of the most relevant filters of the unlisted infrastructure equity and debt universes. The survey results highlighted strong preferences among infrastructure investors for:

- geographic segments reflecting economic levels of development and the investability of infrastructure;
- broad-based sector segments (as opposed to specific sectors);
- distinguishing between infrastructure projects and corporates;
- taking into account the impact of broad families of infrastructure "business models"; and
- reflecting the range of credit-risk buckets.

Hence, our broad market index families are defined using the filters that are the most relevant to investors. Families of EDHEC*infra* indices fall into one of three categories: broad market indices, market subindices, and custom benchmarks.

2.1 Broad Market Index Families

Broad market index families are the most relevant for describing the characteristics of unlisted infrastructure as an asset class and aim to reflect the notion of *principal market* under IFRS 13.

For each of the unlisted equity and private debt universes, there are four global **EDHEC*infra* broad market infrastructure index families** providing investors with an asset-class-level view of the risk and performance of infrastructure investments. While the global index aims to capture the performance of all private and investable infrastructure companies, major distinctions should be made between emerging and developed economies, and between all infrastructure and investments that are created through project financing. See table 3.

*Table 3: EDHEC*infra *Global Broad Market Index Families*

EDHECinfra Broad Market Index Families	
Unlisted Equity Universe	Private Debt Universe
Global Unlisted Infrastructure Equity	Global Private Infrastructure Debt
Global Project Finance Broad Equity	Global Project Finance Senior Debt
Advanced Markets Unlisted Infrastructure Equity	Advanced Markets Private Infrastructure Debt
Emerging Markets Unlisted Infrastructure Equity	Emerging Markets Private Infrastructure Debt

Source: EDHEC*infra*

*Table 4: EDHEC*infra *Subindex Segments*

EDHECinfra Global Broad Market Infrastructure Index Families				
Unlisted Infrastructure Equity Subindices		Private Infrastructure Debt Subindices		
Business Risk	Industrial	Business Risk	Industrial	Credit Risk
- Regulated - Contracted - Merchant	- Power gen. (not renewables) - Environmental services - Social infr. - Energy & Water infra. - Data infra. - Transport - Renewable power gen. - Network utilities	- Regulated - Contracted - Merchant	- Power gen. (not renewables) - Environmental services - Social infra. - Energy & Water infra. - Data infra. - Transport - Renewable power gen. - Network utilities	- Default Risk - Maturity - Origination curr.

Source: EDHEC*infra*

2.2 Thematic Subindices

Beyond broad market indices, which aim to represent the infrastructure sector as a whole, a number of subindices are relevant to infrastructure investors, especially for the purpose of performance monitoring.

Subindices apply a single type of filter to the broad market universe in order to isolate the effect of:

1. business risk;
2. industrial nature and activity; or
3. credit risk.

These filters correspond to the *GICCS*® classification of infrastructure companies and are described in table 4.

Hence, broad market families can be subdivided into 44 subindex families of unlisted infrastructure equity and 80 subindex families of private infrastructure debt.[1]

With 124 potential subindices, investors can track the risk-adjusted performance of almost any specialized manager or dedicated account that is focused on a subsegment of the broad infrastructure market.

2.3 Custom Benchmarks

Finally, investors and managers may need to access specific custom benchmarks for monitoring, valuation, or due-diligence purposes.

Strictly speaking, these benchmarks are not market indices; they are too narrow to correspond to an asset class or a segment of the infrastructure market. Nevertheless, custom benchmarks could be constructed to answer specific research or strategic questions and, for example, understand the evolution and the risks of the UK power market or the global airport sector, etc.

1 - Assuming three credit-risk buckets, three maturity buckets, and three main underlying instrument currencies.

The potential segments that can be used to create custom benchmark families are many and include any combination of subsegments for which enough constituents exist to apply benchmark construction and calculation rules. In the EDHEC*infra* data framework, these subsegments include:

1. regions (5) and countries (25);
2. industrial superclasses (8), classes (33), and subclasses (83);
3. business-model classes (3) and subclasses (5); and
4. corporate-structure classes (2) and subclasses (4).

Thus, if enough constituent data is available, hundreds of custom benchmarks can be envisaged that can be relevant to specific investors or products.

2.4 Live Index Families

The filters that can be applied to the sampled investable universe can potentially allow the computation of hundreds of indices, subindices, and custom benchmarks. However, for numerous combinations of these filters, a sufficient number of constituents may be lacking.

EDHEC*infra* index families are computed and considered "live" if they meet the following minimum constituent criteria:

1. Minimum number of constituents during the reference period: 25
2. Minimum reference period: 5 consecutive years

In other words, EDHEC*infra* index families are considered *live* and computed if they include at least 25 constituents for any reference period of at least five consecutive years. The indices available within families meeting the minimum constituent criteria are computed during the relevant reference period only.

3. Data Collection

A mandatory core set of data is required for the calculation of asset prices before index performance can be reported. The relevant data is collected and processed by a team of analysts who also conduct initial cash-flow-forecasting analyses and provide an internal rating for the investment.

The data-collection process follows the bottom-up approach used to build the sampled universe. Company-level data is collected from public and private sources for all the firms identified in the sampled universe defined in section 1.

Data can be collected from public and private sources. When it can be collected from both types of sources, the availability of privately sourced data is an additional factor impacting the sampling strategy, that is, given the requirement to sample firms with certain characteristics (size, sector, etc.), companies that include private contributors are given a higher weight so that both public and private information can be used and cross-validated. In markets where only one data source is available (either public or private), the sampling rules described in section 1 apply.

3.1 Public Data Sources

First, data is collected first-hand from business registries, company disclosures, and freedom of information requests.

Significant events such as the start of the investment, any change in shareholdings, the start of operations, contract renegotiations, events of default, etc., can be collected, cross-validated, and aggregated from various news websites, company disclosures, etc. In certain markets, historical financial information can also be obtained from audited financial reports or open-source databases.

The data collected includes cash-flow and balance-sheet items; the evolution of the firm's financial structure; and of various attributes of the firm, such as its business model or other dynamic elements that may change over time.

The required data is described in details in the EDHEC*infra* **Data Collection Standard**, which describes the standardised data items used in the data-collection process.

3.2 Private Data Sources

EDHEC*infra* also collects information from its pool of private data contributors. Data from these contributors range from base-case financial models to audited financial statements.

Due to sensitivity and confidentiality requirements, all privately sourced data is stored in a secured data room. Only employees that have been pre-approved to access such information have access to view (but not modify) the data.

Private data contributors are subject to EDHEC*infra*'s **Data Contributor Code of Conduct**, summarised in section 3.2.1 and available in full on the EDHEC*infra* website.

3.2.1 Data Contributor Code of Conduct

Private data providers are required to comply with the EDHEC*infra* **Data Contributor Code of Conduct**, which outlines data quality and integrity requirements during the preparation process. Noncompliance with the standards that is not corrected or properly addressed may result in the rejection of data submission or the removal of a contributor's data from databases and the relevant indices.

3.2.2 Contributed-Data Inclusion Criteria

The EDHEC*infra* Index Committee decides whether contributed data can be included in the sampled universe. The criteria for including and excluding contributors are:

Rules for inclusion

Inclusion rules of privately contributed data depends on the type of data contributed, according to the tiered IFRS 13 classification of data inputs:

- Level-2 data (transaction prices): Either at least two independent reports of the transaction exist or the data point(s) have been validated by a third party (e.g., an external auditor)
- Level-3 data (financials): When audited accounts are not publicly available, submitted annual reports or financial models must have been audited by a third party and the corresponding audit report must be provided.

Rules for exclusion

At the discretion of the Index Committee, contributed data may be excluded from the sampled universe under the following circumstances:

- Breach of Data Contributor Code of Conduct with respect to data quality, completeness, timeliness, or collusion
- Submission of new data less than 30 days before the sampled universe sign-off
- Failure to respond to queries regarding anomalous data
- Evidence of gross misconduct by a contributor

3.2.3 Data Confidentiality

EDHEC*infra* enters into a standard nondisclosure agreement (NDA) with all private data contributors. Privately contributed data is kept private and saved on a secured, encrypted server where it can only be retrieved by the relevant contributor. Specifically:

1. Level-2 data (transaction prices) is always kept strictly confidential and never displayed in any research or index report.
2. Level-3 data (financials) is kept strictly confidential unless it is also available through public sources (e.g., a corporate registry), in which case it may be reproduced in research reports.

3.3 Data Validation and Screening

All data collected from public and private sources are subjected to data validation and screening processes. This includes investigating abnormal changes from prior years' financial results, missing data, and potential errors. Separate templates are used for public data and for private data to ensure that data from both sources are not amalgamated together, as required by the NDAs.

Data points are entered by data analysts into a preformatted template on a company-by-company basis. The template includes data-validation rules to control for accuracy, missing data, calculation, and formatting. After the template has been populated, it is subject to further rounds of screening to guarantee its integrity, accuracy, and completeness–this includes two rounds of human review, followed by multiple rounds of logical error checking.

The first two rounds of human review assess that the data inputs are reasonable and sensible. The multiple rounds of logical checks screen for erroneous formatting, missing data, duplicate entries, and data that falls outside a set range. Only when all errors raised during these screening rounds have been addressed and resolved will the data be tentatively added into the database.

At the index level, performance metrics are calculated and checked for anomalies or out-of-range results. These issues are raised to the data team and review team for further investigation. Only when satisfactory explanations are provided and all errors have been cleared will the database be updated with the finalised data set.

The above is repeated during every annual data update to ensure that the fresh data introduced to the platform goes through the same validation and screening process.

3.3.1 Contributed-Data Quality Review

Data from private sources range from base-case financial models to audited financial statements. Submissions are received on a quarterly, semi-annually, or yearly basis, or at a frequency stated in the data contributor's contract. Due to the commercial sensitivity and NDA requirements, all contributed data will be stored in a secured data room. Only employees that have been pre-approved will have access to view, but not modify, the data.

Data will be analysed for the following:

1. Is the data commercially sensitive?
2. Can this information be obtained from public sources?
3. Are there sufficient data points?
4. Is there a need to standardise the data provided?

Once the data has been analysed, the data analyst will accord a "quality score" based on preset criteria that encompass accuracy, completeness, and timeliness of the data submission. For data with low "quality scores," a dialogue will be opened with the contributor to align submissions with best practices as stated in EDHEC*infra* **Data Contributor Code of Conduct**. This will also include understanding and reviewing the contributor's submissions processes, and if needed, providing recommendations to resolve any difficulties faced by the contributor during the process.

4. Index Weighting

EDHEC*infra* publishes the full list of constituents and their respective weights for each index (as per the weighting scheme) in the respective quarterly reports.

There are three alternative index-weighting schemes that are calculated:

- Value weighting;
- Capped value weighting; and
- Equal weighting.

The **reference currency** of all EDHEC*infra* indices will be in Euros(EUR) for the European region or United States dollars (USD) for the rest of the world. All weights are calculated in the reference currency, irrespective of the choice of the reporting currency of the index.

The EDHEC*infra* methodology used to compute the three alternative index-constituent weights, that is, the fraction of the index invested in each index constituent, is explained as follows.

4.1 Value Weighting

In value-weighted indices, each constituent influences the index in proportion to its value. The weights are calculated at each rebalancing date using the following formula:

$$w_{i,t} = \frac{V_{i,t}}{\sum_{i}^{n} V_{i,t}}$$

where:

- $w_{i,t}$ denotes weight of constituent i at time t
- $V_{i,t}$ denotes index constituent i's estimate of fair value at time t. The fair value is estimated using the methodology as described in our **EDHEC*infra* Private Infrastructure Asset-Pricing Methodology**, which can be obtained from the EDHEC*infra* website.

Index-constituent value weights are calculated in the reference currency so that all constituent market values denominated in a different currency than the reference currency are converted accordingly.

In order to remove any impact of currency change, value weights in local currency index are calculated in the reference currency but using the exchange rates fixed at one point in time (set to January 1, 2005). Whereas, time-variant exchange rates are used in currency-specific indices.

4.2 Capped Value Weighting

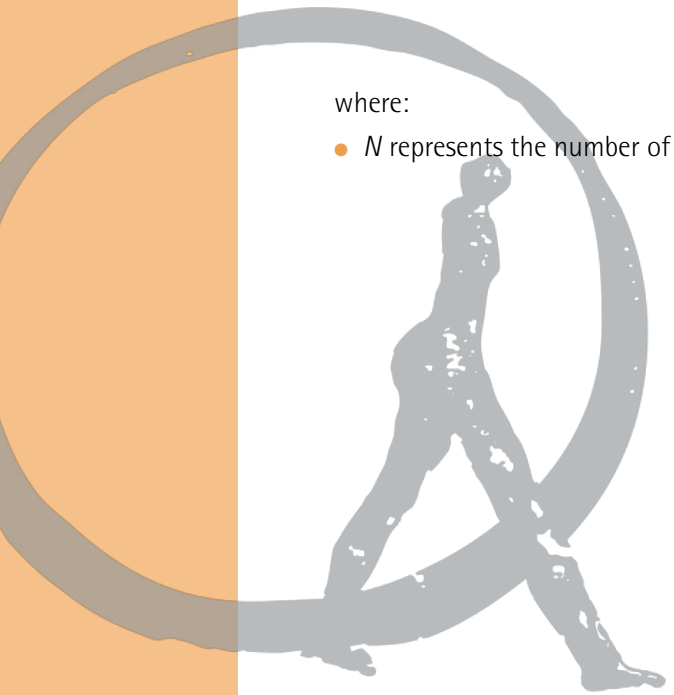
A capped value-weight index follows the same calculation methodology as the value-weights scheme described above, however, prevents any single constituent from having a disproportionate influence on the index.

EDHEC*infra* imposes a single-company limit, whereby, individual constituent's weight will be capped at 5% (an arbitrary number decided by EDHEC*infra*). Thereafter, the weights of the remaining index constituents are increased as a consequence of reducing the weights of the larger companies. The weights of the uncapped constituents are then checked, and if they exceed 5%, they are then also capped at 5%. This is an iterative process that is repeated until no company exceeds 5%.

4.3 Equal Weighting

Equal weighting scheme gives each index constituent equal representation in the index so that each constituent makes exactly the same contribution to the overall index performance at all times. In particular, index-constituent equal weights are calculated as follows:

$$w_i = \frac{1}{N}$$



where:

- N represents the number of index constituents at each rebalancing date

5. Metrics

EDHEC*infra* indices reflect the performance of representative sets of infrastructure companies through time. Because of the presence of two types of capital, debt and equity, EDHEC*infra*derives two types of infrastructure indices from its unique global sample: EDHEC*infra* unlisted equity indices and EDHEC*infra* private debt indices.

The EDHEC*infra* indices are only calculated in the total return space, taking into account dividend and coupon payments and their systematic reinvestments in equity and debt indices respectively.

Companies included in the EDHEC*infra* global sample are all included in the EDHEC*infra* equity indices. However, inclusion in EDHEC*infra* debt indices depends on the presence of senior debt instruments.

5.1 Index Performance

5.1.1 Total Return Index Values

EDHEC*infra* index data has been generated with a value of 1000 at: *1 January 2005* for indices starting on or before this date and *inception date* for indices starting after this date.

Starting from a base value of 1000, each successive index value is calculated by multiplying the preceding index value by (1 + quarterly return).

$$Index_{t=0} = 1000$$

$$Index_t = Index_{t-1} \times (1 + TR_t)$$

where:

- TR_t is the total return of the index, as calculated in section 5.1.2

5.1.2 Total Investment Return

The total return index measures the overall market performance of the index, including capital appreciation and reinvested income from regular coupon or cash dividend payments. Any cash distributions are assumed to be reinvested back into the index on coupon date / ex-dividend date of the distribution, and this contributes to the total return index performance.

Total return is calculated as the percentage value change plus net income accrual relative to the initial value of the asset. This is recognised by the Global Investment Performance Standards (GIPS®) [1].

1 - The GIPS are voluntary standards created and administered by the CFA Institute with the purpose of providing an industry-wide framework for comparing firms' investment performance. The standards are based on the fundamental principles of full disclosure and fair representation of investment performance results.

$$TR_t = \sum_i^n w_{i,t-1}\left(\frac{V_{i,t,RepCCY} + D_{i,t,RepCCY}}{V_{i,t-1,RepCCY}} - 1\right)$$

where:

- TR_t denotes the total return of the index for the period between *t-1* and *t*
- $w_{i,t-1}$ represents an index-constituent weight (either value weighted, capped value weighted, or equally weighted) at time *t-1*
- $V_{i,t,RepCCY}$ and $V_{i,t-1,RepCCY}$ denote an index-constituent fair value expressed in the reporting currency at the end of quarter *t* and *t-1* respectively
- $D_{i,t,RepCCY}$ denotes an index-constituent coupon/dividend payment between quarter *t* and *t-1* expressed in reporting currency

5.1.3 Excess Returns

Excess returns (ER) refers to total investment return that exceeds the rate of return on a security that is perceived to be risk free.

$$ER_t = TR_t - R_{f,t}$$

where:

- ER_t denotes the excess return of the index at time *t*
- TR_t denotes the total return of the index at time *t*, described in section 5.1.2
- $R_{f,t}$ denotes the risk-free rate at time *t*

Since choice of risk-free security impacts the excess return, EDHEC*infra* uses two different methods:

1. Use 3-month USD LIBOR rate as the standard risk-free rate for all indices

$$ER_{std,t} = TR_t - R_{f\_std,t}$$

where:

- $ER_{std,t}$ denotes the standard excess return of the index at time *t*
- TR_t denotes the total return of the index at time *t*, described in section 5.1.2
- $R_{f\_std,t}$ denotes the standard risk-free rate at time *t* (3-month USD LIBOR)

2. Compute a weighted average of the individual constituents' excess returns

$$ER_{local,t} = \sum_{i=1}^{n}(w_{i,t-1} \times ER_{i,t})$$

where:

- $ER_{local,t}$ denotes the local excess return of the index at time *t*
- *n* denotes the number of constituents in the index
- $w_{i,t-1}$ denotes the weight of consituent *i* at time *t-1*
- $ER_{i,t}$ denotes the excess return of consituent *i* at time *t*

Mean excess return is the average quarterly excess return of the index

$$\bar{ER}_T = \frac{1}{T}\sum_{t=1}^{T} ER_t$$

where:

- $\bar{ER}_T$ denotes the mean excess return of the index over the horizon
- T denotes the number of periods in the time horizon
- ER_t denotes the excess return of the index at time t

5.1.4 Annualised Rate of Return at Different Horizons

The annualised rate of return (ARR) is geometric, time-weighted, and calculated by compounding index-level period returns. The measure gives an equal weight to each period. ARR_n is reported in various horizons: current quarter, 1 year, 3 years, 5 years, 10 years, and rate since inception of the index.

$$ARR_n = [(1 + TR_1) \times (1 + TR_2) \times \ldots \times (1 + TR_n)]^{\frac{1}{n}} - 1$$

where:

- ARR_n is the annualised rate of return for a given period of time n
- TR_n denotes the quarterly total return of the index, described in section 5.1.2
- n denotes the given time period

5.1.5 Index Yield to Maturity

The index yield to maturity (YTM) can be calculated either by weighting the average yield of the constituents by value weights or by duration weights.

Value weighted

The value-weighted YTM of the index gives a fair indicator of overall interest rates prevailing in the market at any point of time. The calculation takes the weighted average of individual constituents' yield to maturity with the weight of each constituent's fair value.

$$\text{Index YTM}_t = \frac{\sum_{i=1}^{n}(V_{i,t} \times Y_{i,t})}{\sum_{i=1}^{n} V_{i,t}}$$

where:

- $V_{i,t}$ denotes constituent i's estimate of fair value at time t
- $Y_{i,t}$ denotes the yield to maturity for the constituent i at time t

Duration weighted

The duration-weighted YTM of the index gives a better approximation of the true yield of the index if the durations of the individual index constituents are very different from one another.

$$\text{Index YTM}_t = \frac{\sum_{i=1}^{n}(V_{i,t} \times Y_{i,t} \times MD_{i,t})}{\sum_{i=1}^{n}(V_{i,t} \times MD_{i,t})}$$

where:

- $MD_{i,t}$ denotes the modified duration of the constituent i at time t, described in section 5.2.3
- $V_{i,t}$ denotes constituent i's estimate of fair value at time t
- $Y_{i,t}$ denotes the yield to maturity for the constituent i at time t

5.1.6 Income return

Income return, or dividend yield, measures the income received in relation to the initial value of the asset. It ignores capital gains. The index-level income return is calculated as the weighted average using the fair value of each constituent.

$$\text{Index income return}_t = \sum_{i=1}^{n}(w_{i,t-1} \times \frac{D_{i,t,RepCCY}}{V_{i,t-1,RepCCY}})$$

where:

- $D_{i,t,RepCCY}$ denotes an index-constituent coupon/dividend payment in the quarter between times t and t-1 expressed in reporting currency
- $V_{i,t-1,RepCCY}$ denotes constituent i's fair value estimate at time t-1 expressed in reporting currency
- $w_{i,t-1}$ denotes the weight of constituent i at time t-1

5.1.7 Free cash flow yield

Free cash flow yield is computed as the ratio of free cash flow to the initial value of the asset. It ignores capital gains. The index-level yield is calculated as the weighted average using the fair value of each constituent.

$$\text{Free cash flow yield}_t = \sum_{i=1}^{n}(w_{i,t-1} \times \frac{FCF_{i,t,RepCCY}}{V_{i,t-1,RepCCY}})$$

where:

- $FCF_{i,t,RepCCY}$ denotes the free cash flow of consituent i at time t expressed in reporting currency
- $V_{i,t-1,RepCCY}$ denotes constituent i's fair value estimate at time t-1 expressed in reporting currency
- $w_{i,t-1}$ denotes the weight of constituent i at time t-1

5.1.8 Capital Growth

Capital growth, or indirect return, measures the change in asset's value over a period of time relative to the initial value. The index-level capital growth is calculated as the weighted average using the market value of each constituent.

$$\text{Capital growth}_t = \sum_{i=1}^{n} (w_{i,t-1} \times \frac{V_{i,t,RepCCY}}{V_{i,t-1,RepCCY}} - 1)$$

where:

- $V_{i,t,RepCCY}$ and $V_{i,t-1,RepCCY}$ denote constituent *i*'s fair value estimates at times *t* and *t-1* respectively
- $w_{i,t-1}$ denotes the weight of constituent *i* at time *t-1*

5.2 Risk Analytics

5.2.1 Standard Deviation

Standard deviation (σ), also known as volatility, measures how dispersed returns are around the average. A higher standard deviation indicates that returns are spread out over a larger range of values, hence, more volatile.

Asset-level risk measure

Given a time series of prices for any relevant unlisted infastructure asset (debt or equity), returns are computed as

$$\hat{r}_{i,t,t+1} = \log \frac{\hat{P}_{i,t+1} + CF_{i,t+1}}{\hat{P}_{i,t}}$$

where $\hat{P}_i$ denotes model-implied prices and CF_i is the realised cashflow.

Model-implied prices for the next period, $\hat{P}_{i,t+1}$, are computed using predicted variables, such as prices of risk factors and risk-free rates for the next period. Hence, these prices are uncertain and fall in a range depending on the range of predicted values for the underlying variables. As a result, the standard deviation of price can be written as

$$\sigma(P_{i,t}) = \frac{\partial P_{i,t}}{\partial R_f}\sigma(R_f) + \sum_k \frac{\partial P_{i,t}}{\partial \lambda_k}\sigma(\lambda_k) + \sum_k \frac{\partial P_{i,t}}{\partial \beta_{i,k}}\sigma(\beta_k) \quad (5.1)$$

where the first term, $\frac{\partial P_{i,t}}{\partial R_f}\sigma(R_f)$, reflects the uncertainty in the predicted price arising from uncertianty in risk-free rates, the second term, $\sum_k \frac{\partial P_{i,t}}{\partial \lambda_k}\sigma(\lambda_k)$, reflects the uncertainty in the predicted price arising from uncertainty in estimated prices of *k* risk factors, and the third term, $\sum_k \frac{\partial P_{i,t}}{\partial \beta_{i,k}}\sigma(\beta_k)$, reflects the uncertainty in the predicted price arising from the uncertainty in the project's loading to *k* risk factors.

Thus, the estimated volatility of returns, $\sigma_{i,t}$, reflects:

- the volatility of the risk-free-rate term structure, $\sigma(R_f)$;
- volatility of forecasted cash flows, $\sigma(CF_i)$;
- uncertainty with which the prices of risk factors are estimated, $\sigma(\lambda)$; and
- uncertainty with which the factor loadings are estimated, $\sigma(\beta)$.

These three sources of uncertainty—cash flows, risk-free rates, expected risk premia, and factor loadings—capture the full range of uncertainty for the future price of an asset, and the volatility estimate summarises the combined effect of all these sources of uncertainty.

This volatility measure is thus constructed in a "bottom-up" fashion, by estimating and aggregating individual sources of uncertainty. Some assets may be risky because their cash flows are riskier (higher

$\sigma(CF)$), some assets may be risky because they originate in countries where risk-free rates are volatile ($\sigma(R_f)$), some assets may be risky because their factor loadings are uncertain ($\sigma(\beta_k)$), and some may be risky because they have a higher exposure to more volatile risk-factor prices ($\sigma(\lambda)$).

Depending on the investment objective, different sources of uncertainty may matter more or less for different investors, and they may justify different allocations to assets with different underlying sources of risk, even if they exhibit similar levels of aggregate volatility.

Index-level risk measure

At the index level, the portfolio risk is estimated by relying on the multi-factor model used to compute asset values and returns.

In the multi-factor model, the expected excess return of each asset r_i can be represented as:

$$r_i = E(R_i) - R_f = \beta_{i,1} f_1 + \cdots + \beta_{i,K} f_K + \varepsilon_i \tag{5.2}$$

where $\beta_{i,k}$ is the asset exposure to factor k, f_k is the factor return to be estimated, and ε_i is the specific return.

Portfolio risk can then be calculated as:

$$\hat{\sigma}_P = \sqrt{w^T \Omega w}$$

where w is a $n \times 1$ weights matrix of the assets, Ω is a $n \times n$ covariance matrix of assets

Covariance between assets is computed as follows:

1. Since each asset's return is described by factors, first the covariances ($\omega_{k1,k2}$) between these factors are computed. It requires estimating correlations between the factors.
   - Sample correlation estimates are subject to dimensionality issues: limited data history and sparse frequency, nonstationary and rank deficient.
   - A Bayesian dynamic model is used to produce time-varying estimates of factor correlation. More details about the estimation of factor correlations are given in the EDHEC*infra* **Unlisted Infarstructure Asset Pricing Methodology**.

2. Then the covariances of each asset are derived at each point in time

$$COV_{n,m} = \sum_{k1,k2=1}^{K} \beta_{n,k1}\, \omega_{k1,k2} \beta_{m,k2} + \sigma_{n,m} \tag{5.3}$$

where $COV_{n,m}$ is the covariance of assets n and m

$\beta_{n,k1}$ the exposure of asset n to factor $k1$

$\omega_{k1,k2}$ the covariance of factor $k1$ with factor $k2$

$\sigma_{n,m}$ the specific covariance of assets n and m,

which is zero by design unless $n = m$, in which case it is the specific variance of the asset.

This can be represented in matrix notation as follows:

$$\Omega = \beta\omega\beta^T + \sigma \tag{5.4}$$

where Ω is a $n \times n$ covariance matrix of assets

where ω is a $k \times k$ covariance matrix of factors

β is a $n \times k$ matrix of asset exposures to factors

σ is a $n \times n$ matrix of specific covariances of assets

5.2.2 Sharpe Ratio

The Sharpe ratio is calculated by dividing the mean excess return of the index by its volatility, annualized over the horizon under consideration. In some years, the risk-free rate used to compute excess returns can be negative. The higher the Sharpe ratio, the higher the excess returns for a unit of risk.

$$SR_T = \frac{\bar{ER}_T}{\sigma_T}$$

where:

- $\bar{ER}_T$ denotes the annualised mean excess return of the index, described in section 5.1.3
- σ_T denotes the annualised volatility of the index

EDHEC*infra* publishes two sharpe ratios, i.e., standard and local, depending on the risk-free rate and excess return used for calculation as explained in section 5.1.3.

5.2.3 Average Duration

Modified duration is the approximate percentage change in price for a 100-basis-point change in interest rates, that is, the interest rate sensitivity. In general, the longer the modified duration, the more sensitive (higher fluctuations) the index is to changes in interest rates. The average duration of the index is calculated as the weighted average modified duration of all the assets in the index.

$$\text{Average Duration}_t = \frac{\sum_i (MD_{i,t} \times V_{i,t})}{\sum_i V_{i,t}}$$

where $MD_{i,t}$ is the modified duration of asset i at time t

$V_{i,t}$ represents the fair value estimate of asset i at time t

MD, modified duration, is calculated as:

$$MD_t = -\frac{1}{P_t}\frac{\delta P_t}{\delta r_f}$$
$$= \frac{1}{P_t}\sum_{\tau=t+1}^{T}\frac{(\tau - t) \times CF_\tau}{(1 + r_{f,t,\tau} + r_{x,\tau})^{\tau-t+1}}$$

where δP_t is price change of an asset by an infinitesimal change in risk-free rate(δr_f)

CF_τ cash flows at time τ

T represents maturity of an asset

$r_{f,t,\tau}$ represents risk-free rate at time t

$r_{x,\tau}$ represents a random change in the risk-free rate

5.2.4 Value at Risk

Value at Risk (VaR) is a statistical technique used to measure and quantify the level of financial risk within the firm, portfolio, or index over a specific time frame.

VaR is calculated by assessing the amount of potential loss, the probability of occurrence for the amount of loss, and the time frame. A 3% 1-month VaR of 2% means that there is a 3% chance of the asset/portfolio/index declining in value by 2% during the 1-month time frame.

EDHEC*infra* uses parametric approach for VaR computation with an inherent assumption that returns are normally distributed. VaR is calculated at a given point in time using total index return and volatility, since the total index returns are based on median fair value estimates of individual constituents and the volatility is cross-sectional.

$$VaR_t = (TR_t - Z_c \times \sigma_t) \times V_t$$

where:

- TR_t is the total return of the index at time t, described in section 5.1.2
- Z_c is inverse of the normal distribution for c (which is 1-α, where α is the level of significance)
- σ_t is the volatility of the index at time t
- V_t is the value of the index at time t

5.2.5 Maximum Drawdown

A maximum drawdown (MDD) is the maximum decline in the value of the index, calculated as the difference between a peak to a trough of the index before a new peak is achieved. The value of the index is based on total returns of the index, as calculated in *section 5.1.2*. It is an indicator of downside risk over a specific time period. It is usually quoted as a percentage of the peak value.

$$MDD_t = \frac{\text{Index Peak} - \text{Index Trough}}{\text{Index Peak}}$$

5.3 Performance Attribution

5.3.1 Index Factor Exposures

Portfolio-risk estimation can be achieved by estimating a factor model that describes asset-return comovements.

$$r_{i,t+1} = r_{f,t+1} + \sum_k [\beta_{F_k,t+1|t} F_k] + \epsilon_{i,t+1}$$

Where:

- $r_{i,t+1}$ is the return of each asset
- k is the risk factor
- $\beta_{F_k,t+1|t}$ is the asset exposure to factor k
- F_k is the factor return to be estimated
- $\epsilon_{i,t+1}$ is the specific return

5.3.2 Choice of Factors

We estimate the effect of a dozen potential factors that are relevant to infrastructure investments and may be used in a cross-sectional regression of expected returns. Some of these factors only apply to equity investments, such as "momentum" or "profitability," while others do not apply to infrastructure corporates' equity, like "term."

An important limitation is that new infrastructure investments have no accounts track records and standard measures of profitability or even meaningful book values are not necessarily available for them. Nevertheless, numerous new prices are observable only at the initial–or, greenfield–stage, when the investment is made, making the use of standard metrics for factor construction more difficult.

- Generic risk factors include:
  1. The **size** effect, measured using standardised total assets (taking into account the impact of the greenfield stage and using the maximum value during the first 10 years).
  2. The **value** (equity only) effect, proxied by the firms's free cash flow to equity retention rate, indicating how much of its free cash flow to equity the firm is able to distribute as shareholder payouts.
  3. **Momentum**, which can be measured for brownfield assets that trade in secondary markets using lagged returns.
  4. The impact of **liquidity**, which is expected to be a nonlinear function of size, measured using the standardised square of total assets.
  5. The impact of relative **volatility** on expected returns, measured using the conditional standard deviation of cash flow available for debt service (CFADS).
  6. The **investment** (equity only) factor, measured by the standardised change in total assets. For Greenfield projects this includes the expected change until operation start; for brownfield projects this includes the change in total assets over the past three years.
  7. The effect of **profitability** (equity only), measured as the ratio of future dividends to total expected equity investment.

8. The **term** factor (infrastructure project only), measured using an estimate of duration and convexity given the firm's future debt or equity cash flows.
9. **Credit risk**, measured using the current default probability computed as a function of the debt-service-ratio expected value and volatility.

- Infrastructure-specific risk factors include:
  1. **Lifecycle effects**, measured by using the log of age (number of years of operation) and/or the exponential of time to maturity.
  2. **Business-model/risk** effects, as defined under the first *GICCS*® pillar, measured using dummy variables.
  3. **Industry** effects, as defined as broad *GICCS*® classes of industrial activity, also measured using dummy variables.
  4. **Country** effects are measured using country-specific macrovariables such as the log of interest rate or GDP growth.
  5. **Corporate-governance** effects as defined under the fourth *GICCS*® pillar are proxied using dummies
- Forecasting risk: Modeling uncertainty is measured by the out-of-sample prediction error of the cash flow forecast

5.4 Concentration Measures

5.4.1 Effective Number of Bets

The effective number of bets (ENB) is formally defined as the dispersion of factor exposure distribution. In value-weighted portfolios, the ENB is lower than the number of portfolio constituents. In an equally weighted portfolio, the ENB must be equal to the number of constituents for a universe of assets with equal volatility and pairwise correlation values.

It can be calculated as the inverse of the Herfindahl-Hirschman index (HHI), which is a measure of market concentration.

$$ENB = \frac{1}{HHI} = \frac{1}{\sum_{i=1}^{n} w_i^2}$$

where:

- w_i^2 is the square of the value weight of each constituent in the index, as calculated in chapter 4

5.5 Constituent Valuation Ratios

For the purpose of understanding asset-level performance for EDHEC*infra*'s unlisted equity indices, EDHEC*infra* also publishes and calculates various performance ratios. These ratios are also calculated at the index level using a weighted-average approach.

5.5.1 Price to Book

The price to book (P/BV) ratio is used to measure the value of an index.

$$\text{P/BV}_i = \frac{V_i}{BV_i}$$

where:

- V_i is the median estimate of fair value of constituent i
- BV_i is the 5-year trailing average book value of constituent i

5.5.2 Price to Earnings

The price-to-earnings (P/E) ratio is the price of the index to the earnings per share.

$$\text{P/E}_i = \frac{V_i}{E_i}$$

where:

- V_i is the median estimate of fair value of constituent i
- E_i is the 5-year trailing average earnings of constituent i

5.5.3 Enterprise Value to Free Cash Flow

This ratio is the enterprise value (EV) of a company divided by its free cash flow (FCF), which refers to cash flow available to all capital providers (both equity and debt providers) of the company. A high EV/FCF may indicate that a company is overvalued, and vice versa.

$$\begin{aligned} EV\ to\ FCF_t &= \frac{EV_t}{FCF_t} \\ &= \frac{Ve_t + TD_t - Cash_t - Investments_t}{CFADS_t - DS_t - Cash_{t-1}} \end{aligned}$$

where:

- Ve_t is the equity value of company i at time t
- TD_t is the total debt of the company, including both long-term and short-term debt on the balance sheet
- $CFADS_t$ is the cash flow available for debt service (free cash flow) at time t
- DS_t is the senior debt service at time t
- $Cash_t$ is the total cash in the bank at time t
- $Cash_{t-1}$ is the total cash in the bank at time t-1

5.6 Index-Level Credit Risk Analytics

EDHEC*infra* also publishes credit risk measures for its private debt indices. These measures are calculated on the index level and at the index-constituent level.

5.6.1 Index Average Maturity

The average maturity of the index is the weighted average of the remaining life of senior debt instruments in the index. The higher the average maturity, the longer it takes for the debt instruments in the index to reach maturity.

$$\text{Average maturity}_t = \frac{\sum_{i=1}^{n}(M_{i,t} \times w_{i,t})}{\sum_{i=1}^{n} w_{i,t}}$$

where:

- $M_{i,t}$ is the weighted average maturity of debt instruments of constituent i at time t
- $w_{i,t}$ denotes weight of constituent i at time t

5.6.2 Index Average Expected Loss

The index-level expected loss is calculated as the weighted average of expected loss at the firm level.

$$\text{Average expected loss}_t = \frac{\sum_{i=1}^{n}(EL_{i,t} \times w_{i,t})}{\sum_{i=1}^{n} w_{i,t}}$$

Where:

- $EL_{i,t}$ is the expected loss for constituent i at time t, as calculated in section 5.7.1
- $w_{i,t}$ denotes weight of constituent i at time t

5.6.3 Probability of at Least One Default

Given the probability of default of individual consitituents, the probability of at least one default in the index can be comptued as

$$\text{Probability of at least one default}_t = \sum_i PD_i - \sum_{i,j;i\neq j} PD_i PD_j + \cdots$$

where PD_i is the probability of default of a an individual constituent, PD_iPD_j denote the probability of two simultaneous defaults, and $\cdots$ denote higher order terms of more than two simultaneous defaults and these terms become increasingly smaller as the order of the term increases, and can be negligible if the probability of individual defaults is small.

5.7 Constituent-Level Credit Risk Analytics

5.7.1 Expected Loss

The expected loss is the probability of default times the amount of debt forgone (i.e., loss given default) in debt restructuring.

$$\text{Expected loss} = \text{Prob. of default} \times \text{Loss given default}$$

5.7.2 Probability of Default

Probability of default is determined as the probability of the DSCR falling below a certain threshold.

For hard defaults, the DSCR threshold is 1.x = 1.0
For soft defaults, the DSCR threshold is 1.x = 1.05
For a dividend lockup, the DSCR threshold is 1.x = 1.10

$$PD_{t+1|t} = N\left(-\frac{DSCRMean_{t+1|t} - 1.x}{DSCRVol_{t+1|t}}\right)$$

where:

- $PD_{t+1|t}$ is the probability of default at time *t+1* conditional on time *t* information
- N is cumulative probability density function for a standard normal random variable
- $DSCRMean_{t+1}$ is the average debt service coverage ratio of the constituent at time *t+1* conditional on time *t* information
- $DSCRVol_{t+1}$ is the volatility of the debt service coverage ratio of the constituent at time *t+1* conditional on time *t* information
- $DSCR_t = \frac{C_{bank,t}+C_{op,t}+C_{IA,t}+C_{dd,t}-C_{inv,t}}{DS_{senior,t}}$, where $C_{bank,t}$, $C_{op,t}$, $C_{IA,t}$, $C_{dd,t}$, $C_{inv,t}$ denote cash at bank, cash from operating activities, cash withdrawal from investment account, cash from debt drawdowns, and cash invested into physical investments, at time *t*, respectively. $DS_{senior,t}$ denotes debt service payments for senior debt instruments at time *t*.

5.7.3 Loss Given Default

The loss given default at the asset level is the amount of money that a bank or other financial institution loses when a borrower defaults on a loan. The value of the debt in the case of a default is based on a debt-restructuring model that assumes that debt holders will forgo some debt to avoid a default because debt holders will receive less if a project is liquidated.

Any debt relief (also known as debt forgiveness) will decrease the outstanding debt and will reduce the project's probability of default in the future.

$$V_{debt,t} = max(V_{firm,t} - Cost_{exit,t}, Cash_t)$$

$$LGD_t = max(0, V_{outstanding,t} - V_{debt,t})$$

where $V_{outstanding,t}$ is the outstanding amout (face value) of debt.

5.7.4 Distance to Default

The distance to default is the probability that the market value of a firm's assets falls below the value of the debt. The calculation used by EDHEC*infra* is derived from the Merton (1974) model:

$$DD_t = \frac{1}{\sigma_{DSCR_t}} \frac{DS_{t-1}}{DS_t} \left(1 - \frac{1}{DSCR_t}\right)$$

where:

- $DSCR_t$ is the debt service coverage ratio for senior debt instruments, which is the ratio of cash flow available for debt service (CFADS) to the exepcted debt service (DS) at time t
- DS_t is the debt service, which is the sum of principal and interest payments at time i
- σ_{DSCR_t} is the standard deviation of the annual percentage change in the DSCR value

6. Index Rules

6.1 Reporting Robustness

6.1.1 Valuation Adequacy Rules

Secondary transaction prices are used in EDHEC*infra*'s asset-pricing models whenever possible. These transaction prices are obtained from various independent databases. EDHEC*infra* reviews all transaction prices prior to including them in the data set.

6.1.2 Assessment of Representativeness of Index Quarterly Reports

EDHEC*infra*'s published quarterly index reports are meant to give an understanding of the performance and composition of the respective indices. Prior to publishing, the underlying data set is checked to ensure that it is representative of the respective markets.

6.1.3 Exclusions from Indexes

During every update and quarterly review (whichever is earlier), EDHEC*infra* assesses the level of data quality across the database to identify any gaps, anomalous results, or errors.

If such issues cannot be addressed in time for index fixing, the relevant constituents will be excluded. Examples of gaps or errors include, but are not limited to:

- missing mandatory data;
- data that does not comply with EDHEC*infra* **Global Data Standards Methodology**;
- contradictory data: classifications or values which are inconsistent within or across asset records; and
- questionable results or variances that cannot be explained.

6.2 Index updates

Indices are updated on a quarterly basis. However, as companies follow different fiscal years, these quarterly updates are partially based on the new data from the reporting companies and partially on the stale data of other companies.

In the quarerly updates, historical index values are subject to change on account of two reasons:

- The minimum age criteria for individual constituent inclusion implies that only the companies which have been in operation for some years are added to the index. But these companies are added along with their historical cash flows and thus could change the historical index values.
- If a constituent drops out from the index due to the poor data quality or similar reasons, the entire history of the constituent is removed from the index and hence would also change the historical index values.

To address this impact, EDHEC*infra* will also publish annual frozen-weight indices. These indices will have a fixed set of constituents with frozen weights as of the last update for the year and will allow subscribers to benchmark the performance based on the weights as of a given year.

6.3 Fixing Dates

Index-fixing dates are set so that index users will be kept informed of any changes to the composition of the respective index. This gives index users sufficient time to adjust or rebalance their portfolios to take into account the anticipated changes in the index.

On the fixing dates, EDHEC*infra* will publish all pertinent information relating to index eligibility and values that will be used in the upcoming quarter's index results.

Fixing dates are set such there is a minimum of five business days following each index-fixing date and before the end of the calendar month, excluding weekends, public holidays, and bank holidays. However, index-fixing dates are subject to unforeseen changes such as catastrophic natural disasters.

6.4 Local-Currency Regional Indices

EDHEC*infra* also publishes indices that are reported in local currency, which are indices for which the effect of currency is removed. The purpose of this is to represent a portfolio that has been continuously hedged for foreign-exchange exposure.

The difference between USD-denominated indices (or EUR-denominated indices) and local-currency indices is that USD-denominated indices also represent the gains or losses an investor has that can be attributed to foreign-currency gains or losses.

6.5 Currency Conversion

EDHEC*infra* index currency refers to the reporting currency of the index. Index returns are converted into the reference currency, irrespective of the choice of the index reporting currency. Fully hedged EDHEC*infra* indices are also calculated for the purpose of reflecting the pure performance of infrastructure companies without any currency effect. In short, such indices do not take into account the impact of currency in their calculation.

Index-constituent market values are also all converted into reference currency in case of value-weighted and capped-value-weighted EDHEC*infra* indices. The conversion consists of multiplying market values denominated in the base currency by the corresponding foreign exchange rate.

6.5.1 Return Conversion

For any EDHECinfra index for which $CCY \neq RefCCY$, the return of that index will first be converted into the reference currency:

$$R_{RefCCY} = (1 + R_{CCY}) \times (1 + R_{\frac{CCY}{RefCCY}}) - 1$$

The index-level return is then converted into any chosen reporting currency.

$$R_{RepCCY} = (1 + R_{RefCCY}) \times (1 + R_{\frac{RefCCY}{RepCCY}}) - 1$$

where:

- R_{CCY} denotes the return of the index in base currency
- R_{RefCCY} denotes the return of the index in the reference currency
- R_{RepCCY} denotes the return of the index in the chosen reporting currency
- $R_{\frac{CCY}{RefCCY}}$ denotes the change in the exchange rate from the base currency to the reference currency

In particular, the change in the foreign exchange rate from the base currency to the reference currency is expressed as follows:

$$R_{\frac{CCY}{RefCCY}} = \frac{X_{\frac{CCY}{RefCCY},t} - X_{\frac{CCY}{RefCCY},t+1}}{X_{\frac{CCY}{RefCCY},t}}$$

where $X_{\frac{CCY}{RefCCY},t}$ and $X_{\frac{CCY}{RefCCY},t+1}$ denote the foreign exchange rate from the base currency to the reference currency at time t and $t+1$ respectively.

6.5.2 Currency Risk

With the exception of fully hedged indices, all indices, irrespective of their reporting currency, exhibit some level of currency risk.

6.5.3 Foreign Exchange Rates

Foreign exchange rates used at each rebalancing date correspond to their closing rate of the last business day of each quarter. If foreign exchange rate data is not available for a particular market, EDHEC*infra* uses the latest information available.

A. Appendix: Policies and Benchmark Determination

EDHEC*infra* policies and procedures are designed to ensure that there is consistency across decision-making and to provide clear guidelines in the event of ambiguity over the treatment of data collection, production, publication, and other relevant situations during the course of index administration. All policies and procedures have been designed to be in compliance with the International Organisation of Securities Commissions' (IOSCO)[1] "Principles for Financial Benchmarks."

The policies and procedures relating to index methodology and data inputs are described below:

- A.1 Universe Change Policy
- A.2 Correction Policy
- A.3 Methodology Change Policy
- A.4 Consultation Policy
- A.5 Index Cessation Policy
- A.6 Complaints Policy
- A.7 Data Retention Policy

EDHEC*infra* also has in place other policies and procedures relating to other aspect of the business. These policies and procedures have also been designed to be in compliance with IOSCO's "Principles for Financial Benchmarks." These four policies have been made available on the EDHEC*infra* website:

- Anti-Bribery and Corruption Policy
- Conflicts of Interest Policy
- Handling Confidential, Nonpublic, and Price-Sensitive Information Policy
- Whistle-Blowing Policy

A.1 Universe Change Policy

EDHEC*infra* updates the universe periodically to take into account new projects, projects that have come to the end of their investment life, etc. Changes in the composition of the universe may thus result in material changes either through the inclusion or exclusion of constituents in the sampled universe that is subsequently used for the computation of the indices.

A.1.1 Policy

The data-collection and data-review teams rely on established guidelines to identify potential material changes to the universe. This encompasses evaluating the overall impact on the total asset value of the universe and the composition of the sector or business model. Any changes that have been deemed to be material will be raised to the Index Committee. The Index Committee will make a final decision as to

1 - The IOSCO is an association of organisations that regulates the world's securities and futures markets. In July 2013, the IOSCO published its final report on principles for financial benchmarks, which lists a set of recommended practices that should be implemented by benchmark administrators and submitters. Adopters of IOSCO's principles for financial benchmarks are expected to publicly disclose the extent of their compliance on an annual basis. Any deviation from the principles has to be explained. The principles are not intended to supersede any existing local laws, regulations, or relevant regulatory or supervisory framework in specific jurisdictions, including any IOSCO principles or undertakings agreed with regulatory authorities relating to any specific type of benchmark, or a related activity.

whether the change is deemed to be material and hence subject to a formal public announcement as required by the **Consultation Policy**.

All changes (i.e, inclusion or exclusion of constituents) made will have to be retained as required by the **Data Retention Policy**.

A.1.2 Scope

This policy applies to all full EDHEC*infra* indices, not to consultative or ad hoc indices.

A.1.3 Implementation

Once the Index Committee determines that a change to the universe is material, a public announcement will be prepared and published on EDHEC*infra*'s website.

A.2 Correction Policy

If any data errors or corrections have been identified at any point of the index administration, they must be raised to the Index Committee for the assessment of materiality. Index corrections can be distinguished between calculation errors and invalid data input.

Examples of calculation errors include the following:

- Corrections made to index-calculation methodology
- Erroneous calculation of historical cash flows

Examples of data-input errors include the following:

- Corrections made to input data and the downstream implications in indices and associated analytics
- Erroneous classification of financial-statement items
- Erroneous identification of underlying assets' financial statements or attributes

The materiality of correction required is subject to the Index Committee's decision. As a general rule of thumb, a correction is deemed to be material if the correction will significantly affect the benchmark users' expectations or decision-making abilities.

A.2.1 Policy

EDHEC*infra* corrects any errors in the underlying data once they have been identified. The impact of any of these errors will be assessed and validated by the Index Committee. If the restatements are deemed to be material, they will be published on the EDHEC*infra* website, along with an explanation of the corrections made and the corresponding impact (if any).

The following are not in scope for this policy:

- Changes to universe constitution
- Changes in index methodology

Separate policies have been designed to address the mentioned out-of-scope changes.

A.2.2 Materiality

The data-collection and data-review teams are provided guidelines as to when a restatement or correction is deemed to be material. The final decision on the materiality of the restatement rests with the Index Committee. Any such restatement will be published on the EDHEC*infra* website, with an explanation of the restatement and the corresponding impact.

A.2.3 Scope

This policy is limited to changes in erroneous underlying data. Changes in underlying data due to the addition new constituents, historical data, accounting restatements in the universe are not covered under this policy.

EDHEC*infra* applies a 36-month correction period calculated retrospectively from the date when the error was detected. Any errors detected beyond this period will not be corrected.

A.2.4 Implementation

Once an error has been identified, EDHEC*infra* will assess the impact on the relevant universe.

For errors that are deemed **not material**:
The underlying data will be modified. Relevant indices will not be restated, and no public announcement will be made.

For errors that are deemed to be **material**, but are **not within the correction period**:
Underlying data will still be modified, and a restatement will be effected for subsequent releases. No public announcement will be made.

For errors that are deemed to be **material**, and are **within the correction period**:
Underlying data will be modified, relevant indices will be corrected and restated, and a public announcement will be made on the EDHEC*infra* website.

A.3 Methodology Change Policy

Changes to the EDHEC*infra* methodology might arise, and this might be due to, but not limited to, changes in the regulatory environment or a shift in industry practice. Depending on the circumstance and urgency, changes may be adopted gradually or rapidly. EDHEC*infra* does not expect changes to the methodology to occur frequently.

If there is a need for any changes to EDHEC*infra*'s methodology, this will be executed using a considered and transparent approach, where rigorous internal assessment will be done, and all relevant and interested stakeholders will be consulted before any final decisions are made. All final decisions will be publicly disclosed along with explanations on the EDHEC*infra* website.

A.3.1 Policy

A systematic approach is used with regards to changes in methodology:

- Formal internal recommendation by the Index Committee
- External consultation of all affected users and stakeholders

- Consideration of stakeholder feedback
- Determination on change of methodology
- Public announcement on final decision at least three months before implementation of change

EDHEC*infra* refrains from reproducing results based on methodologies that have been phased out.

A.3.2 Implementation

Proposals for the change in methodology may be received from any department within EDHEC*infra*, index users, or relevant stakeholders.

The Index Committee reviews all proposals and assesses for practicality and feasibility of the implementation. If required, further information from the proposer may be requested. If a change has been deemed to be material, according to **A.4** , there is a need to engage in a consultation with index stakeholders. The process follows procedure set out in the Consultation Policy, and the subsequent decision by the Index Committee will have to be made public at least two months prior so that index users will have ample time to make the relevant adjustments. An explanation for the change in methodology will also be included in the announcement.

A.4 Consultation Policy

There are instances that that require EDHEC*infra* to engage or consult interested parties before any action is taken.

A.4.1 Policy

EDHEC*infra* will undertake consultation with stakeholders if and when there is a need to make material changes to the index methodology or index calculation. This also includes any changes relating to valuation techniques, performance measures, factor analysis, and risk analysis. Other material changes highlighted in other index policies also lead to EDHEC*infra* undertaking stakeholder consultations.

The above-mentioned scenarios are not exhaustive. The decision lies with the Index Committee as to whether a situation or issue requires a need to engage in a consultation with stakeholders.

A.4.2 Implementation

Once a proposed change has been agreed by the Index Committee, consultation will take place with interested parties. 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.

A.4.3 Retention of Feedback

All consultations will have to be retained for a minimum of five (5) years, as required by **A.7, Data Retention Policy**. Consultation reports will also be made public on EDHEC*infra*'s website.

A.5 Index Cessation policy

This policy establishes the conditions and procedure regarding the cessation of an existing EDHEC*infra* index. Because subscribers may have relied on the index to create various financial projects, EDHEC*infra* should provide ample notice and undergo extensive stakeholder consultations to allow for rebalancing or adjustments to portfolios.

A.5.1 Policy

The representativeness and usefulness of all indices will be reviewed after each update of of the index market coverage. The decision as to whether an index should be continued or ceased lies with the Index Committee.

An index should only be ceased if it has been deemed essential, and it is apparent that the index is no longer representative of the said market, and all alternatives to improving the representativeness of the benchmark have been considered and exhausted. An index may also be ceased due to insufficient data coverage or quality that impedes EDHEC*infra*'s ability to publish a benchmark that is representative of the said market or sector.

A.5.2 Scope

This policy applies only to published EDHEC*infra* indices.

A.5.3 Implementation

When reviewing the need to cease an index, the Index Committee will first assess if there are any remedial actions to improve either the representativeness of the index or the level of data quality and quantity. If this does not result in any resolution, it will be escalated for public consultation.

All feedback from the consultation will be assessed, and the final decision will be made by the Index Committee as to whether the index should be continued or ceased. If the decision is to terminate the index, a public announcement will be made on the EDHEC*infra* website and an accompanying explanation will be also be publicly published.

A.6 Complaints Policy

This policy establishes the formal process when a formal complaint is lodged for any EDHEC*infra* index. It describes the steps and procedures that will be taken during the submission of the complaint, the handling process, and the resolution steps that will be taken.

A.6.1 Policy

Any formal complaint regarding any of EDHEC*infra*'s indices has to be submitted through the official form on the EDHEC*infra*'s website. Formal complaints can originate from any subscriber or user of the index.

Only formal complaints received through this channel will be entertained. Complaints received through other forms of communication channels will not be accepted.

In the unlikely event that the EDHEC*infra* website is down or is inaccessible, complaints can be emailed directly to EDHEC*infra*. The complaint must be structured in the following manner:

1. Full name of complainant
2. Company name (if applicable)
3. Contact details
4. Nature of complaint, including the name of the index and date of issue

A.6.2 Scope

This policy applies to all published EDHEC*infra* indices.

A.6.3 Implementation

Once a formal complaint has been submitted, it will be subjected to the following procedure:

- Formal complaints will be raised to the Index Committee
- If further clarification is needed, EDHEC*infra* will contact the complainant (through email) for follow-up
- Complaints will be escalated as appropriate within EDHEC*infra*, depending on the nature and subject matter of the complaint

If the complaint leads to a material change in the index, the process detailed in **A.2, Correction Policy**, will be followed.

All efforts will be made to ensure that complaints are kept confidential, unless disclosure is required due to applicable laws, regulation, or other types of proceedings.

The complainant will be notified in writing (by email) within a reasonable period of time following the outcome of the investigation.

A.6.4 Retention of complaint records

As required by **A.7, Data Retention Policy**, all formal complaints will be kept for a minimum period of five years, subject to applicable laws and regulation.

A.7 Data Retention Policy

EDHEC*infra* maintains several databases that store different types of data. Proper audit trail has been established to ensure that such data can be retrieved for operational or regulatory needs.

A.7.1 Policy

All written data has to be stored in a secured data room, and only restricted employees are allowed to access retained data to ensure that stored data is not compromised.

The following data types have to be stored in a secured and encrypted data room:

- Contributed data bound by NDAs
- Commercially sensitive information

The following data types have to be stored in a secured data room or system:

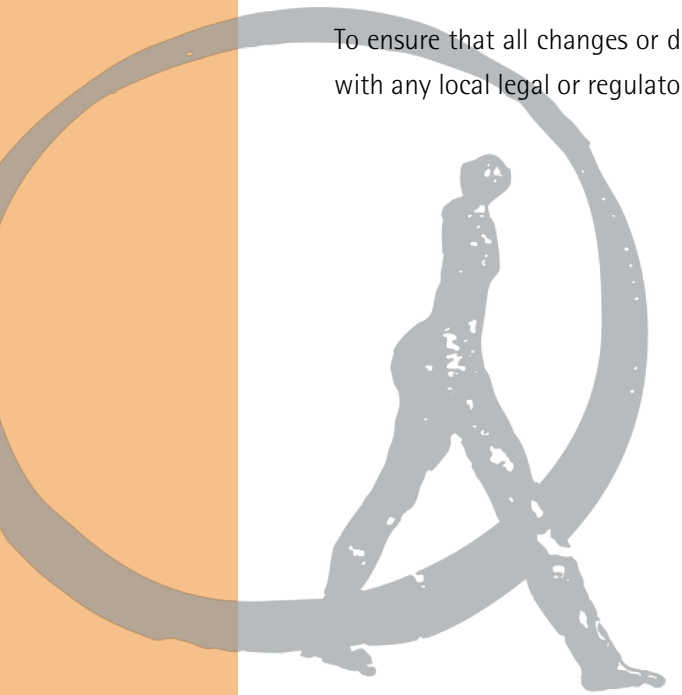
- Decisions and judgements regarding data collection, index production, and publication
- Queries and responses relating to data inputs
- Changes made to universe/sampling sets
- Employee-related information and respective accesses

A.7.2 Scope

This policy applies to, but is not limited to, index-related data, calculation methodologies, decisions made in relation to the benchmark production, publication, and issues raised by users or stakeholders of the index.

A.7.3 Implementation

To ensure that all changes or decisions made in the course of index administration are in compliance with any local legal or regulatory requirements, all data will be stored for a minimum of five (5) years.



B. Summary of Asset-Pricing Methodology

B.1 Valuation Principles

Following on the IFRS and academic guidance discussed in the EDHEC*infra* **Asset-Pricing Methodology**, the valuation process follows five key principles:

1. **Principal market measure**: Input data must be obtained from a preidentified principal market according to the EDHEC*infra* market-inclusion criteria (see appendix)–a combination of national markets that are sufficiently active and representative of the activities of buyers and sellers of infrastructure assets over time and thus allows inferring average price preferences over time.
2. **Dual methodology**: Individual asset valuations combine the income (or DCF) *and* market (or multiple) approaches. This is enforced by the constituent-level minimum data inclusion criteria (see appendix).
3. **Market calibration**: The valuation process ensures that price estimates are calibrated to best reflect available level-2 input data, that is, primary and secondary transactions as well the most current level of interest rates and other market inputs.
4. **Risk-factor pricing**: Following the modern academic literature on asset pricing, the valuation process aims to discover the current market price of individual risk factors that can be attributed to the relevant type of investments on the basis of known information (e.g., the company is located in a given country) or economically justified assumptions (e.g., multiperiod investments are exposed to interest-rate risk).
5. **Credit risk measurement**: In the case of debt securities, a scenario-driven analysis of nonperformance and postdefault restructuring is also conducted to estimate the fair value of expected losses.

B.2 Valuation Approach

The premise that a limited number of factors explains the majority of investment risk found in financial securities makes the development of robust and persistent factor models of returns an important part of investment-risk management.

With frequent trading and observable prices and returns, factor models can be used to decompose portfolio risk according to common factor exposures and to assess how much of the portfolio's returns are attributable to each common factor exposure.

The standard approach in both academic and industry factor models is the two-step regression method put forward by Fama and McBeth (1973), or FMB. The FMB approach consists of estimating two sets of coefficients: both the asset betas or factor loadings *and* the market prices of each risk factor are unknown and must be estimated using time series of asset prices/returns. Once individual factor loadings have been estimated over time, factor prices (lambdas) are estimated in the cross section of returns given estimated asset betas. This is possible because individual security prices are observable over time in sufficiently long time series as well as in the cross section in sufficitenly large numbers. FMB uses the two dimensions of the data available to estimates first the betas and then the lambdas of the APT framework.

With illiquid financial assets too few trades are available to decompose individual asset returns into exposures to common sources of risk over time and estimate asset betas. However, if individual factor exposures can be estimated or assumed directly and a minimum number of transaction prices can be observed in each time period, risk-factor prices (lambdas) can still be estimated in the cross section of expected returns.

In any given period, a number of primary and secondary transactions are observable in the market for unlisted infrastructure investments. As long as sufficient information about the expected cash flows to equity or debt holders can be obtained or estimated, at any time t we have:

$$P_i = \frac{\sum_{t=1}^{T} CF_t}{\left(1 + (R_f + E(\tilde{R}_i))\right)^t}$$

for primary or secondary investment P_i in asset i, paying CF_t until time T. $R_f + E(\tilde{R}_i)$ is the approximate expected internal rate of return (IRR) at time t.

Using standard root finding techniques, $E(\tilde{R}_i)$, an estimate of the expected rate of (excess) return for the entire life of the investment can be derived.

Hence, a cross section of expected returns is observable in each period. However, these estimates are noisy because they are solely derived from initial and secondary investment values and expected cash flows. Cash flow forecasts are characterised by measurement errors, and we know that cash flow timings and size can have a dramatic impact on IRRs.

Moreover, only a fraction of the investments representing the broad market at time t are the object of observable transactions at that time. Hence, only a subset of approximate excess returns $E(\tilde{R}_i)$ is available in each period.

Once a cross section of approximate expected returns is known, it can be regressed against individual asset factor loadings (betas) to estimate individual factor prices ($\hat{\lambda}_k$) in the cross section, at that point in time. Thus, we have

$$E(\tilde{R}_i) - R_f = \lambda 1 \beta_{i,1} + \cdots + \lambda_K \beta_{i,K} + \omega_i \tag{B.1}$$

where ω_i is the measurement noise introduced when estimating $E(\tilde{R}_i)$. In other words, we can write estimated excess returns at time t as a function of factor loading and factor prices plus some measurement error. Using a range of statistical techniques, the value of λ_i can be estimated for observable transactions at time t (the cross section of transactions). Estimated $\hat{\lambda}_k$ then gives us new estimates of expected excess returns $\hat{R}_i$ for all assets j in the relevant period in accordance with their individual betas, including those assets for which no transaction prices were available at the time, so that

$$E(\hat{R}_j) - R_f = \sum_k \hat{\lambda}_k \beta_{j,k} \tag{B.2}$$

This approach can be labelled *hedonic factor pricing* after the hedonic models used in real estate and other private markets. It consists of predicting the prices of risk factors that apply to assets with certain characteristics even though they have not been traded in the relevant period.

Estimating a factor model of returns for illiquid, seldom-traded assets has methodological and empirical limitations. Nevertheless, if it can achieve a certain level of minimum robustness and out-of-sample

persistence, it provides a valuable framework for thinking methodically about risk and returns in private markets. Investors' natures and preferences in private infrastructure markets keep changing. Documenting how systematic sources of risk are priced on average in private investments should rest on a solid theoretical framework and can be a vast improvement over existing methodologies.

By measuring the impact of common factor exposures on returns, APT-style factor models help derive mean or expected returns (or discount factors), that is, what drives returns and prices systematically and across assets. Conversely, it does not explain sources of pricing and returns that arise from owner's private information or deal-making skills. This remains an idiosyncratic dimension.

C. Appendix: Glossary of Terms

Base date of index

is the date where the respective index is given a fixed value for calculation purposes.

Benchmark

is the average against which the performance of a portfolio or group of assets is measured.

Capped index

refers to an index with constituent weights that are limited to a fixed percentage. This prevents the index from being heavily weighted against any particular index constituent.

Capped weight

refers to the weight limit that has been placed on a constituent that would otherwise exceed the cap limit in the index.

Equal-weight index

refers to an index with constituents that have weights that equal, regardless of fair value or book value.

GIPS

is the Global Investment Performance Standards, created and administrated by the CFA Institute.

Methodology

refers to a set of documents that describe how an index is designed, determined, calculated, and published.

Sampled universe

refers to a representative sample of constituents that have been drawn from the universe.

Universe

refers to the list of firms that qualify for inclusion.

D. Appendix: Version History

This section keeps a record of all changes that have been made to this publication.

As of October 2018, there have been no modifications made to this publication.

E. Appendix: List of Discontinued Indices

This section lists the EDHEC*infra* indices that have been discontinued.

As of October 2018, there are no EDHEC*infra* indices that have been discontinued.

F. Disclaimer

The EDHEC*infra* indices calculated by EDHEC Infrastructure Institute are for research purposes and in no case constitute an investment recommendation or allocation. As a result, neither EDHEC Infrastructure Institute nor EDHEC are responsible for the material or moral consequences of their use, which are the sole responsibility of the user. Publication of the index-composition data and the financial characteristics that could be associated with these components does not consitute promotion or a solicitation to invest in these components but provides useful additional information for the proper study and use of the indices.

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It is not possible to invest in EDHEC*infra* broad market indices or subindices.

EDHEC*infra* Indices Documentation (2018)

EDHEC*infra* Index Data & Analytics Documentation

- EDHEC*infra* Index Methodology - October 2018
- Global Infrastructure Company Classification Standard (*GICCS*®) - October 2018
- Global Infrastructure Investment Data Standard - October 2018
- EDHEC*infra* Data Contributor Code of Conduct - October 2018
- EDHEC*infra* Unlisted Infrastructure Asset Pricing Methodology - October 2018

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