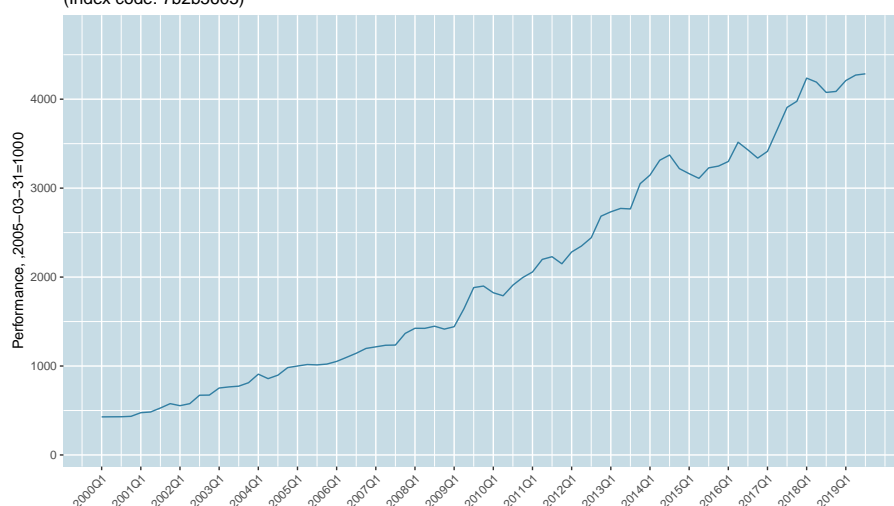


Global unlisted infrastructure equity (USD returns)

Data as at 2019-09-30

The Global unlisted infrastructure equity, value-weighted (USD) index is a(n) market value-weighted representation of the Global Private Infrastructure Equity Market. It covers all investable infrastructure sectors (see definition). Index constituents include all business models. They include both infrastructure projects (SPVs) and corporates. As of 2019-09-30 the index had a total market capitalisation of USD337.35bn, representing 516 firms. Since inception, a total of 621 firms have been included in this index.

Total Return Index, 2005=1000
Global unlisted infrastructure equity index family (USD returns)
(Index code: 7b2b5605)



Index Performance and Risk

	This Quarter	Annualised	1-year	3-year	5-year	10-year	Historical
Total Returns	0.34%	1.35%	5.14%	7.7%	4.91%	8.58%	12.54%
Excess Returns	-0.15%	-0.61%	2.89%	5.98%	3.8%	7.89%	10.76%
Volatility	4.522%	9.044%	8.954%	9.312%	9.904%	13.436%	13.521%
Sharpe Ratio	-0.034	-0.067	0.323	0.642	0.383	0.588	0.796
Value-at-Risk	11.31%	21.95%	17.92%	16.29%	20.6%	26.03%	22.29%

Model volatility is estimated based on the price sensitivity and factors uncertainty. Sharpe ratio and Value-at-Risk are computed using the model volatility

Key Index Metrics

	This Quarter	1Y ago	3Y ago	5Y ago	10Y ago	4Q high	4Q low
Index Value	4285	4076	3430	3372	1882	4285	4087
Yield-to-maturity	6.76%	7.1%	7.32%	8.11%	9.31%	7.1%	6.76%
Duration	12.7 years	12.7 years	12.6 years	11.9 years	11 years	13 years	12.7 years
P/Book	1.379	1.371	1.395	1.263	1.334	1.413	1.359
P/Sales	2.468	2.468	2.548	2.069	2.065	2.528	2.432

Index value is set to 1000 in 2005; reported yield-to-maturity is duration-weighted, reported duration is the modified duration; reported expected loss is given as a proportion of market value; 'investment grade' is defined as having a probability of default below 0.5%; reported value-at-risk is the 99.5% quantile.

FEATURES

Coverage

Constituents are selected to create a representative sample of the private invest-able infrastructure market in most major markets globally.

Objective

The index and subindices are designed to capture the dynamics of the global private infrastructure market: they measure payout and interest rate risk and reflect the evolution of investors' risk preferences (required risk premia) over time.

Investability

EDHEC*infra* broad market indices are not directly investible.

Transparency

EDHEC*infra* universe construction and index computation rules, constituents and downloadable index data are freely available at indices.edhecinfra.com.

Availability

EDHEC*infra* broad market indices and sub-indices are presented in USD. They are also available in local currency, GBP and EUR.

Classifications

EDHEC*infra* indices and sub-indices are categorised according to the taxonomy and rationale described in Amenc and Blanc-Brude (2018).

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USD index returns have been on the decline, shrinking to 0.34% in Q3 from 1.46% in Q2. This stems from significant depreciation of the GBP against the USD and the heavy weight of UK firms in the index as, overall, infrastructure equity returns in local currency increased in 2019. USD unlisted infrastructure equity index outperformed both public equity and listed infrastructure equity in Q3.

In terms of sector performance, Network Utilities was the hardest hit by FX fluctuations and, owing to its large weight in the index, contributed almost -30% of the index return. Transport and Renewables sectors were by far the largest return contributors over the quarter.

Philippines based companies were the top five performers in Q3, aided by the government's aggressive rate cuts; however, they have a combined weight of less than 0.1% in the index. The worst performer was Ep Langage Limited, an independent power producer in the UK which went through an impairment last year.

Higher leverage has historically implied higher risk premiums, but sensitivity to this factor has almost halved since the financial crisis period. Overall, leverage and term spread were the key contributors to the reduction in risk premiums in Q3.

Finally, there was no change to the index constituents in this quarter. FGP Topco Limited, the owner of Heathrow Airport, remains the highest weight in the index. A new entrant to the top five weights is Severn Trent Water Limited, a UK-based water and waste water treatment firm.

Index Weights Distribution

	This Quarter	1Y ago	3Y ago	5Y ago	10Y ago
Regions					
Americas	2.21%	2.43%	1.59%	2.34%	0.87%
Asia	4.04%	4.17%	4.47%	5.29%	4.28%
Europe	77.29%	76.42%	78.52%	76.56%	84.05%
Oceania	16.46%	16.99%	15.42%	15.81%	10.8%
Broad Sectors					
Data Infrastructure	0.16%	0.22%	0.26%	1.33%	1.56%
Energy and Water Resources	6.99%	7.1%	6.88%	6.81%	5.58%
Environmental Services	0.89%	0.94%	0.95%	0.85%	0.33%
Network Utilities	35.48%	34.87%	36.16%	36.56%	51.07%
Power Generation x-Renewables	6.8%	7.2%	7.82%	9.96%	12.4%
Renewable Power	5.4%	5.89%	6.72%	7.68%	3.55%
Social Infrastructure	1.23%	1.21%	1.29%	1.34%	0.95%
Transport	43.04%	42.57%	39.92%	35.47%	24.56%
Business Models					
Contracted	17%	17.88%	18.97%	21.15%	17.35%
Merchant	22.41%	22.48%	21.57%	22.14%	18.75%
Regulated	60.59%	59.64%	59.46%	56.72%	63.89%
Corporate Structure					
Corporate	79.57%	78.67%	78.85%	75.26%	80.17%
Project Company	20.43%	21.33%	21.15%	24.74%	19.83%

This table shows the index weights summed by broad categories.

INFORMATION

Index Name

Global unlisted infrastructure equity, value-weighted (USD)

Bloomberg Ticker

GPIEUV

EDHECinfra Index Code

7b2b5605-36af93d6

Current constituents

516

Index Universe

Equity

Currency

USD

Asset Selection

All sectors; all business models; all corporate structures

Weights

Market Weights

Index Launch

31 June 2019

Review Dates

31 December, 30 March, 30 June, 31 September

Base Value

1000 in 2005

Current Index Value

4285.37

Current USD Capitalisation

USD337.35bn

12-month Turnover

New entrants: 4

Exits: 4

Fundamental Research

EDHEC Infrastructure Institute

Top 10 Weights

Constituent Code	Name	Country	Weight
1724549011211	FGP Topco Limited	GBR	6.888%
1430639000049	Eurogrid GmbH	DEU	4.927%
1636339002665	Autoroutes du Sud de la France	FRA	4.848%
1636339003469	Aeroports de Paris SA	FRA	4.352%
1724549010937	Severn Trent Water Limited	GBR	4.328%
1636609000026	ANA - Aeroportos de Portugal S.A.	PRT	2.342%
1636339000667	APRR	FRA	2.276%
1724549000274	Thames Water Utilities Limited	GBR	2.09%
1636339000286	Gaz de France Reseau Transport	FRA	2.09%
1724549010927	United Utilities Water Limited	GBR	1.732%

New Constituents

Constituent Code	Name	Country	Weight
1636339002645	Nimes-Montpellier HSR PPP	France	0.0158%
2138339009079	Ohio River Bridges East End Crossing	United States	0.0173%
1946459000152	Arjang Northwest Wind Farm	Sweden	0.009%
1724549003720	Bagmoor Wind Farm	United Kingdom	0.0032%

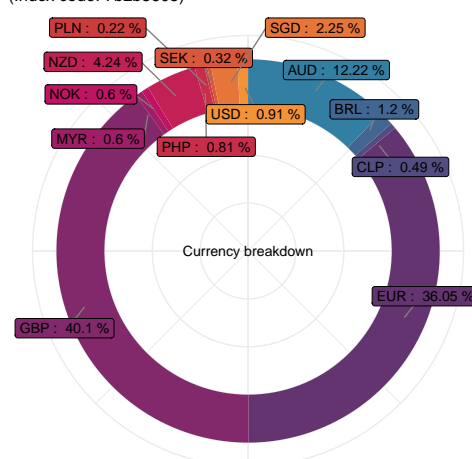
This table lists constituents included in the index in the 12-months prior to this report's compilation date.

Outgoing Constituents

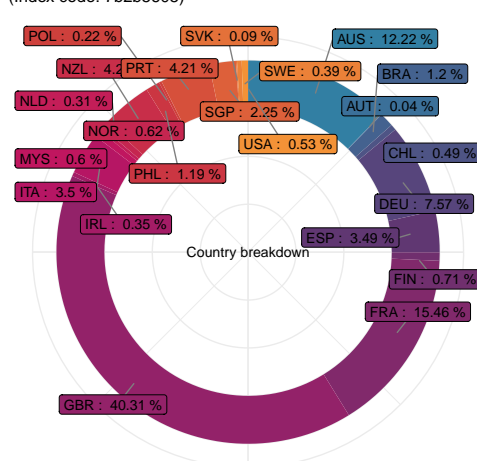
Constituent Code	Name	Country	Weight
1336369000840	Aeropuerto Chacalluta	Chile	0.0018%
1724549006130	Amey Birmingham Highways PFI	United Kingdom	0.0072%
1430639001430	Tanquid Tank Storage Business	Germany	0.0769%
1724549001321	Connect Project PFI	United Kingdom	0.0519%

This table lists constituents removed from the index in the 12-months prior to this report's compilation date.

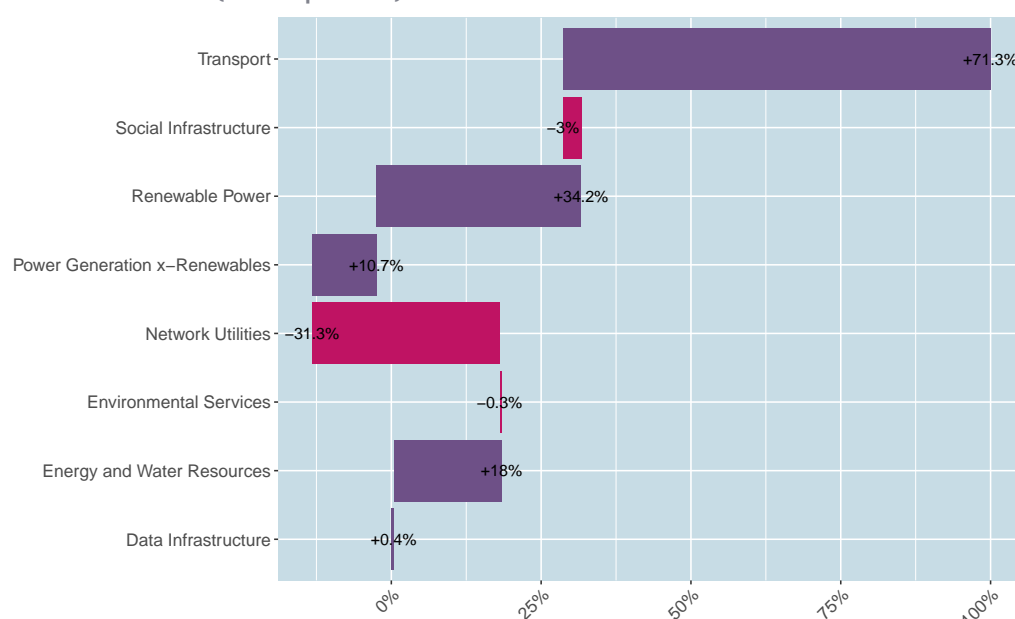
Currency Composition
Global unlisted infrastructure equity index family (USD returns)
(Index code: 7b2b5605)



Country Composition, Market Weights
Global unlisted infrastructure equity index family (USD returns)
(Index code: 7b2b5605)



Share of Contribution (TICCS pillar 2) to 2019Q3 returns



A modern approach to measuring performance in unlisted infrastructure investments

EDHEC*infra* indices and benchmarks aim to provide a **representative, risk-adjusted view of the performance of investments in unlisted infrastructure equity and private debt**. These indices respond to a clear demand on the part of asset owners and managers to have access to better measures of value and risk when defining and comparing infrastructure investment strategies, monitoring performance and setting risk budgets. In the 2019 EDHEC/GIH survey of infrastructure investors, 90% of respondents declared that their current choice of absolute or relative benchmarks were not representative and did not adequately measure risk and performance.

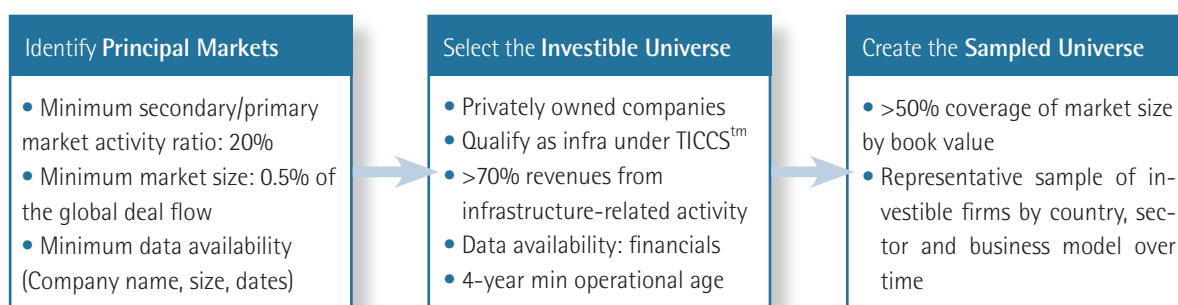
EDHEC*infra* produces *calculated* (as opposed to contributed) indices: our data and technology allows re-pricing hundreds of individual assets through time, using actual transaction prices to recalibrate expected returns (and discount rates). This approach uses market inputs, thus avoiding the smoothing of returns caused by appraisal valuations and providing a genuine **fair value** assessment of performance.

Unlike other private indices, which only report an average performance, EDHEC*infra* indices include the effect of diversification and provide advanced risk metrics such as volatility, value-at-risk and risk factor prices. The index calculation method is summarised below in four key steps.

Further details can be found in a series of in-depth documents available at edhec.infrastructure.institute.

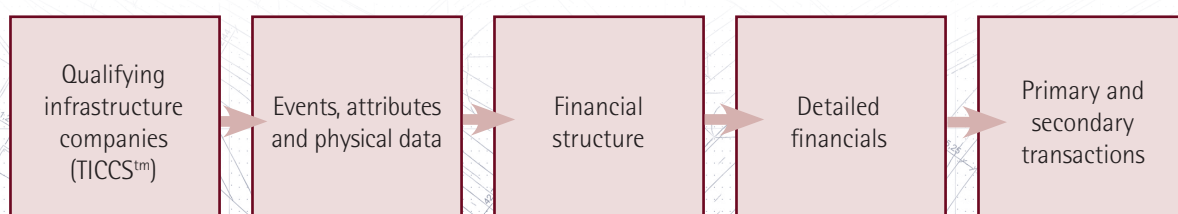
Step 1: A Representative Universe

Universe construction uses systematic rules to identify *principal* markets (IFRS-13) and select individual companies. As of early 2019, the **EDHEC*infra* Universe** includes 25 countries and more than 5,000 firms.



Step 2: A Standardised Database

EDHEC*infra* collects company level data from public and private sources for all firms in the **Sampled Universe** according to the **Global Infrastructure Investment Data Standard**. The hundreds of firms included in the Sampled Universe represent millions of data points.



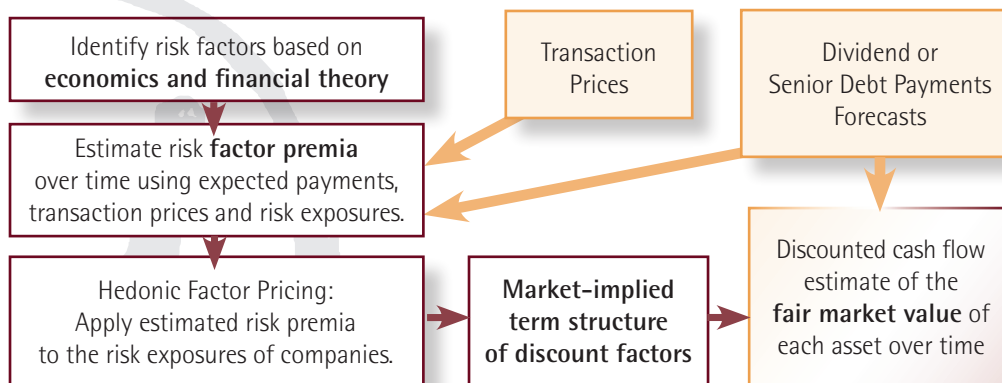
EDHEC*infra* data contributors follow a **Data Contributor Code of Conduct**, which also defines the minimum data required for contributions to be included in the database.

Step 3: Fair Value Asset Pricing

EDHEC*infra* produces **fair value estimates** for equity and senior debt instruments in each infrastructure firm in its Sampled Universe. The IFRS-13 fair value is the average price of a financial asset based on what buyers and sellers in any principal market are willing to pay at the time of evaluation.

In each period, excess returns are implied from the combination of actual transaction prices and dividend or senior debt payment forecasts. These expected returns represent the aggregate market price of risk for a cross-section of equity or debt investments at that point in time. They are then **decomposed into multiple risk factor premia** (e.g. the size or leverage risk premia) using a cross-sectional regression.

Each risk premia in a given period can then be applied to all relevant investments at that time, whether they are traded or not, using each company's 'factor loadings' (e.g. its actual size or leverage) to derive a **market-implied discount rate** for each investment.



Step 4: Risk-Adjusted Performance Indices

Individual constituents returns are computed in both local or major currencies and aggregated using different weighting schemes to compute quarterly index values. EDHEC*infra* indices use three weighting schemes.



We compute the return covariance of each pair of constituents in the Sampled Universe. This allows us to compute index risk metrics such as volatility, drawdown and value-at-risk. Filters are applied to the **Sample Universe** such as geography, sector or business model to create sub-index families.

Geography breakdown

EDHEC*infra* broad market index families

Unlisted infrastructure equity index families	Private infrastructure debt index families
Global unlisted infrastructure equity	Global private project finance debt
Global project finance equity	Global private infrastructure debt
Advanced markets unlisted infrastructure equity	Advanced markets private infrastructure debt
Emerging markets unlisted infrastructure equity	Emerging markets private infrastructure debt

Sector/business risk breakdown

EDHEC*infra* broad market index families

Unlisted infrastructure equity sub-indices		Private infrastructure debt sub-indices		
Business risk	Broad sectors	Business risk	Broad sectors	Credit
<ul style="list-style-type: none"> Regulated Contracted Merchant 	<ul style="list-style-type: none"> Transport Social infrastructure Energy Renewables 	<ul style="list-style-type: none"> Regulated Contracted Merchant 	<ul style="list-style-type: none"> Transport Social infrastructure Energy Renewables 	<ul style="list-style-type: none"> Default risk Maturity Instrument currency

Find out more at edhec.infrastructure.institute

About EDHECinfra

EDHECinfra is an independent research organisation delivering unique index data and analytics measuring the risk-adjusted performance of unlisted infrastructure investments.

The lack of risk-adjusted benchmarks Today, most investors have to use ad hoc benchmarks for their unlisted infrastructure investments. Some investors use an inflation rate plus a spread, others a measure of the average returns of an equally ad hoc selection of infrastructure projects.

These benchmarks, whether they refer to absolute or relative returns, all have the same flaw: they take no account of risk.

Without robust measures of risk-adjusted performance, it is impossible to justify a choice of spread. Without a clear understanding of the representativity of reported returns and of their covariance, existing 'benchmarks' fail to answer the most important question about the asset class: What is the risk-adjusted performance of private infrastructure debt or equity?

EDHECinfra exists to answer this question and build the market indices and benchmarks that investors need.

Building the largest database in the world We collect, clean and analyse private infrastructure investment data and have created the largest database of infrastructure investment data in the world today: a global repository of financial knowledge built to be representative of the investable market each year, going back 20 years.

Measuring risk in illiquid investments EDHECinfra has developed a series of models to estimate realised and future volatility, and measure risk and returns at the index constituent level.

For example, for a given unlisted equity infrastructure investment and its expected dividends, discount rates can be estimated to match the term structure of risk-free rates at the relevant horizon, future dividend volatility and the aggregate price of risk, which can be implied from the value invested in this project and all other primary or secondary market transactions for assets with similar dividend volatility and maturity at that time. The range of expected returns at one point in time, which results from the range of observable transactions, thus measures the risk of this investment at that point in time.

Measuring credit risk in private debt Measuring the risk-adjusted performance of long-term private debt instruments when few defaults are observable requires better credit risk models than the ones relying on historical data alone.

EDHECinfra has created and implemented a structural approach to credit risk and post-default debt restructuring in infrastructure debt that allows computing distance to default and expected losses at each point in the future and as well as the relevant metrics to benchmark highly illiquid infrastructure debt instruments (e.g. value-at-risk, duration, etc).

Building proper indices Using the performance results from our asset pricing and risk models, we can report the portfolio-level performance of groups of infrastructure equity or debt investments using the categories that are most relevant for investors' investment decisions.

Because each index is built using risk and performance measures derived at the constituent level, return covariance and diversification benefits can be estimated, allowing the creation of proper indices and benchmarks.

Data access EDHECinfra is building the largest, most representative database of underlying infrastructure investments in the world. A representative sample by investable sector, business model, and corporate structure is built for each national market, while ensuring a 50% market coverage by size. This sampling approach ensures that EDHECinfra indices are representative of the universe they track in each year.

Detailed financial data is collected from contributors using a standard template that also aims to improve reporting and transparency. Other sources of data include freedom of information requests, audited accounts as well as sources of physical data about each asset (GIS).

In early 2018, the EDHECinfra database tracked the performance of 700 firms and included close to 4.5 million cash flow and balance sheet items, and hundreds of thousands of events, company attributes and financial instruments. The EDHECinfra Global Index will track 1,000 assets by 2019, going back more than 20 years. All the data collected by EDHECinfra is stored on a secure data server and is protected by the latest encryption.

About EDHEC Business School

EDHEC Business School, founded in 1906 and among the select few institutions to have garnered international recognition through the triple crown of EQUIS, AACSB and Association of MBAs accreditations, offers management education at under-graduate, graduate, post-graduate and executive levels designed to meet the needs of companies.

Its large range of international graduate programmes draws students from the world over. With its five campuses in Lille, Nice, Paris, London and Singapore, its

6,000 students, and its 134 full-time faculty and researchers, EDHEC has been ranked among the top international business schools for several years.

The Research for Business strategy is a key component of the school's identity. Due to its not-for-profit aim, its financial independence and the time devoted to conducting research, the Research and Development Department contributes, as do other entities within the school, to the group's strategic objectives of growing our resources, aiming to have a visible impact on business, and forging close ties with business wherever they may be located.

Disclaimer

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