

# Infrastructure investing

Everything you always wanted to know but never knew  
who to ask about investing in infrastructure

Frederic Blanc-Brude, Ph.D.  
Director, EDHEC*infra*  
9 March 2021



A portrait of Frederic Blanc-Brude, a man with short grey hair and glasses, wearing a light blue striped shirt. He is standing in front of a bookshelf filled with books. The background is slightly blurred.

## About the speaker

Frederic Blanc-Brude is the director of EDHECinfra. He joined EDHEC in 2012 after 10 years in the infrastructure investment sector and direct involvement in more than USD6bn of transactions. He is a regular contributor to the G20 working group on infrastructure investment, the Advisory Board of the Global Infrastructure Facility of the World Bank and a member of the Editorial Board of the Journal of Alternative Investments.

# Agenda

1. What we do
2. Stylised facts
3. Our approach
4. Findings
5. Products

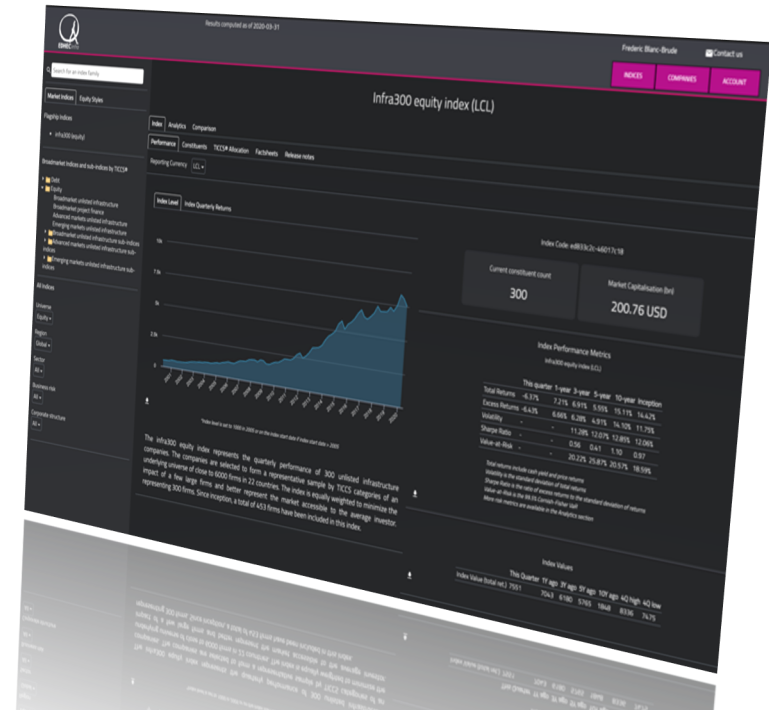
# About EDHEC*Infra*

- Created at EDHEC Business School in 2015
- Located in Singapore and London
- Original funding from the Singapore Government and the industry (\$10m investment)
- Today: a leading research center and **commercial provider of indices** for investors in unlisted infrastructure equity and debt
- Team of 20 people based in London and Singapore



# Our services

- **400+ indices** data and analytics are accessible via a dedicated online platform updated quarterly
  - Index performance data
  - Risk analytics
- **Subscription model**
  - Global or site-based index data license
  - Analytics add-on
  - Data also available via Bloomberg, Aladdin, Rimes, etc.
- **Future products (2021-22)**
  - Valuation metrics
  - Fund analysis tools
  - Asset rating



# The curious case of infrastructure investing..

- The motive: increasing **yield** and portfolio **diversification**
- The evidence?
- Investors apparently decide to invest in **infrastructure** without a clear understanding of
  - Fair value
  - Risk
  - Yield
  - Diversification or the optimal allocation



# Three simple questions

- How risky was infrastructure investing before Covid-19?
- How bad was Covid-19 for infrastructure assets?
- Should one invest in airports in 2021?

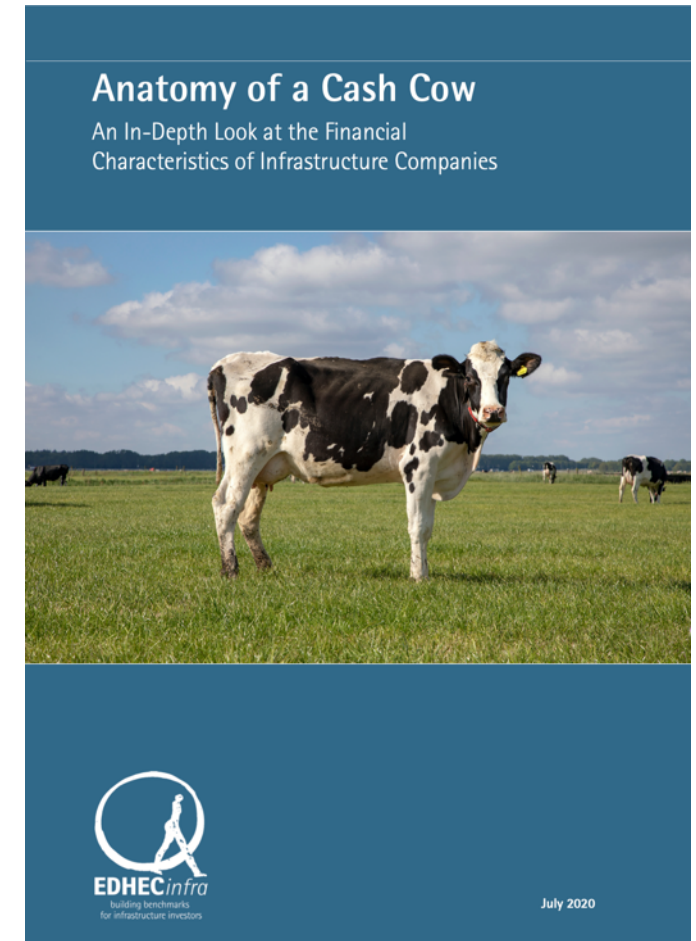
# infrastructure

Stylised facts



# Infrastructure is a cash cow

- Infrastructure companies are very good at paying dividends. Perhaps the best.
- July 2020 paper finds higher dividend payout ratios than several control groups of comparable companies in other sectors
- Mature infrastructure companies pay 20–25% of revenues as dividends for several decades.



# Infrastructure is a risky investment

- Bankruptcy risk is real:
  - 20 years of data: 150+ defaults or dividend lockups, dozens of bankruptcies.
- If bankruptcy risk exists.. So does market risk
  - The risk premia that applies to infrastructure companies changes over time
- Decade-long repayment periods also means discount rate risk, even if cash flows are very stable.

Duration, Spread Volatility and Total Return Volatility of Public and Corporate Bonds compared to the infra300 Equity index. Sources: Datastream, EDHECinfra. All computations based on quarterly data, 2010-Q1 to 2020-Q1.

	Modified Duration		Spread/ Risk Premia Volatility		Total Return Volatility	
	5-year	10-year	5-year	10-year	5-year	10-year
30-year US Treasuries	20.5	19.6	N/A		18.1%	18.5%
20-year UK Gilts	15.0	14.3	N/A		8.4%	9.0%
Long IG Corp. Bonds	14.1	13.9	20bp	21.5bp	10.2%	10.1%
Infra 300	9.9	9.3	53bp	173.5bp	11.6%	12.9%



# Appraisal values are stale

- Reported NAVs volatility implies a wildly unrealistic risk/return profile compared to mark-to-market data.
- Mark-to-market data shows a different, more credible picture.

## The Unbelievably Smooth Risk/Return Profile of Infrastructure Appraisals

	3-year	5-year	10-year
Appraisal NAV Total Returns	8.72%	9.65%	9.24%
Appraisal NAV Total Returns Volatility	2.73%	2.68%	2.85%
Implied Sharpe Ratio	2.79	3.19	2.86
Volatility of Appraisal NAVs only	2.34%	2.48%	2.38%

Source: Annual reports, NAV of assets for 13 funds of unlisted infrastructure equity representing USD23.4bn of investment in 2020

## The Realistic Risk and Returns of the EDHECinfra Broadmarket Equity index

	3-year	5-year	10-year
Unlisted Infrastructure Total Returns	5.65%	8.49%	15.01%
Unlisted Infrastructure Returns Volatility	9.45%	9.59%	12.23%
Sharpe Ratio	0.53	0.81	1.13

Source: EDHECinfra Broadmarket Index represent USD230bn in 2020, available at [indices.edhecinfra.com](https://indices.edhecinfra.com)

# Listed proxies don't work

- **Biased**: Listed infrastructure do exist, but it is not a representative sample of the unlisted universe
- **Fake**: Most listed infrastructure products include companies that are not really infrastructure
- **Not an asset class**: Listed infrastructure is always highly correlated with equities and just as volatile.

Correlations and market beta of listed infra with equity indices

	Correlation with listed infra	Market Beta (CAPM)
Listed infra	1.00	0.87
Equities	0.88	1
Technology	0.71	1.04
Industrials	0.83	1.12
Quality	0.85	0.86
Min Volatility	0.89	0.64
Value	0.88	1.00
Growth	0.86	0.99

*Source: Datastream: Listed infra (S&P Global Infra), Equities (MSCI Dev World), Technology (MSCI World IT), Industrials (MSCI World Industrials), Value (MSCI World Value), Growth (MSCI World Growth), Quality (MSCI World Quality), Min Volatility (MSCI World Min Volatility). Monthly returns in USD over 15 years period: 2005 Q1 to 2019 Q4*



# Absolute returns are useless to understand infrastructure

- Infrastructure is not a **market-neutral** investment
- Abs. returns **performance benchmarks** are either too easy (2009–2019) or too hard to beat (2020)
- **Hurdle rates** are also ad hoc and create unnecessary costs for investors
  - Equalisation interests are *ad hoc* and on the high side
  - Opportunity cost: funds are not deployed due to high hurdle rates
  - Expected returns in global infra projects are below 7% in 2021, whereas fund hurdle rates can still be much higher

# Buy-and-hold investors...

- ...may not be worried about **short term volatility**
- But they still need to know fair market values
- It is the market price of their assets that determines
  - **Allocation** decisions
  - Risk **management**
  - **Impairment** and liquidity tests (liquidation value)
  - Match assets with marked-to-market **liabilities**
  - **Yield** management
- Unlisted infrastructure investment cannot be an excuse for 'blind' investment in unknown quantities
- Still, many investors **do not know the fair value** of their infrastructure portfolio which is booked at (or very near) historical cost.

# Look beyond recent history

- The infrastructure asset class has been through a period of **re-valuation since 2009**.
- Returns have been very good in part because of significant **capital appreciation** until 2018.
- This history is not a very good guide of the future
- Looking at **market signals today** gives us a better idea of expected returns than the past decade: hence the importance of marking to market



# Our approach

Calibrating valuations to market prices

# What is needed to benchmark unlisted infrastructure adequately?

- A **well-defined** universe
- A **representative** index
- An **up-to-date** index
- A **mark-to-market** index

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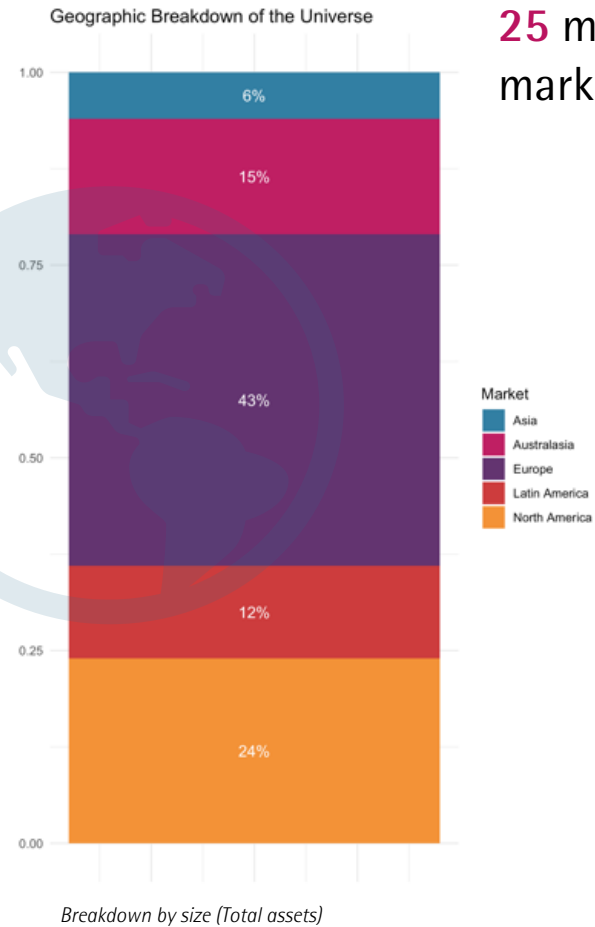


A Representative TICCS® Review Committee :





# The infra300 index



25 most active markets



Universe of 5,500 investible infra firms

USD2.1Tr  
Total Asset Book Value (2019)



Tracking 650+ firms and 2,400+ debt instruments over the past 20 years



- ✓ No reporting or selection bias
- ✓ No survivorship bias
- ✓ Transparent coverage

Infra300: built a representative sample of the universe TICCS® segments (business risk, industrial activity, corporate structure)

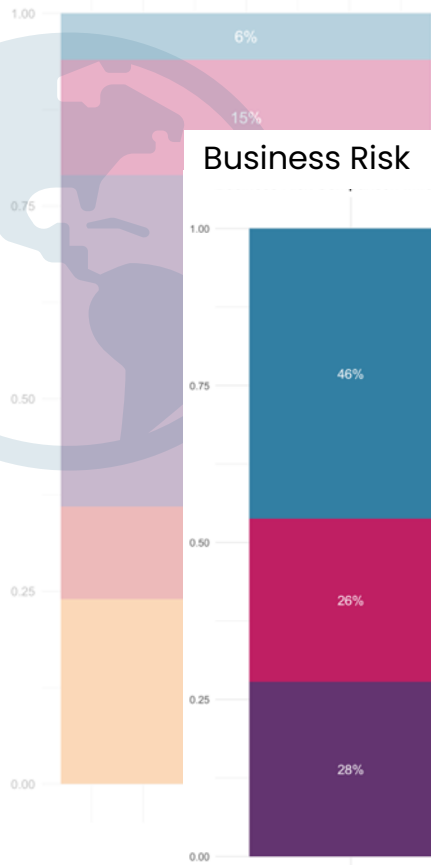
Bloomberg ticker: infra300

→ 200+ other unlisted infra equity indices and 400+ private infra debt indices.



# The infra300 index

Geographic Breakdown of the Universe



25 most active markets

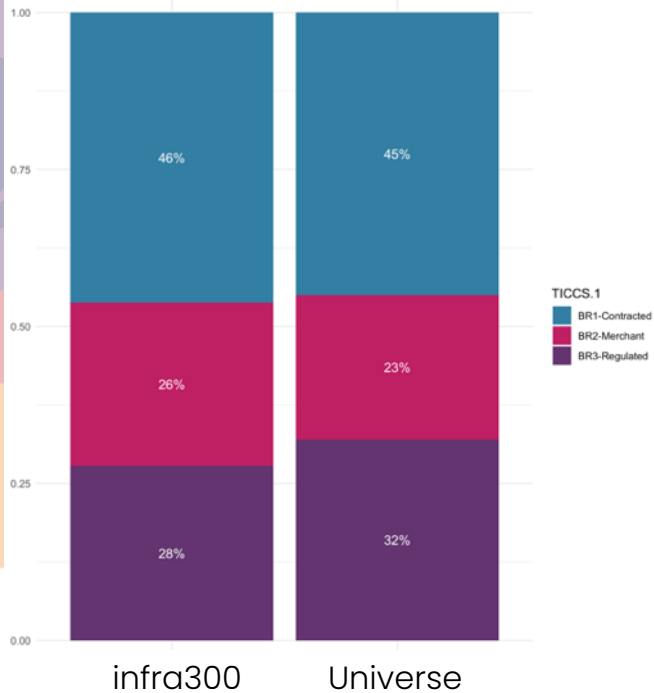


Universe of 5,500 investible infra firms

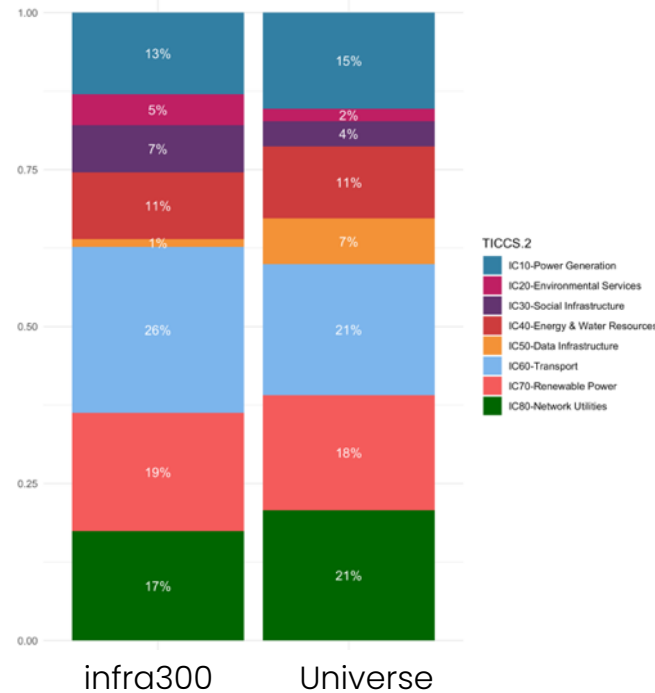


Infra300 is representative of the universe

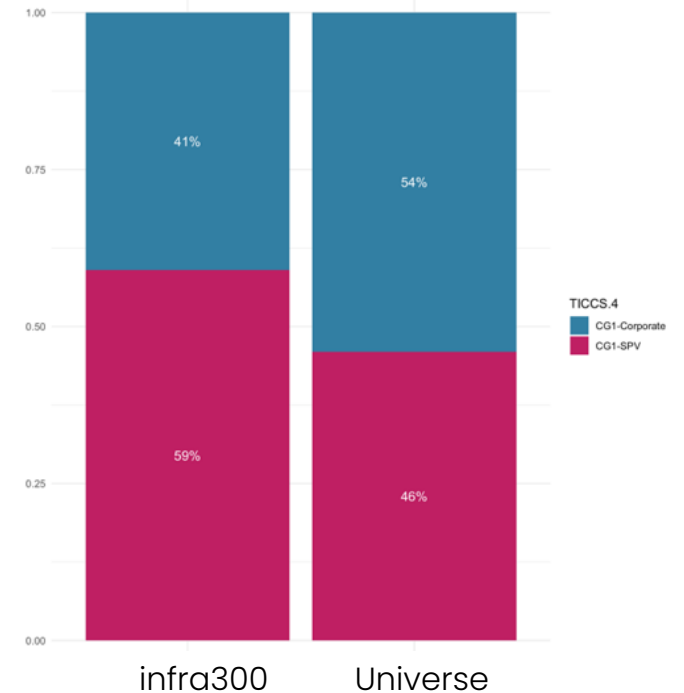
Business Risk



Industrial Activity



Corporate Structure



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650 firms researched individually by human analysts

- Historical financials
- Financial structure (2,400 inst.)
- Events and regulation
- Revenue & dividend **forecasts updated each quarter**

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Primary & secondary market price data each quarter researched by analysts to **recalibrate the mark-to-market discount rates of individual assets.**



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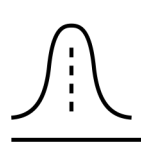
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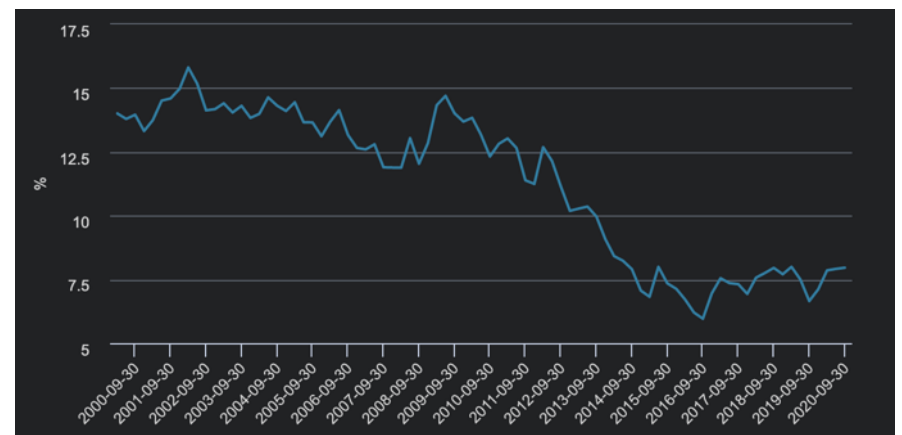


Primary & secondary market price data each quarter researched by analysts to **recalibrate the mark-to-market discount rates** of individual assets.

$$r_i = r_f + \sum_k \beta_{k,i} \lambda_k$$

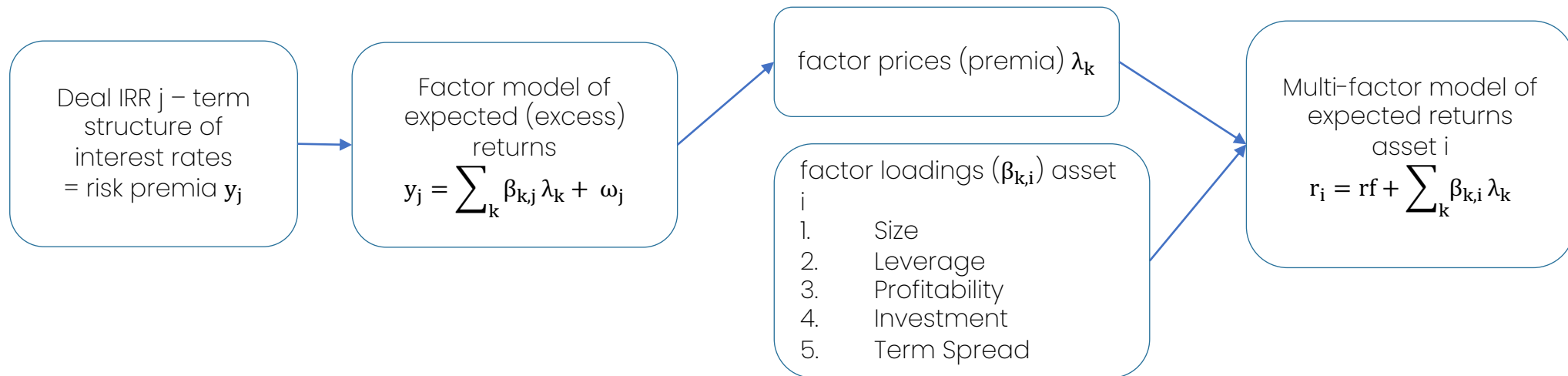


Infra300 average discount rate, Q1 2000 - Q3 2020



# Marking infrastructure assets to market

- Using 'comps' would require more data than there are transactions.. but we can **reduce the problem** to **pricing a limited number of risk factors**, each of which is relevant to all the firms to price, only in different amounts (factor loadings).
- In equilibrium, expected returns are equivalent to **market discount rates**: EDHECinfra produces fair value discount rates each quarter based on the latest price of risk and the relevant interest rates curves
- To produce mark-to-market discount rates using secondary market data, we update a multifactor model of the unlisted infra equity risk premia (or credit spread) in a Bayesian fashion: **each new transaction updates our prior belief about each risk premia**

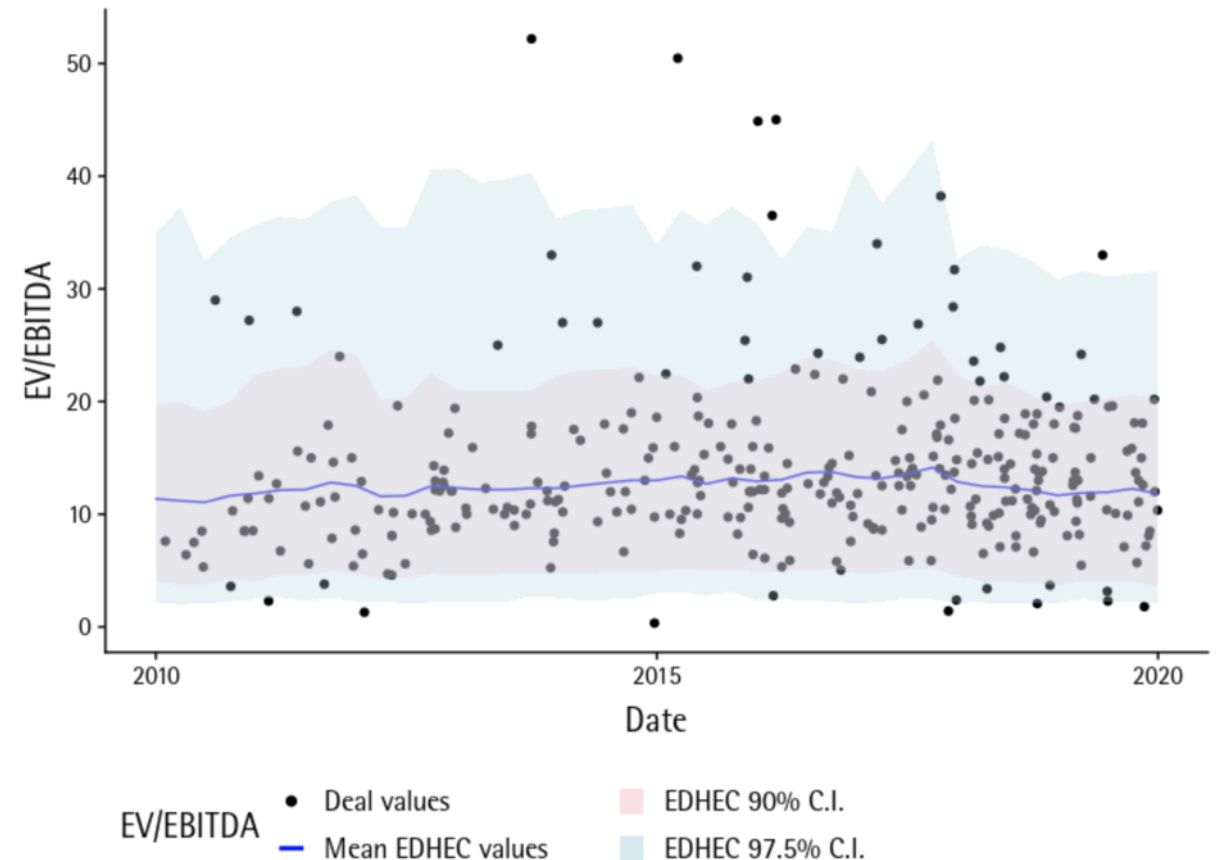


# Valuation precision

## Comparing EV/EBITDA with actual deals

- The chart shows the **EV/EBITDA ratio of 331 private infrastructure deals** between Q1 2010 and Q4 2019
- The blue line shows the average EV/EBITDA of companies priced in the EDHECinfra index universe: hundreds of firms in each quarter
- The 90% (pink/grey) and 97.5% (blue) confidence intervals of EDHECinfra valuations **covers the vast majority of observed deals.**
- **EDHEC valuations track market transactions well:  $\pm 5\%$  of observed transaction prices**

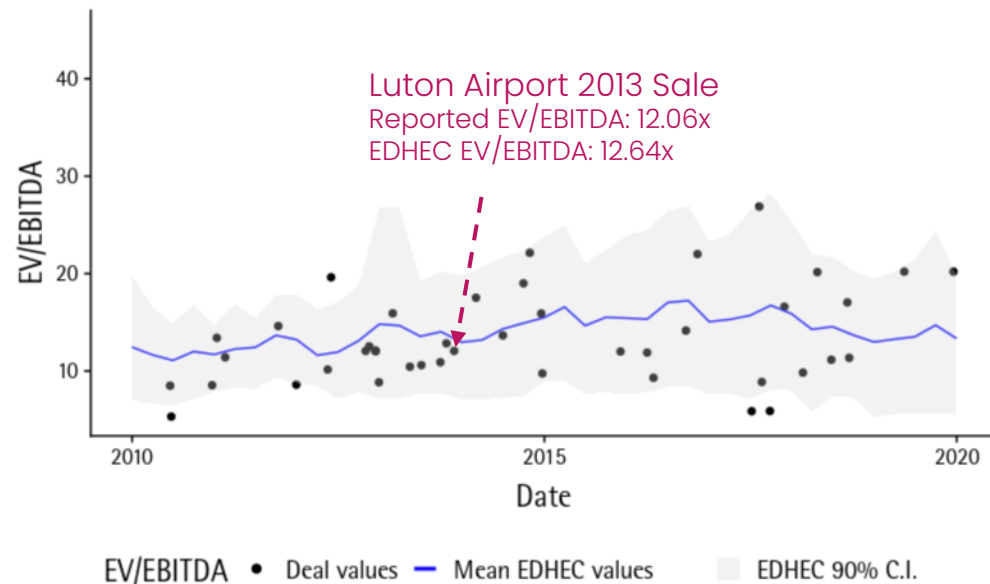
Comparison of 331 reported market transactions with EDHEC valuations



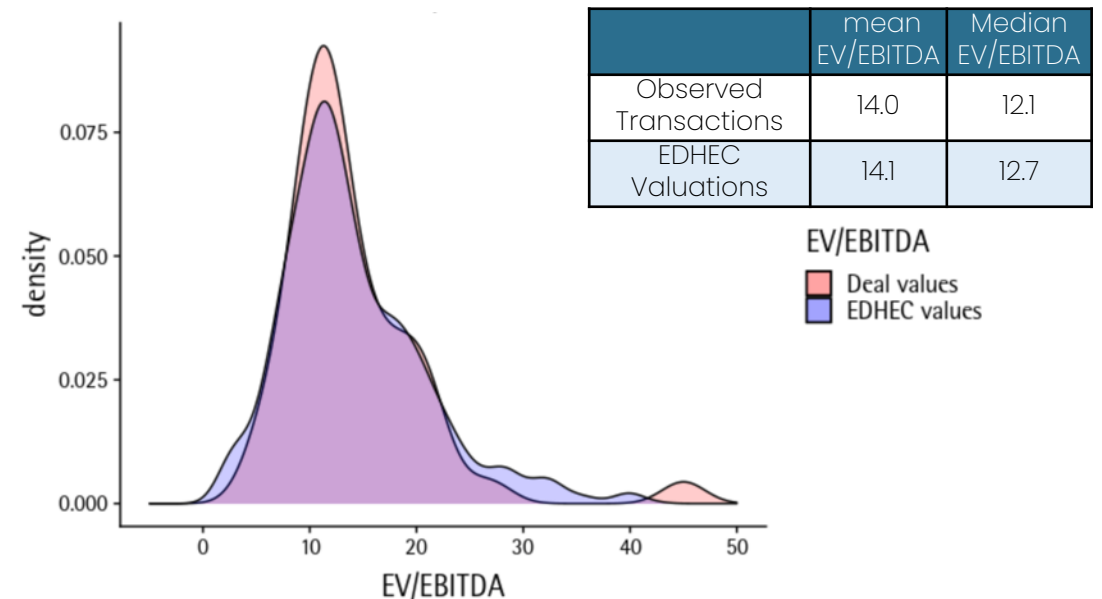
# Valuation precision

## A closer look at Airports

Comparison of 45 airport transactions and the EDHEC quarterly valuations of 31 airports, , Q1 2010 – Q4 2019



Distribution (density) of 45 airport transactions and the EDHEC quarterly valuations of 31 airports, Q1 2010 – Q4 2019



- Average EDHECinfra **valuations for airport companies** peaked at 17x and have since fallen back to 13-14x by Q4 2019.
- The distribution of the **EDHECinfra valuations for 31 airports (some included the market prices observed, some not) aligns well with market transactions** highlighting the precision of the valuation approach.
- Average valuation statistics are very close with a difference of 0.6x for the median EV/EBITDA ratio between EDHEC data and transactions.



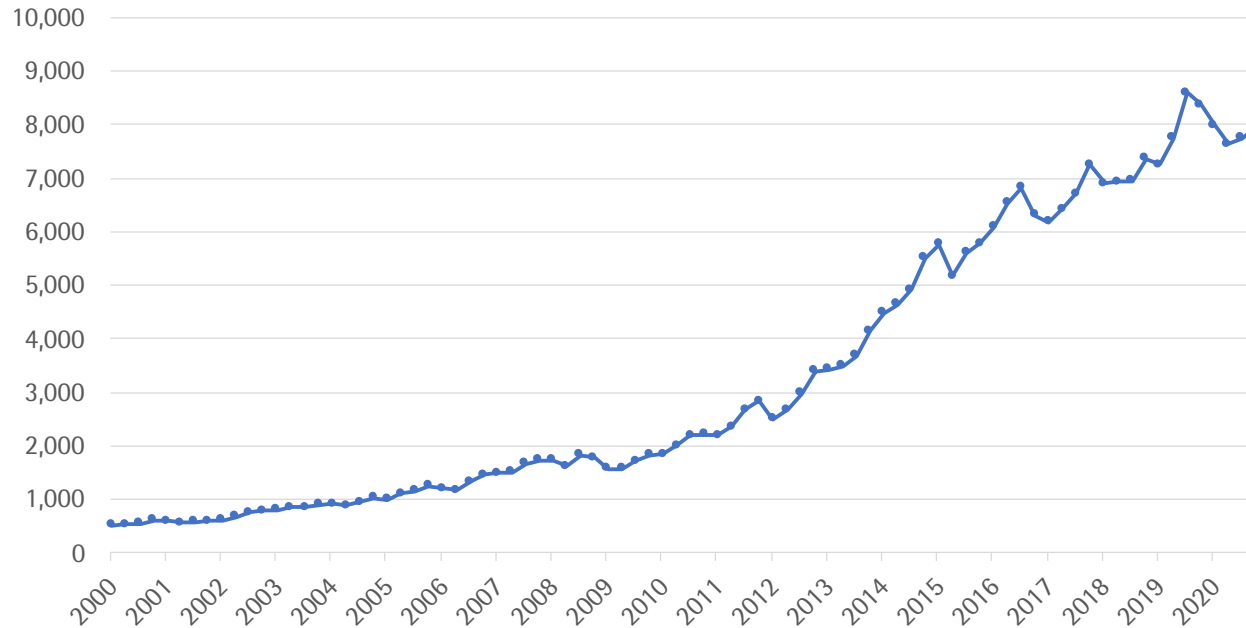
# Applications

Some answers to our 3 questions

# Infra300<sup>®</sup> equity index (Q4 2020, LCU)

## Index level

Rebased at 2005 = 1000



	This quarter*	1-year	3-year	5-year	10-year	Inception
Total Returns	3.04%	-4.67%	3.22%	6.65%	13.73%	14.17%
Excess Returns	3.06%	-4.72%	2.74%	6.14%	12.85%	11.60%
Volatility	-	-	10.14%	10.18%	12.58%	11.84%
Sharpe Ratio	-	-	0.27	0.603	1.021	0.98
Value-at-Risk	-	-	19.05%	18.75%	20.84%	18.14%

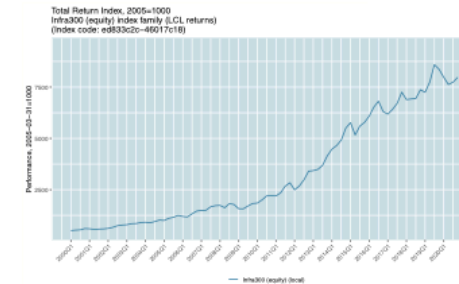
Source: EDHECinfra. Computed as of Q4 2020; \*Estimated. Volatility is the standard deviation of total returns. Value-at-Risk is the 99.5% Cornish-Fisher VaR. Local currency. Bloomberg Ticker: infra300

EDHECinfra index

## Infra300 (equity) (Local returns)

Data as at 2020-12-31

The Infra300 equity index represents the quarterly performance of 300 unlisted infrastructure companies. The companies are selected to form a representative sample by TICCS categories of an underlying universe of close to 6000 firms in 22 countries. The index is equally weighted to minimize the impact of a few large firms and better represent the market accessible to the average investor, representing 300 firms. Since inception, a total of 466 firms have been included in this index.



### Index Performance and Risk

	This Quarter	1-year	3-year	5-year	10-year	Historical
Total Returns	3.04%	-4.67%	3.22%	6.65%	13.73%	14.17%
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Sharpe Ratio	-	-	0.27	0.603	1.021	0.98
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### Key Index Metrics

	This Quarter	1Y ago	3Y ago	5Y ago	10Y ago	4Q high	4Q low
Index Value	7976	8367	7252	5780	2203	7978	7627
Yield-to-maturity	8%	7.11%	6.93%	7.13%	12.82%	8.06%	7.86%
Duration	9.4 years	9.9 years	10.3 years	10.1 years	8.4 years	9.8 years	9.1 years
P/Bbook	1.119	1.517	1.502	1.51	0.868	1.292	1.071
P/Sales	1.903	2.536	2.595	2.58	1.453	2.188	1.82

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 investable 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**  
EDHECinfra broad market indices are not directly investible.

**Transparency**  
EDHECinfra universe construction and index computation rules, constituents and downloadable index data are freely available at [indices.edhecinfra.com](http://indices.edhecinfra.com).

**Availability**  
EDHECinfra broad market indices and sub-indices are presented in USD. They are also available in local currency, GBP, EUR, JPY, CAD and AUD.

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

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# TICCS<sup>®</sup> segment level performance & risk

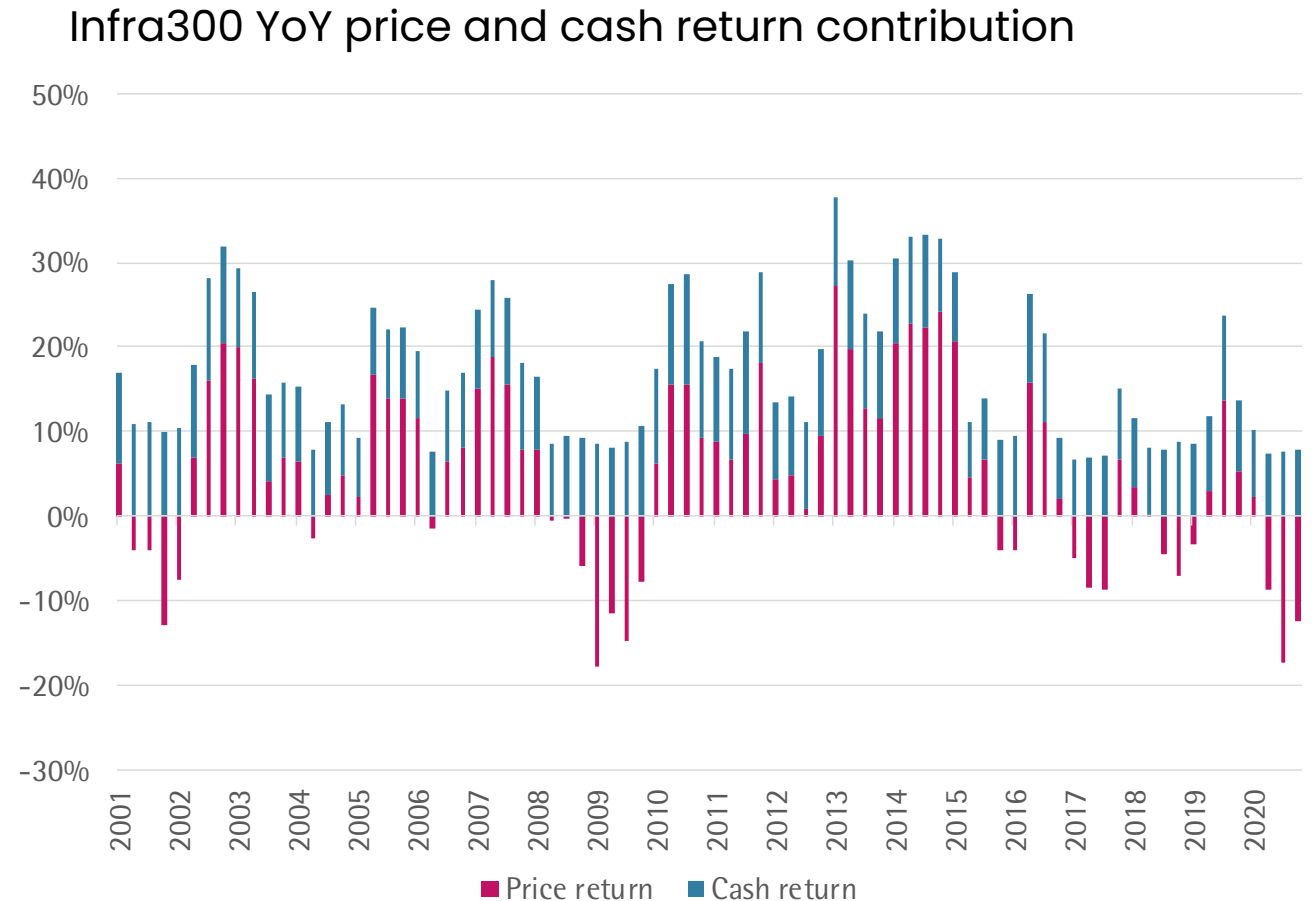
Key Performance and risk measures of the EDHECinfra indices as of Q4 2020

Indices	TICCS <sup>®</sup> filters	Q4 2020 total return*	1-year total return	5-year total return	5-year volatility	Sharpe Ratio	99.5% one-year VaR	Maximum drawdown	Duration
Broad market infrastructure	N/A	3.09%	-1.89%	8.49%	9.59%	0.81	15.48%	13.7%	8.79 years
Contracted infrastructure	BR-1	3.29%	2.01%	8.37%	8.78%	0.86	13.82%	10.4%	7.87 years
Merchant infrastructure	BR-2	2.02%	-6.61%	9.76%	11.33%	0.80	19.14%	21.6%	10.24 years
Airport companies	IC6010	-9.47%	-35.07%	-0.71%	18.55%	-0.07	46.84%	40.7%	13.46 years
Broad market infrastructure projects	CG-1	3.65%	2.11%	10.31%	8.99%	1.05	12.39%	13.9%	8.54 years
Broad market Infrastructure corporates	CG-2	1.32%	-13.50%	2.96%	12.19%	0.20	27.45%	17.7%	9.62 years

Source: EDHECinfra. Computed as of Q4 2020; \* estimated. VaR is the one-year Cornish Fisher Value at Risk measured at the 99.5% confidence level using a 5-year return and volatility estimate, Maximum Drawdown is since inception (2000). Duration is the modified duration (sensitivity to interest rate risk). All results for equal weighted indices computed in local currency.

# A strong cash yield

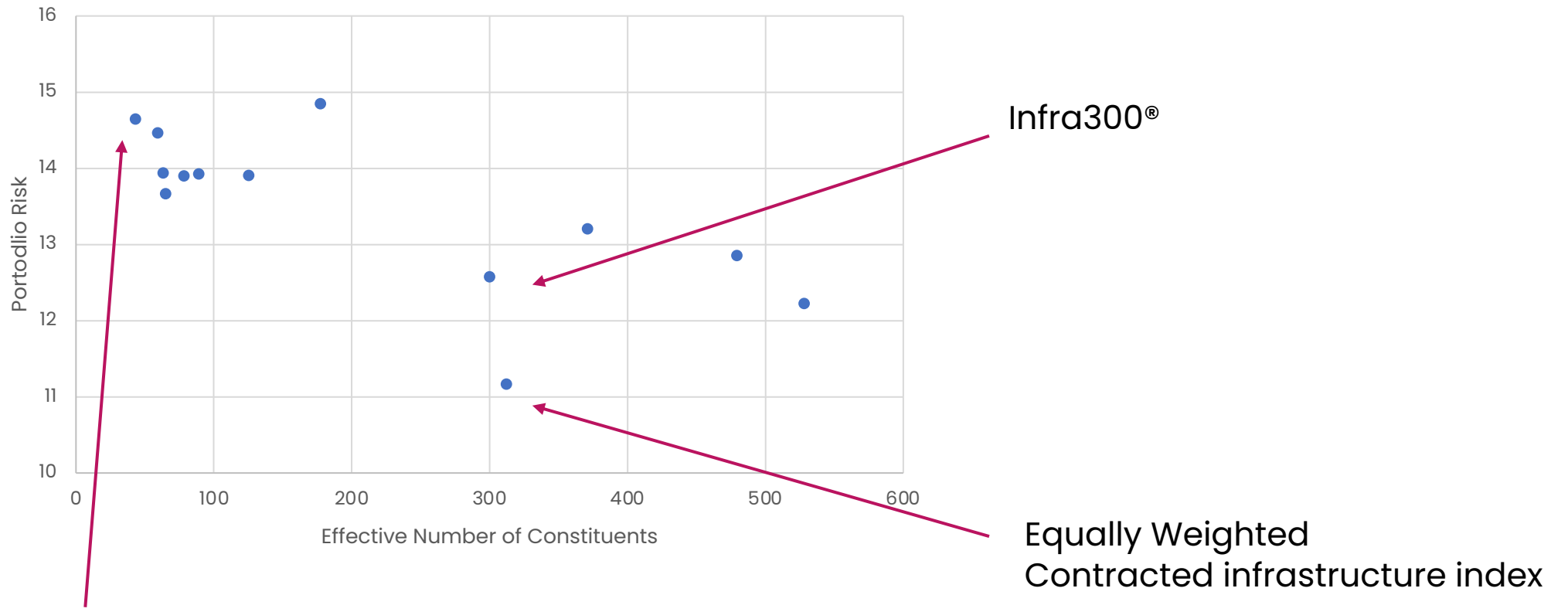
- Total returns are composed of two effects:
  - **Change in the value**, i.e., price return
  - **Dividends paid** by the underlying companies, i.e., cash return
- Drawdowns during Covid-19 crisis are of the similar magnitude as seen during the financial crisis of 2008
- **Large and stable cash yield of 7-8%** throughout has been the distinguishing factor of infrastructure companies



Source: EDHECinfra. Computed as of Q4 2020

# Diversification

Effective number of constituents vs 10-year index volatility



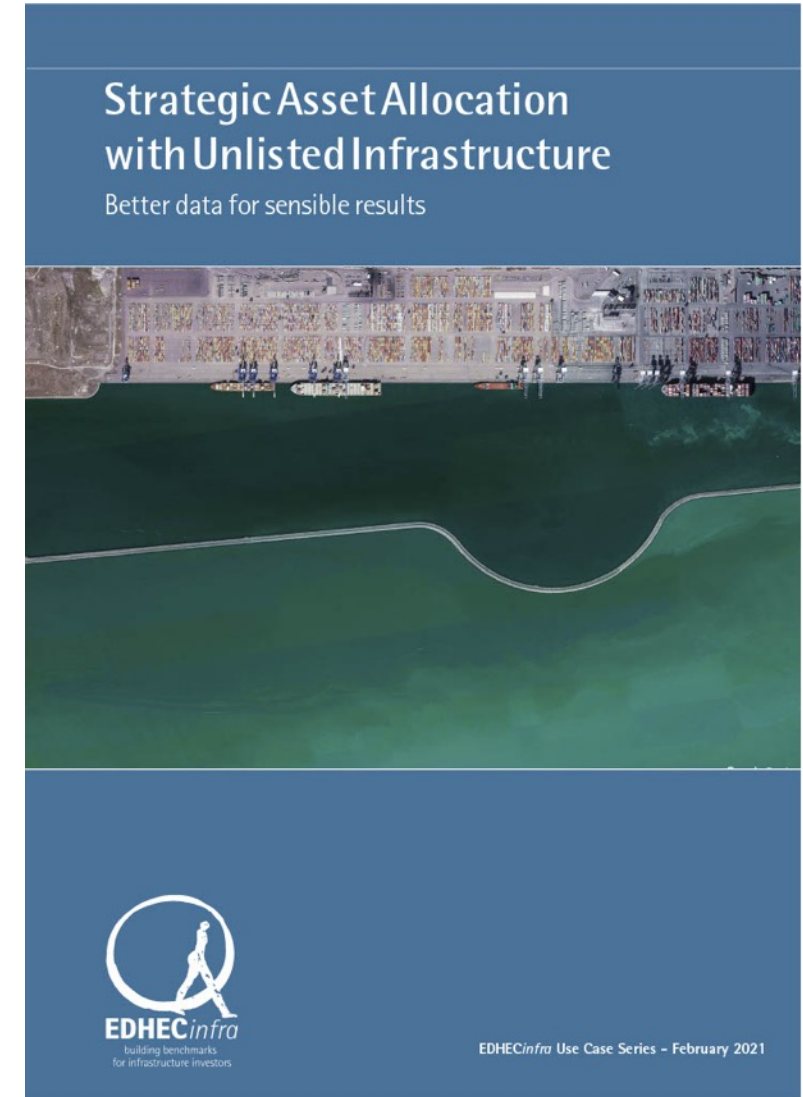
Value weighted broad European infra index



# Optimal allocation

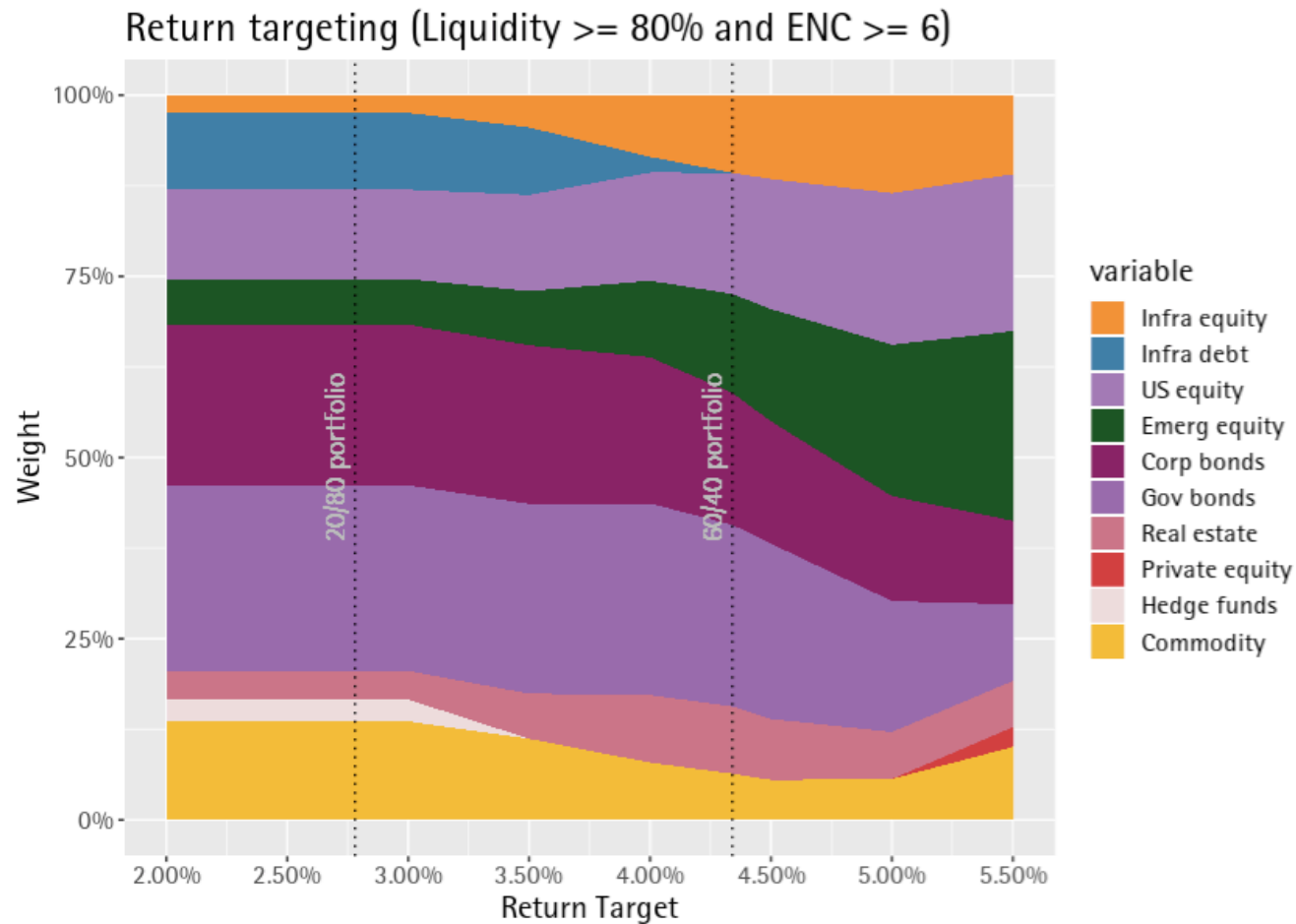
February 2021 Paper With N. Amenc and A. Gupta

- With proper measures of risk, we can now address a more **normative question**: what is the **role of unlisted infra in the multi-asset portfolio?**
- We consider the **forward-looking** return, volatility and correlation **beliefs** of leading consultants and asset managers and **take the average view** of Blackrock, JP Morgan, Morgan Stanley, BNY Mellon, Invesco, Schroders, Northern Trust, State Street, Callan and Envestnet as reported at the **end of 2019**.
- For unlisted infrastructure we use the **infra300** for unlisted infrastructure equity and the EDHECinfra broadmarket **private infra debt** index



Source: *Strategic Asset Allocation with Unlisted Infrastructure – Better data for sensible results*, Noel Amenc, Frederic Blanc-Brude, Abhishek Gupta, EDHEC Infrastructure Institute, February 2021

# Optimal allocation



## Multi-asset portfolio including infrastructure equity and debt while targeting a return level

		'20/80' investor	'60/40' investor
Return target		2.78%	4.34%
Weights	Infra equity	2.4%	10.7%
	Infra debt	10.6%	0.0%
	US equity	12.3%	16.7%
	Emerging equity	6.3%	13.6%
	Corporate bonds	22.2%	18.2%
	Gov bonds	25.6%	25.1%
	Real estate	4.0%	9.3%
	Private equity	0.0%	0.0%
	Hedge funds	3.0%	0.0%
	Commodity	13.6%	6.4%
	Portfolio return		3.29%
Portfolio risk		5.41%	7.10%
Sharpe ratio		0.608	0.611
Sharpe ratio without infra*		0.573	0.581

\*Same optimization problem but excluding infra equity and infra debt from the portfolio

# Large investor peer-groups vs. the market

*July 2020 paper with Abhishek Gupta*

- Take the list of the **top 20 Infrastructure Asset Managers** (top AMs) and the **Top 20 Asset Owners** investing in infrastructure (Top AOs) by infrastructure AUM in 2019. (source: IP&E Real Assets)
- Take the EDHEC*infra* broadmarket universe (650 firms tracked in 22 countries over 20 years) and **keep only the assets owned by the Top AMs and the top AOs during that period.**
- Get entry and exit dates, and percentage ownership of each investment. (source: inframation)
- Compute a '**pooled portfolio**' of investments made by each peer group including each acquisition, sale or cash distribution.
- All portfolio weighted by value.

## Unlisted Infrastructure Performance Contribution, Attribution & Benchmarking



# Large investor peer-groups vs. the market

- Both Large Asset Owners and Large Asset Manager peer groups:
  - are slightly above the broad market benchmark in Q2 2020 on a YTD basis
  - Largely above the broad market benchmark over the long term
- In **Q1 2020** (Covid-19 lockdowns): Performance of top AMs was worse than the top AOs and the benchmark due to their higher allocation to Merchant infrastructure (TICCS® pillar 1)
- In **Q2 2020** (Covid-19 fallout): Top AOs performed worse than AM and the benchmark as they are over-allocated to large regulated Corporates (TICCS® pillar 4).
- Top AMs peer group performs better **on a risk-adjusted basis** than top AOs peer group.

Performance of Large Investor Peer Groups relative to the broad market (data as of Q2 2020)

Total Returns	Large Asset Managers Peer Group	Large Asset Owners Peer Group	Market Benchmark (EDHECinfra Broadmarket)
2020 Q2#	-2.67%	-5.65%	-6.06%
2020 Q1#	-7.89%	-4.50%	-5.19%
YTD Q2 2020#	-10.34%	-9.89%	-10.93%
3 years	13.86%	11.23%	3.01%
5 years	15.31%	13.97%	6.04%
10 years	17.90%	17.14%	12.25%
Sharpe ratio*	Large Asset Managers Peer Group	Large Asset Owners Peer Group	Market Benchmark (EDHECinfra Broadmarket)
3 years	0.88	0.68	0.20
5 years	0.96	0.84	0.43
10 years	1.09	0.97	0.81

Peer-group portfolios based on a 118 unlisted infrastructure equity investments made by large asset managers (including 64 exits) and 31 investments made by large asset owners (including one exit) between 2010 and 2020. All returns annualized computed in local currency, except # quarterly returns. \* estimated as of 30 June 2020.

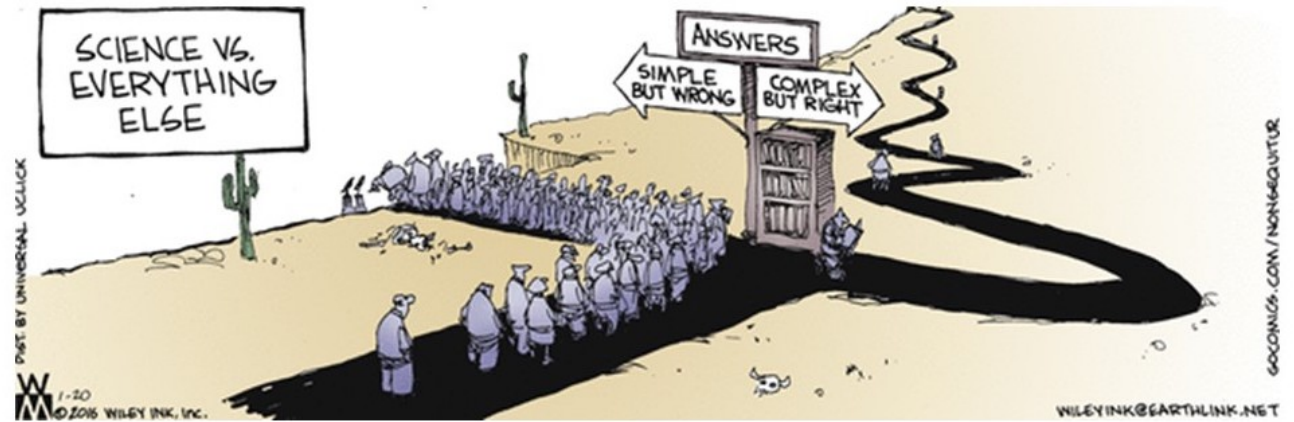
# Answers?

- Was infrastructure risky before 2020 and Covid-19?
  - Yes, from bankruptcy risks to interest rate risk...
- How bad was Covid-19 for infrastructure assets?
  - Projects did ok, Merchant Corporates not so well..
- Should one invest in airports in 2021?
  - At the right price, probably yes...



# The future?

- New data and indices allow granular and mark-to-market benchmarks and **comparing infrastructure directly with other asset classes**.
- With Covid-19 the industry is shifting towards **new benchmarking practices**.
- This like hedge funds 10 years ago: move towards more **transparency**, better understanding of **risk**
- **Fiduciary** responsibility, **prudential** requirements, even the **social responsibility** of investors points to the need for better benchmarks.
- EDHECinfra offers a **scientific** approach to benchmarking unlisted infrastructure assets.



More than **600 organisations** are registered on the EDHECinfra platform.

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