



The Risk-Adjusted Performance of a Private Infrastructure Equity Portfolio

First European Results

Frédéric Blanc-Brude, PhD
Director, EDHEC Infrastructure Institute
(in collaboration with Majid Hasan, Qi Wang and Tim Whittaker)

A presentation prepared for the 3rd LTIIA annual meeting

Frankfurt, 20th October 2016

Agenda

1. EDHEC*infra* asset pricing technology
2. Application: a private portfolio of "Contracted" Infrastructure equity in Europe
3. Asset identification and data collection
4. Next: building representative, 'broad market' benchmarks
5. Tomorrow: building factor models of infrastructure returns

EDHEC*infra*: asset pricing technology

Recent research work at EDHEC has led to the creation of a fully functioning asset pricing technology for private infrastructure:

1. Cash flow models
 2. Discount factor models
 3. Quasi-market valuations (taking into account new and secondary market investments to revise expected returns in each period for all investments)
- ✓ The aim is to compute the **metrics needed to answer asset allocation and prudential questions** while using a **standardised set of observable data**
- see Blanc-Brude, Hasan, and Ismail (2014); Blanc-Brude and Hasan (2015), Blanc-Brude, Hasan, and Whittaker (2016), Blanc-Brude, Hasan, Wang, and Whittaker (2016) and Blanc-Brude et al. (2016)

A "Contracted" Infrastructure Private Equity Fund

€1,000,000,000_{equiv.}

50 'contracted' infrastructure projects

8 European countries

15 sectors

fully invested by 2008

For each firm:

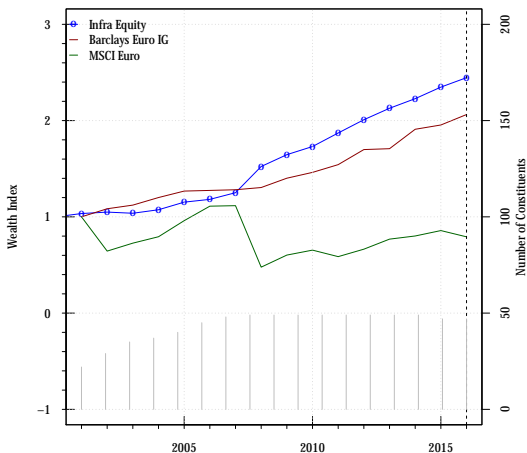
- ➔ 5 to 15 years of realised cash flow data
- ➔ One or more secondary market transactions

A "Contracted" Infrastructure Private Equity Fund

Aggregate unhedged European Contracted Infra Equity

Index (2000 = 1)

Comparison of Wealth Index for an Infra and Corp Portfolios

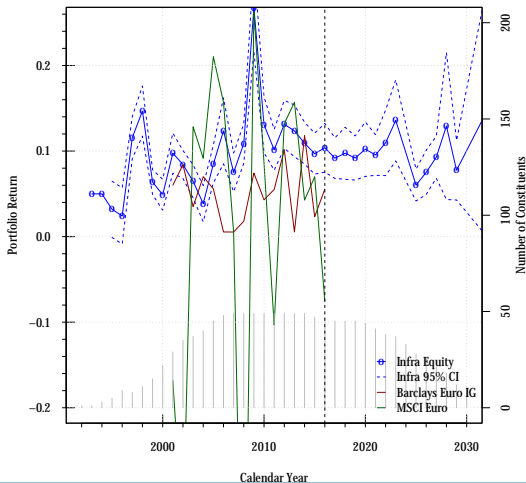


A "Contracted" Infrastructure Private Equity Fund

Aggregate unhedged European Contracted Infra Equity

Period Returns

Comparison of Return of Infra and Corp Portfolios



A "Contracted" Infrastructure Private Equity Fund

Performance metrics

		InfraEquity Agg. Eurp	InfraEquity Cont. Eurp	InfraEquity UK	Barclays Eurp	
					Corp IG	MSCI Eurp
one-year	Return	8.9%	14.5%	6.5%	5.6%	-7.6%
	Risk	12.0%	15.8%	5.6%	5.3%	18.9%
	Sharpe Ratio	0.766	0.758	0.846	0.70	-0.20
five-year	Return	9.6%	12.7%	8.4%	6.0%	3.7%
	Risk	13.0%	16.5%	6.3%	8.5%	21.3%
	Sharpe Ratio	1.08	0.73	1.12	0.65	0.12
ten-year	Return	11.0%	13.8%	10.0%	4.6%	1.5%
	Risk	14.1%	17.9%	7.3%	8.0%	23.0%
	Sharpe Ratio	1.19	0.96	1.3	0.483	0.09
inception	Return	8.2%	8.0%	8.7%	5.1%	0.4%
	Risk	7.7%	9.1%	10.4%	7.8%	23.9%
	Sharpe Ratio	0.75	0.73	0.81	0.51	0.10

- The Barclays Capital Pan-European Aggregate Bond Index : fixed-rate, investment-grade securities issued in 10 European currencies including Treasuries, Government-Related, Corporate and Securitized other covered bonds and asset-backed securities.
- The MSCI Europe Index captures large and mid cap representation across 15 Developed Markets countries in Europe, has 446 constituents, covering approximately 85% of the free float-adjusted market capitalisation across the European Developed Markets equity universe.

A "Contracted" Infrastructure Private Equity Fund

Risk metrics

		InfraEquity Agg. Eurp	InfraEquity Cont. Eurp	InfraEquity UK	Barclays Eurp Corp IG	MSCI Eurp
one-year	VaR	-25.1%	-28.7%	-11.5%	-7.4%	-69.9%
	cVaR	-30.5%	-32.4%	-13.2%	-11.5%	-73.8%
	Max Drawdown	-34.9%	-38.9%	-13.9%	18.6%	-75.4%
five-year	VaR	-27.2%	-30.2%	-9.3%	-13.4%	-70.8%
	cVaR	-31.2%	-34.1%	-11.3%	-20.5%	-75.8%
	Max Drawdown	-37.8%	-40.9%	-11.9%	-22.1%	-79.0%
ten-year	VaR	-29.1%	-32.8%	-8.6%	-13.2%	-78.1%
	cVaR	-34.7%	-37.1%	-10.9%	-20.2%	-80.8%
	Max Drawdown	-40.6%	-44.5%	-11.5%	-23.4%	-84.8%
inception	VaR	-15.7%	-16.7%	-19.3%	-12.5%	-81.8%
	cVaR	-20.3%	-18.8%	-22.6%	-19.1%	-82.8%
	Max Drawdown	-22.9%	-22.6%	-23.7%	-24.5%	-85.4%

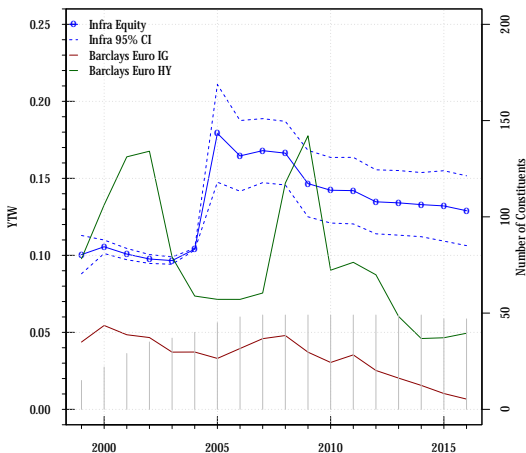
- The Barclays Capital Pan-European Aggregate Bond Index : fixed-rate, investment-grade securities issued in 10 European currencies including Treasuries, Government-Related, Corporate and Securitized other covered bonds and asset-backed securities.
- The MSCI Europe Index captures large and mid cap representation across 15 Developed Markets countries in Europe, has 446 constituents, covering approximately 85% of the free float-adjusted market capitalisation across the European Developed Markets equity universe.

A "Contracted" Infrastructure Private Equity Fund

Aggregate unhedged European Contracted Infra Equity

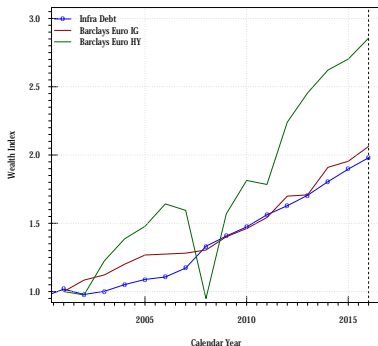
Yield (IRR)

Comparison of YTW of Infra Equity and Corp Debt



Equivalent results for senior infrastructure project debt

Comparison of Wealth Index for an Infra and Corp Debt



		InfraDebt Agg. Eurp	InfraDebt Cont. Eurp	InfraDebt UK	Barclays Eurp Corp IG
one-year	Return	5.8%	3.6%	7.6%	5.6%
	Risk	2.5%	2.4%	2.7%	5.3%
	Sharpe Ratio	2.32	1.59	2.88	0.70
five-year	Return	5.1%	3.4%	6.5%	6.0%
	Risk	2.8%	2.6%	2.9%	8.5%
	Sharpe Ratio	1.76	1.35	2.09	0.65
ten-year	Return	5.6%	2.5%	7.8%	4.6%
	Risk	3.1%	3.0%	3.2%	8.0%
	Sharpe Ratio	1.46	0.96	1.86	0.483
inception	Return	3.4%	1.3%	4.8%	5.1%
	Risk	3.5%	3.3%	3.6%	7.8%
	Sharpe Ratio	0.51	0.53	0.50	0.51

A "Contracted" Infrastructure Private Infrastructure Fund

Findings

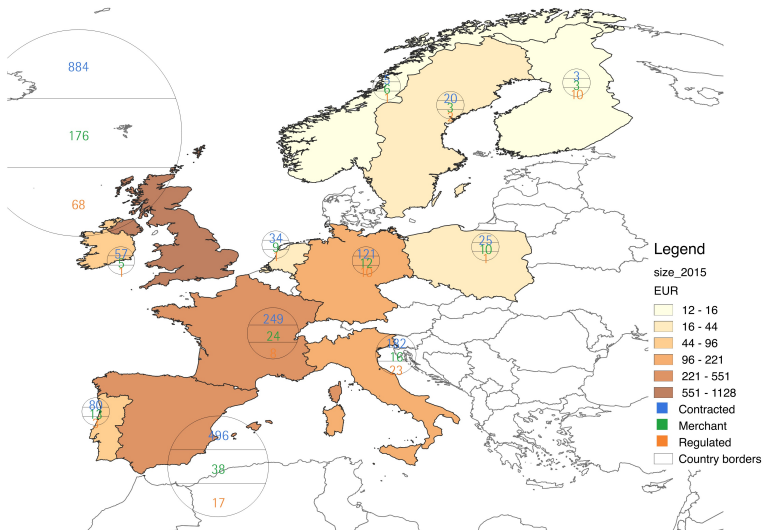
1. **IG-like performance:** A European basket of private contracted infrastructure equity has comparable if not better performance characteristics (Sharpe Ratio) than an **investment grade** corporate bond index, as well as largely superior performance than the European stock market;
2. **A low risk equity fund:** once the fund is fully invested and projects are operational, its 99.5% one-year VaR is much lower than the equity market, but is higher than that of IG corporate bonds;
3. **A "high yielding" fund:** Equity "yield to maturity" spread over IG corporate bonds is above 140bps
4. **A very dynamic profile:**
 - As the portfolio is built, its risk profile can evolve significantly;
 - Once fully invested, the portfolio matures, return vol steadily decreases and excess returns also trend down (risk-adjusted discount rates go down).
 - In this example the fund is not "recharged", hence it drifts towards a lower risk/return profile.

Data: Identification and collection

- First step: identifying and categorising *investable* infrastructure in each national market
 - 'identification' means that we know the company registration number of each firm, whether they are SPVs, utilities or a port or an airport.
 - the regulation of each national market is also studied to ensure that each firm is categorised correctly by business model (contracted, merchant, regulated etc.)
- Second step: a selection of identified firms are studied in details by a human analyst, financial models and statements are obtained from lenders and investors, individual audited accounts statements are obtained and analysed.
 - The data collected corresponds to a reporting framework developed by EDHEC*infra* (see Blanc-Brude et al., 2016).

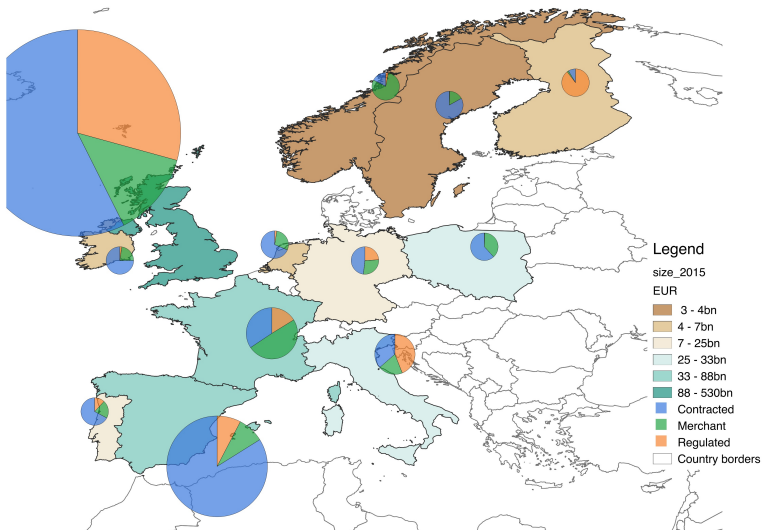
Data collection: European market survey

Identified investment universe by count: approx. 2,700 firms



Data collection: European market survey

Identified investment universe by 2015 book value: approx. Eur730bn



Data collection: firm-level data

- Once investable firms have been identified, individual firm data is collected from a range of sources both mechanically using computer code and by human analysts;
- As per our data collection framework, we collect **events, attributes and 'values'** (mostly cash flows) about **individual firms and individual financial instruments**. Today, we have collected:
 1. more than 13,000 events (from incorporation date to end-date, maturity dates, refinancing dates, default events, bankruptcies, renegotiations, etc)
 2. close to 50,000 attributes (from business models to covenants, contractual aspects, amortisation profiles etc)
 3. and more than one million cash flow and balance sheet items, secondary market prices, financial ratios etc.;

→ for approx 2,700 identified firms in Europe and more than 3,000 financial instruments (covering more than 500 firms) going back as far as 25 years.

Next: a broad market benchmark

- With the technology to measure the risk-adjusted performance of private infrastructure equity investments and the process and resources to identify qualifying assets and collect historical data, what remains is benchmark construction...
 - Such benchmarks cannot be investable, but they can be representative of "the market"
 - A 'broad market benchmarks' will be informative for strategic asset allocation and prudential regulation;
- these can then be broken down into sub-categories by business model, geography, lifecycle stage etc.
- Adequate sampling of the market by size, age, business model etc will ensure an **absence of bias in the portfolio constituents and the creation of a representative index.**
- The number of benchmark constituents are expected to increase to 350-400 firms when this benchmark is finalised at the end of 1Q17.

Tomorrow: factor models of infrastructure returns

- Beyond broad market benchmarks, it is imperative to develop a 'risk factor' understanding of private infrastructure investment;
- Because of the highly illiquid nature of infrastructure assets, allocating significant amounts to infrastructure **creates significant issues in terms of maintaining asset allocation targets and rebalancing a portfolio** i.e. the two things that matter the most in risk management...
- To address these issues, a cross-asset class view is necessary, by which more liquid assets can be used to rebalance a portfolio and offset the style drift of less liquid assets.
- **Understanding and documenting the factor loadings of private infrastructure investments will allow their full integration into long-term investment policies.**

Conclusion: regulatory and market implications

- We find risk profiles for equity and debt in "contracted" European infrastructure which are much more attractive than public equity and on par with IG corporate bonds;
 - Still, this is a "contracted" and "semi-contracted" infrastructure equity portfolio and extreme risk levels are likely to be higher when we include the fully "merchant" category;
 - A new calibration of prudential risk modules for institutional investors is made possible through this work in the near future;
 - New products using infrastructure assets as an underlying can also be developed on that basis;
- but this will require full transparency of the risk models and assumptions backed by empirical data of the highest quality.
- Our work continues with the support of LTIIA.

Thank you!

References

- Blanc-Brude, F., R. Delacroce, M. Hasan, C. Mandri-Perrot, J. Schwartz, and T. Whittaker (2016). Data collection for infrastructure investment benchmarking: objectives, reality check and reporting framework. *EDHEC Infrastructure Institute-Singapore*.
- Blanc-Brude, F. and M. Hasan (2015, January). The valuation of privately-held infrastructure equity investments. *EDHEC-Risk Institute Publications January*.
- Blanc-Brude, F., M. Hasan, and O. R. H. Ismail (2014). Unlisted Infrastructure Debt Valuation Et Performance. *EDHEC-Risk Institute Publications July*.
- Blanc-Brude, F., M. Hasan, Q. Wang, and T. Whittaker (2016, March). Revenue and dividend payout in privately held infrastructure investments. *EDHEC Infrastructure Institute Publications March*.
- Blanc-Brude, F., M. Hasan, and T. Whittaker (2016, March). Cash Flow Dynamics of Private Infrastructure Project Debt, Empirical evidence and dynamic modelling. *EDHEC Infrastructure Institute Publications March*.