

Mission-critical and complementary

By Fraser Hughes
& Simon Wilde

As the demand for infrastructure continues to increase, the question how do listed and private infrastructure vehicles complement each other comes to the fore.

The infrastructure asset class has reached a point where the relationship between the listed and the private industry, each with their characteristics, needs to be analysed together. We need to better understand how they can work together to build an exposure that offers diversification, transparency, control, attractive risk/adjusted returns, and liquidity, all built on a backbone of cashflow stability. The listed real estate sector in fact went through a similar debate back in the 1990s.

Following years of research and work by the real estate industry and their representative bodies, institutional investors and consultants generally agree that listed and private real estate can, in fact, complement each other.

We believe the same is true of infrastructure, and we envisage similar standpoints to form in the coming years. However we need to find a consensus understand-

ing since, depending on the benchmarks used in research, results can differ considerably. Investors must make themselves aware of the differences in order to make informed decisions.

The Infrastructure Landscape

Looking at infrastructure investment globally, McKinsey¹ estimate \$9.5tn new investment flow per annum (approximately 14% of global GDP).

This comprises:

- \$2.5tn in economic infrastructure (transport, power, water, telecoms, etc).
- \$1.3tn in social infrastructure (hospitals, schools, etc).
- \$0.9tn in oil, gas and mining resources infrastructure.
- \$4.8tn in real estate.

Treating natural resources and real estate as separate from infrastructure, as investors define it, implies annual invest-

ment of \$3.8tn in economic and social infrastructure using McKinsey's annual data. The United Nations Environment Programme (UNEP)² estimate the stock value of global infrastructure at \$35tn as at 2014. This represents 8% of their estimated \$450tn value for all investible assets (listed and private).

By comparison, commercial real estate is \$20tn (4.5%) and an estimated \$75tn (17%) for residential home ownership. Current figures are probably closer to \$40tn for infrastructure taking account annual investment and depreciation. For commercial real estate it would be over \$25tn.³

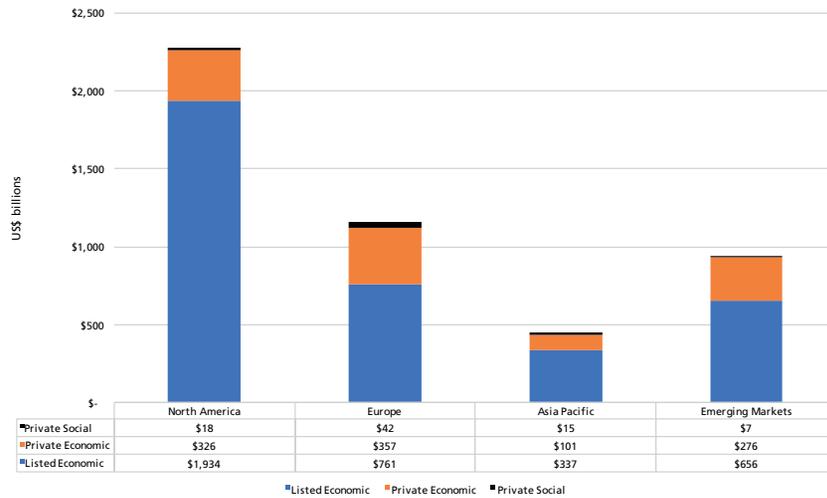
Other estimates of the stock value of infrastructure vary widely. At the upper end Arcadis⁴ value all 'built environment' assets in 2015 at \$218tn, although this includes real estate. At the lower end, the Bentley Infrastructure 500 Index⁵ >

1. Latest McKinsey estimate, Oct, 2017
2. <https://goo.gl/BbVb8Z>

3. <https://goo.gl/8hrkPS>
4. <https://goo.gl/TW26RG>

5. www.bentley.com/en/top-infrastructure-owners

Chart 1: Equity value of listed and private infrastructure June 2016



Source: RARE Infrastructure

tracks major public and private sector infrastructure owners with aggregate asset values of \$16tn. This number excludes most social infrastructure, which is not typically held in corporate structures. We use the adjusted UNEP \$40tn estimate as a reasonable starting point which is also the mid-point of some broader picture \$20-50tn estimates.⁶

Investible Universe of Infrastructure Assets

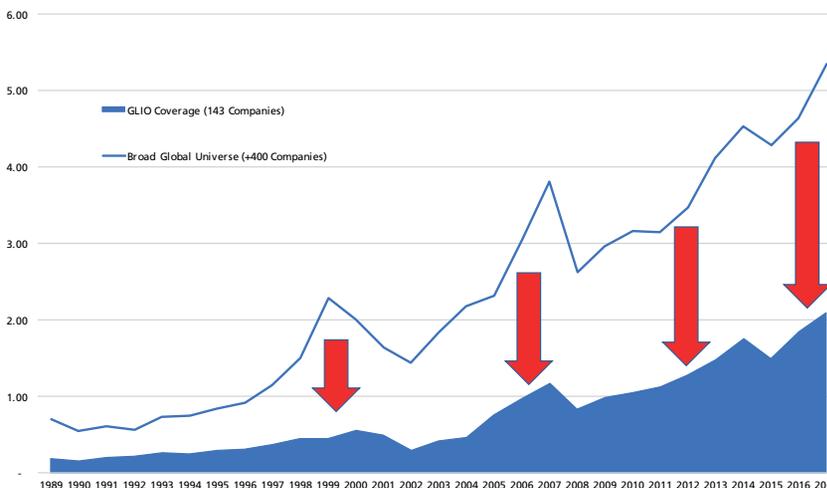
Many of the \$40tn assets are held by central and local governments and hence are not accessible by investors. Investors have existing listed and private infrastructure equity valued at almost \$5tn. Accounting for typical leverage ratios of at

least 50%, this implies a further \$5tn of infrastructure-related debt. Hence private sector infrastructure assets value around \$10tn – around one quarter of our \$40tn value for all infrastructure assets.

Chart 1. shows estimated equity value of listed and private infrastructure, broken down geographically and by economic/social categories.

Chart 1. also shows that listed infrastructure represents 76% of all equity, three times the size of private/unlisted infrastructure. The largest market is North America, which combined with other developed markets comprises 81% of equity, with emerging markets (mainly LATAM and Asia) representing 19%.

Chart 2: GLIO Coverage eliminates 260 company outliers



Source: Thomson Reuters, STOXX, S&P, FTSE, GPR, GLIO

6. RARE (2016) *The Infrastructure Opportunity: Listed versus Unlisted*, November 2016

7. GLIO Coverage of approximately 145 global infrastructure stocks, focuses on core (regulated) utilities, transportation, communications and mid-stream infrastructure in developed and emerging markets. The extended coverage also includes Infrastructure Investment Companies (IICs) and Master Limited partnerships (MLPs).

Social infrastructure is typically not investible via listed vehicles, and private social infrastructure represents only 2% of all infrastructure equity. This points to the potential issue of how well placed current investment mechanisms are to meet the growing needs of emerging markets and social investment, as well as how to define the exactly what is meant by “infrastructure”.

Listed Infrastructure

With regards to listed infrastructure, one step in the right direction over the past 12 months has been the ‘GLIO Coverage’. GLIO Coverage⁷ is the result of establishing a commonality across the core global listed infrastructure index providers. Chart 2. shows the total market capitalization covered by the core and broad-based global listed infrastructure providers, which equates to approximately \$5tn in market capitalization. However, this total broad-based universe is misleading. The GLIO coverage only includes companies covered by at least two or more index providers from S&P, Dow Jones Brookfield, STOXX, FTSE and GPR.

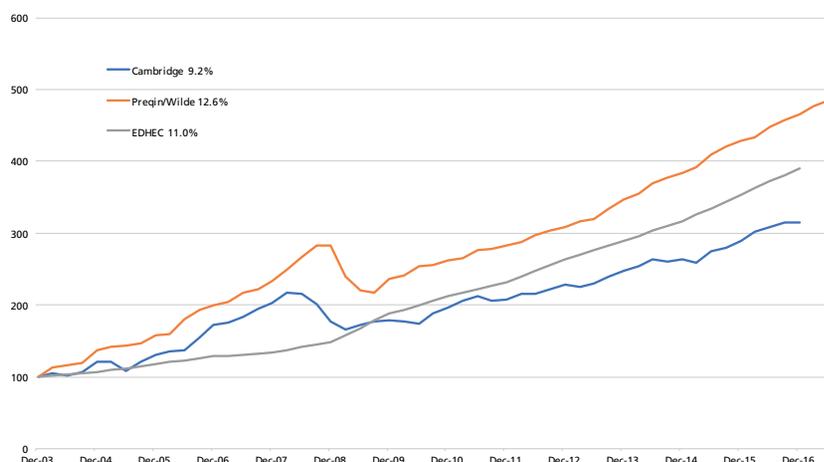
By using this simple methodology, a much more tightly defined ‘traditional’ or ‘core’ infrastructure universe evolves. Some 260 companies, representing over \$3tn market capitalization, drop out of the selection filter. Examples of the companies excluded are: Verizon, Vodafone, China Mobile, Telefonica, Deutsche Telekom, Deutsche Post, Royal Mail and Digital Realty. This methodology produces a much clearer picture of global listed core infrastructure, by cutting out large-cap outliers particularly from the TMT sector.

Of the index providers, the vast majority of dedicated global listed infrastructure managers either use the FTSE Core Infrastructure series or Dow Jones Brookfield. GPR Pure Infrastructure is also a creditable newcomer to the core/traditional infrastructure market. Table.1 outlines annualized total returns over a variety of holding periods. The broader indices produced by STOXX, S&P, and MSCI Indices are viewed as too broad by the dedicated listed infrastructure manager community.

Private Infrastructure

On the private side, valuation methodologies differ across providers. This results

Chart 3: Private infrastructure Total Return Indices December 2003 - June 2017



Source: EDHEC, Cambridge Associates & Preqin/Wilde

in quite differing return characteristics across benchmarks.

Cambridge Associates LLC Infrastructure Index uses a pooled horizon net internal rate of return (IRR), compiling data from 93 private funds across the risk spectrum. The investment strategies represented in the index include diversified infrastructure, utilities and power, public-private partnerships, renewable energy, telecommunications and transportation. The index includes funds that invest all over the world, including funds that focus on the USA, Europe, Latin America and Africa. For the period ending 2016, annualized ten-year net IRR's recorded 6.2%. For five years, the net IRRs were 8.8%.

The *Preqin Infrastructure Index* captures the average returns earned by investors in their infrastructure portfolios, based on the actual amount of money invested in infrastructure partnerships weighted by the size of each fund. They cover approximately 275 funds, with a value of \$340bn. The regional breakdown is North America 45%, Europe 35% and the rest-of-world 20%. The series goes back to 2007. The average annual USD return over 2007-17 is 8.8%.

Building on this index, Simon Wilde at Imperial College calculates an adjusted index based on detailed quarterly cash flow and NAV data on approximately 80 funds which are typically larger funds, equalling a sample size of \$100bn capital. They analyze the spread of returns and the

diversification effect of holding multiple funds. They use what they consider to be better metrics such as Modified IRR and Public Market Equivalents derived from academic private equity research. The series begins in 2003.

The average annual total return is 8.9% for the period 2003-2015. The Wilde data can be used to extend the Preqin times series back to June 2003 to allow for longer comparisons with other indices. This combination of Wilde data 2003-2007 and Preqin 2007-2017 is used later in this article.

MSCI/IPD Global Infrastructure Index asset count is 123, contributed by nine fund managers of private funds, with an enterprise value \$61bn as at December 31, 2016. The index is quarterly valuation-based (not transaction-based). MSCI/IPD is heavily weighted towards Europe and UK (41%) and Australia (47%). North America is 9%. At a sector level, Transport (excluding Airports) is 27% and Airports 21%. Water is 19%, Power transmission 16% and renewable energy 6%. Approximately 36% is classified as regulated, 29% partially regulated and 35% unregulated. Average leverage is approximately 50%.

To December 2016, 8.5 years USD total return recorded 15% for uncontracted infrastructure (approx. 4% income return), and 11% for contracted infrastructure (approx. 5% income total).

Finally, *EDHECinfra All Infrastructure*

Private Equity Index takes in 14 European countries covering 330 value-weighted 'live exposures' representing approximately €295bn. The coverage goes back to January 2000. The index is heavily skewed towards the UK at 66%, with Germany 10% and Italy at 10%. The sector breakdown is transport 44%, environmental services 21%, energy 16% and oil & gas 16%. Business model breakdowns are regulated 59%, merchant 24% and contracted 17%. Heathrow Airport makes up 15% of the total index, with five ex-listed UK water utilities in the top ten holdings.

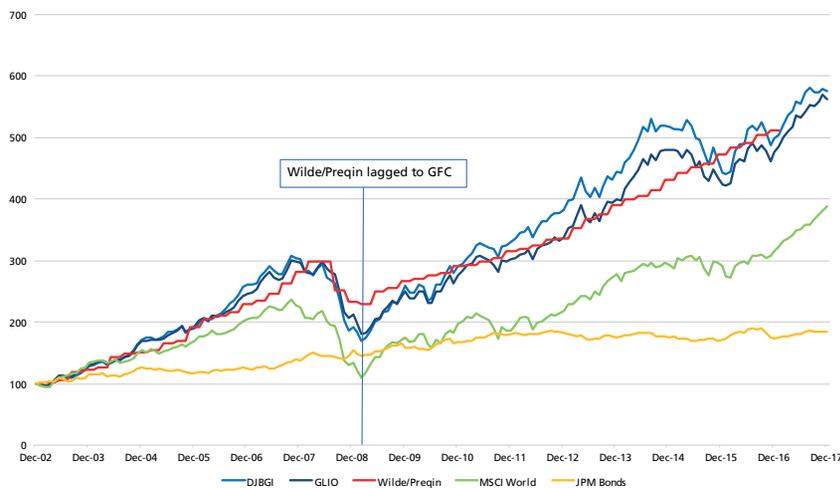
Performance attribution is an estimate of the sensitivity of individual constituent excess returns to year-on-year changes in interest rate level, term structure slope and convexity, as well as cash flow volatility changes – for each reporting period. EDHEC report historical total annual returns from 2000 to 2016 of 11.2%. The measurement process is complex and, oddly enough, the index did not experience a downturn during the GFC.

Chart 3. shows that the different calculation methodologies, coverage sizes, geographic and sector differences result in a wide range of performances among the private infrastructure benchmarks with a longer history. For the period December 2003 to December 2016, annualized total returns range from 9.2% to 12.6%. A simple average of the three private benchmarks is 10.9%, compared against an average of the listed benchmarks of 11%.

Comparing listed and private is not a straightforward exercise.

Comparing listed with private is not a straightforward exercise because of the variety of valuation metrics involved across the various index providers. Listed is simpler because of its real-time pricing. Naturally, prices experience the short-term movements of a liquid market. Over the medium to longer-term, this 'washes out' and performance reverts to type, i.e., it is directly linked to the quality of assets and cashflows, plus of course, >

Chart 4: Global Infrastructure Listed & Private v Equities & Bonds, Dec 2002 to Dec 2017



Note, this chart is not intended as a private versus listed arbitrage pricing comparison.
Source: Reuters, GLIO, Wilde/Preqin

the quality of the company's management team. On the private side, a variety of 'pricing' metrics are used. From simple NAVs, IRRs and transactions pricing, to more complex academic methodologies. These type of pricing metrics bring to the table their own set of issues, such as dampening of 'real' volatility and autocorrelation of valuations.

Listed current pricing is based on future expectations of company performance, while private metrics are inherently looking over their shoulder, or backward-looking.

The key is to acknowledge the fact that listed index pricing is forward-looking. In other words, current pricing is based on future expectations of company performance compared against private metrics, which are inherently looking over their shoulder, or backward-looking. Subsequently, this introduces a lag effect when comparing listed and private benchmarks.

A good example of this is when comparing a combined Wilde/Preqin series (we use this because it is the largest sample size and more evenly spread geographically, not too dissimilar to the listed market) versus the GLIO Coverage and Dow Jones Brookfield in Chart 4. The private data hits its GFC nadir at the end of Q3 2009 compared against the listed core infrastructure market in February 2009 – a full seven months difference.

To adjust for this, in the chart we lag the private index seven months to anchor it at the low point of the GFC in February 2009.

From this simple comparison, it is reasonable to conclude that the global core listed companies follow a similar path to the private infrastructure market over the medium to long term (albeit compared to a far smaller sample size). The chart plots core listed infrastructure (blue) with private infrastructure (red) versus world equities (green) and bonds (orange) over 15 years. The long-term path of the listed infrastructure follows that of private infrastructure. Investors may intuitively expect this outcome, considering that the underlying assets and cashflows are derived from the same industries.

Chart 4. shows visually that the lagged Preqin line moves its performance more closely in line with listed indices, such as DJBGI and GLIO Coverage. This can also be seen statistically, where the unlagged correlation between the returns of DJBGI

and Wilde/Preqin is 0.1 for the period 2003-2017. This increases to 0.4 with a Preqin lag of two quarters.

Likewise, when we look at the Capital Asset Pricing Model (CAPM) beta of the Wilde/Preqin returns. On an unadjusted basis, the Wilde/Preqin returns have limited co-movement with the MSCI World and hence have a beta of close to zero for 2003-2017. Using multivariate unsmoothing of the Preqin returns, we are able to re-estimate CAPM beta taking into account the NAV smoothing effect.⁸ Beta now increases to 0.6, still less than 0.7-0.8 for listed infrastructure indices, but far closer.

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Blending

The well-publicized amount of \$150bn 'Dry Powder' looking to invest in infrastructure might be well advised to take a close look at the listed market as a liquid avenue to achieve exposure to the underlying assets and cashflows.

Looking through the short-term differences (apples vs. oranges) in the valuation metrics of the private (valuation-based) and listed (mark-to-market) infrastructure, the asset class can provide investors with attractive long-term total returns, directly linked to the professional management of those assets. It is worth not forgetting that the underlying infrastructure assets are subject to the same economic condi-

8. "Based on Geltner, D. 1991. Smoothing in Appraisal-Based Returns. *Journal of Real Estate Finance & Economics* 4(3): 327-345"

tions and regulations, irrespective if they are held privately or by a listed company. In a recent GLIO article by Simon Wilde Imperial College, (see *GLIO Journal*, issue 1), he produced a simple mean-variance model using both private and listed infrastructure to build an exposure to the infrastructure asset class. The results show that by using both types of infrastructure vehicle – private and listed – the risk/return profile of the portfolio is optimal when utilizing both infrastructure vehicles.

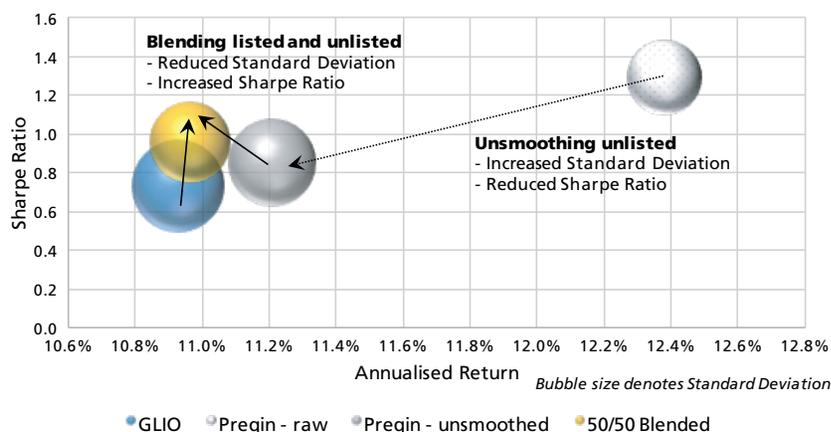
An alternative approach is to see if combining listed and private infrastruc-

ture improves risk-adjusted returns. As noted above, appraisal valuation of private NAVs results in lower apparent volatility. Work in the real estate sector shows this is due in part to a ‘smoothing’ effect compared with listed assets. It is possible to ‘unsmooth’ the private returns which reduces this effect⁹.

The Chart 5. shows the effect of unsmoothing on private returns, which is to increase their volatility (standard deviation) and hence reduce the Sharpe Ratio. It also shows that there is a diversification benefit – measured

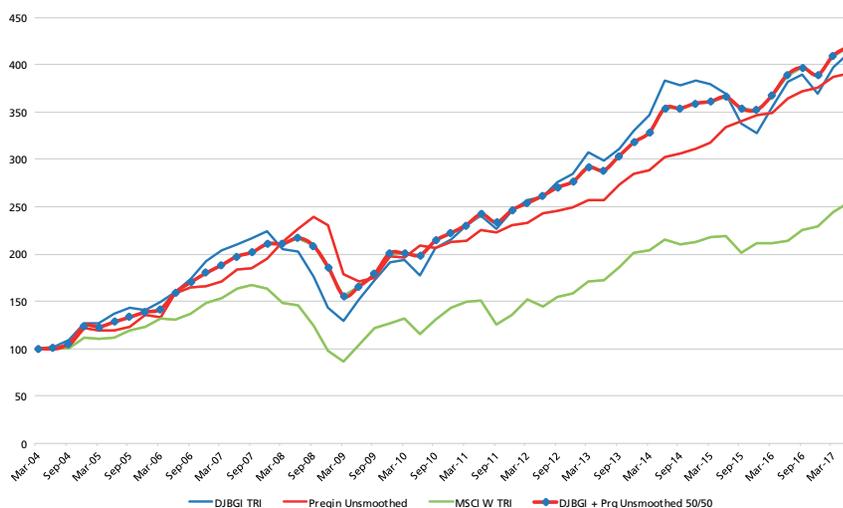
by an increase in Sharpe Ratio – from blending the unsmoothed private returns with the listed Dow Jones Brookfield return series. It should be noted we used the best performing private benchmark (Preqin) analysis period. Chart 6. displays the performance of the 50/50 weighted blended portfolio (red/blue line) over the analysis period.

Chart 5: Effect of blending listed and private on risk-adjusted returns



Source: Authors' analysis based on DJBGI and Preqin data (March 2004 to June 2017)

Chart 6: Blended Infrastructure Dow Jones Brookfield & Unsmoothed Wilde/Preqin Total Return Indices 2004-2017



Source: Authors' analysis based on DJBGI and Preqin data (March 2004 to June 2017)

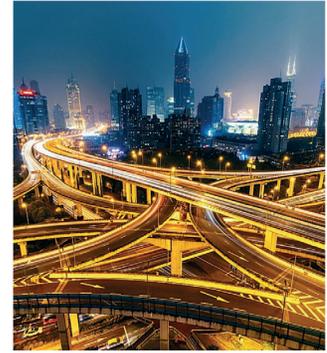
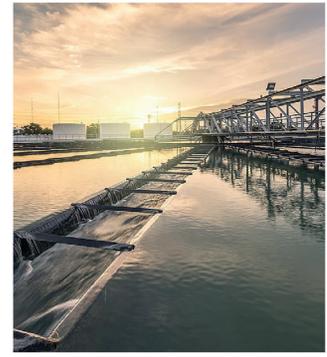
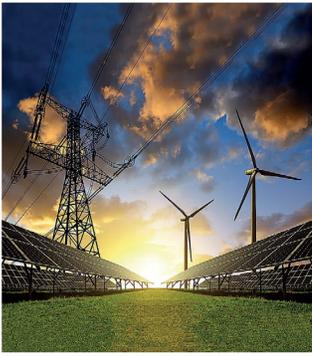
9. "Returns, volatility and Sharpe Ratios are calculated for 2004-2017 for DJBGI listed index and for Preqin/Wilde on raw and unsmoothed bases. The 50/50 blended portfolio is the average of the quarterly returns of DJBGI and Preqin/Wilde unsmoothed, based on the univariate unsmoothing approach in Geltner (1991)."
 10. CREATE Research & Amundi; "Back to long-term investing in the age of geographical risk", November 2017



Conclusions

It is clear both listed and private vehicles can offer attractive features and benefits, and provide investors access to long-lived assets in what are often monopolistic industries. These assets have historically generated relatively predictable and stable cash flows, which are often linked to inflation.

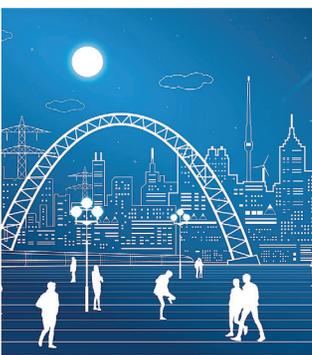
It is well documented that infrastructure allocations will continue to increase going forward. If estimates such as the UNEP 8% of global assets being infrastructure-related are sensible, it seems reasonable to conclude that current infrastructure allocations (which are sub-5%) will move upwards. A recent investor survey of 161 pension-plans representing \$1.7tn of total assets back up the view that investors are increasingly focused on longer-term investing with less attention given to short-term volatility. Long-term infrastructure investment being credited with steady capital growth, regular income and inflation protection. >



JOIN GLIO NOW!

The asset class offers investors global diversification across mission-critical economic sectors including utilities, energy distribution, transportation, and communications infrastructure. It has provided attractive net total returns, and offers transparency, liquidity, underpinned by stable cashflows. Development of the asset class is essential to meet the demands of an environmentally-aware global economy of the future.

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Table 1: Global listed core infrastructure annualized total returns

Index Description	2017	2016	3 Years	5 Years	7.5 Years	10 Years	12.5 Years	15 Years	17.5 Years
DJ Brookfield Global	15.67%	12.52%	3.67%	8.48%	12.44%	6.65%	9.50%	12.38%	-NA-
FTSE Global Core 50/50	19.32%	11.76%	7.03%	10.24%	12.16%	-NA-	-NA-	-NA-	-NA-
FTSE Global Core	16.87%	13.08%	5.71%	10.47%	11.52%	7.04%	-NA-	-NA-	-NA-
GPR Pure	17.03%	11.96%	3.38%	8.30%	12.28%	7.01%	10.05%	14.91%	9.14%
GLIO Global Coverage	18.44%	12.00%	5.45%	10.77%	12.58%	6.64%	9.64%	12.21%	10.41%

Source: GLIO, Reuters & GPR

The relationship between listed and private infrastructure benchmark performance is hard to unravel if one looks solely at broad index comparisons.

While the infrastructure benchmarking world continues to develop, we will see plenty of comparative research over the coming years, as we have seen in the real estate industry over the past 20 years. Clearly, the relationship between listed and private infrastructure benchmark

performance is hard to unravel if one looks solely at broad index comparisons. By creating a balanced library of research, which shows how both the private and the listed infrastructure market can complement each other, it is possible for long-term global investors to better appreciate the opportunities of using both private and listed vehicles as integral parts of their global infrastructure strategy.

Finally, and most importantly, it is essential that we do not lose sight of the much larger picture. McKinsey highlights the need to substantially increase the level of future investment to deliver continued – and greener – growth in developed and emerging markets alike. The need to fund and maintain this mission-critical infrastructure that forms the backbone to the global economy will require both listed and private (or private vehicles) to work together efficiently. Working hand-in-hand will be vital in driving new capital and presenting stable investment opportunities suitable for a wide range of investors over the longer-term. 



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