DECEMBER 2023

LISTED INFRASTRUCTURE RISK AND RETURN ANALYSIS

ATLAS INFRASTRUCTURE

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1 INTRODUCTION

Listed infrastructure may be considered for inclusion in an investor's portfolio for a number of different reasons including in an infrastructure portfolio as a liquid option or a substitute for undeployed capital, or in an equities portfolio as a lower beta or inflation protection option.

In this paper we evaluate the risk/return characteristics of the listed infrastructure market in order to assess whether opportunities exist within that market which meet both the requirements of general equities investors and more specialised infrastructure investors.

Specifically, this paper highlights the following attributes of listed infrastructure:

Attribute	Reference
Performance in line with general equities over past 10 years and marginally superior over 15 years	Section 2.1
This performance has been achieved with significantly lower volatility	Section 3.1
Lower drawdowns and better performance in most down-markets than listed equities	Section 2.2
Strong and stable long term EBITDA growth (significantly more stable than the earnings growth in broader equity markets)	Section 2.3
Short term correlation of c.0.8 to listed equity market when calculated over short time periods, but when measured over 1-year periods, correlation falls to 0.6	Section 3.3
Whilst returns do have a correlation with equity markets, listed infrastructure has shown a beta of c.0.6 to the broader market	Section 3.4
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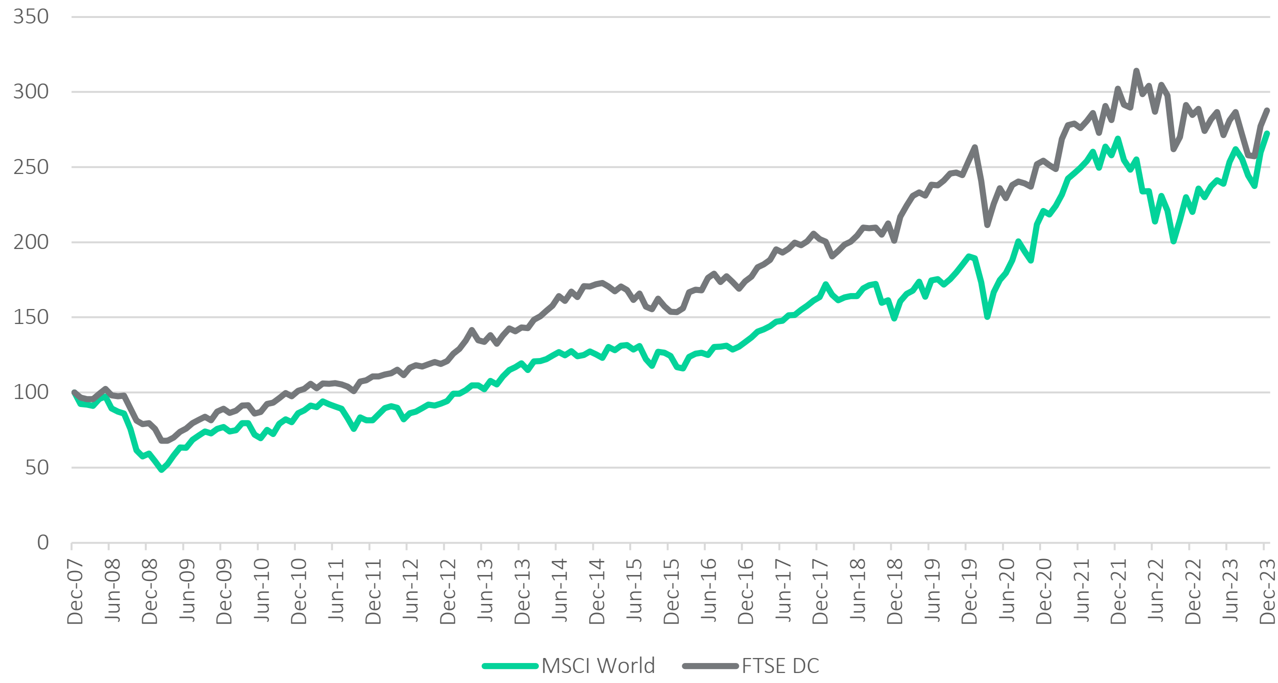
Listed infrastructure continues to trade at materially lower valuations than similar assets in the unlisted market	Section 4.2
Listed infrastructure provides a range of access options for infrastructure investors	Section 5

2 INVESTMENT RETURN CHARACTERISTICS

2.1 Listed Infrastructure vs general equities

The following chart plots the performance of the FTSE Developed Core Infrastructure Index against the MSCI over the past 16 years and is in line with the MSCI World over 10 years which therefore excludes the Global Financial Crisis.

FTSE Developed Core Infrastructure Index vs MSCI World (US$ unhedged)



Source: FactSet, ATLAS Calculations. Time period is 31 December 2009 to 31 December 2023

Listed infrastructure has benefited from a low draw down and fast recovery through the Global Financial Crisis. Over recent years the broader equities market benefited from both strong economic growth and accommodative monetary policy, albeit that the higher inflation and rising bond rates in 2022 saw a material pull back in both equities and bonds, whilst having only a very limited impact on listed infrastructure. In 2023, listed equities delivered a very strong performance largely on the back of a small number of technology stocks.

We would expect that listed infrastructure would underperform the broader equities market in a long bull market due to its defensive characteristics, however listed infrastructure has in fact shown very strong relative returns "through the cycle" and has performed in line with the general equities market over longer time frames. This performance has been achieved with significantly lower volatility and resilient down-market performance providing a superior risk adjusted return.

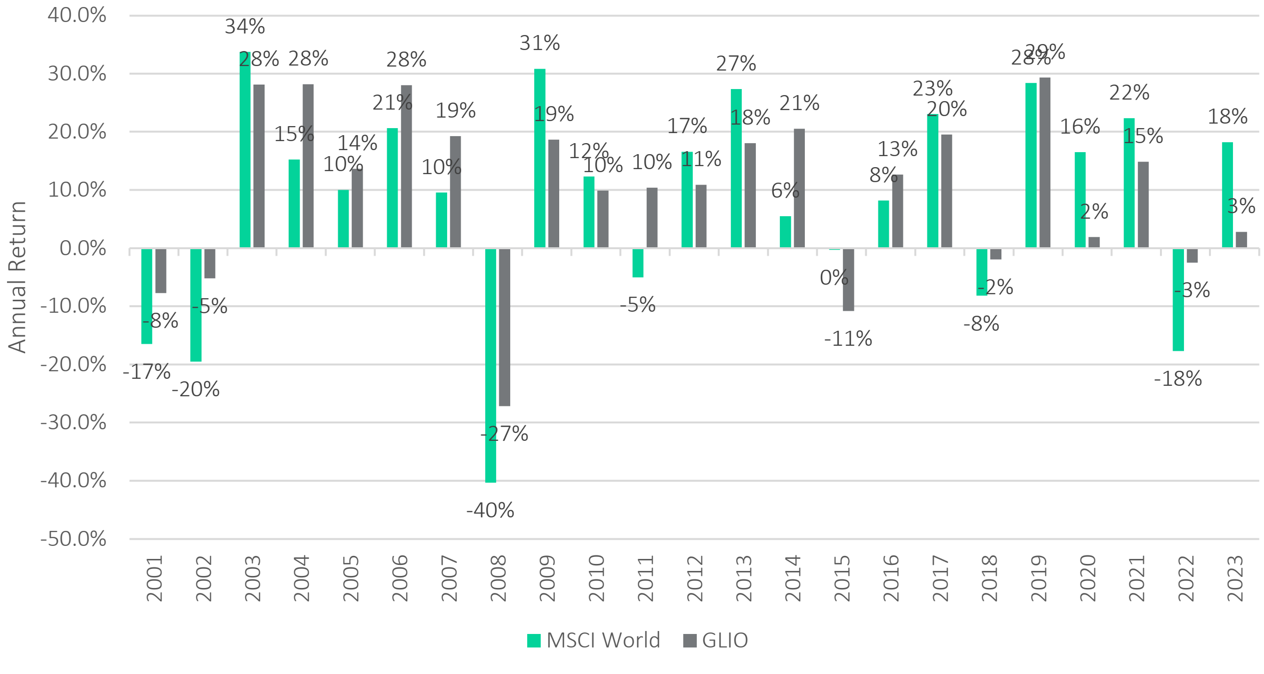
31 December 2023 (USD UH)	3-yr	5-yr	10-yr	15-yrs	10-Yr Vol	15-Yr Vol
FTSE Developed Core	3.4%	7.4%	7.2%	9.2%	13.1%	12.5%
MSCI World	7.3%	12.8%	8.6%	10.7%	14.9%	15.7%

Source: FactSet, ATLAS Calculations

The chart below outlines the annual returns for the Global Listed Infrastructure Organisation (GLIO) Index against the MSCI World (USD Unhedged) each year. There are some interesting observations to be drawn from this chart:

- In years where the MSCI has had a negative return the GLIO index has significantly outperformed the MSCI, with some years actually showing a positive performance.
- The GLIO Index has underperformed in almost all years where the MSCI has seen a return of above 15%. This highlights that listed infrastructure tends to underperform in strong bull markets
- Listed infrastructure performed particularly well relatively to the MSCI over 2001-2002 in the aftermath of the tech bubble. Recent markets have shown similar characteristics - a run up in equities driven significantly by large flows into growth (tech) stocks subsequently reversing with a rotation into more defensive sectors.
- The drawdown in listed infrastructure in 2015 was primarily due to the poor performance of the North American pipelines sector which fell 25% over the course of the year.
- Listed infrastructure held up well in 2022 despite the significant falls in the listed equity market, which were driven by rising rates and inflation.
- Conversely, listed infrastructure lagged the listed equities index in 2023 as the market was driven by a small number of large technology stocks.

Annual returns FTSE vs GLIO



Source: FactSet, ATLAS Calculations. Time period is 1 January 2007 to 31 December 2023

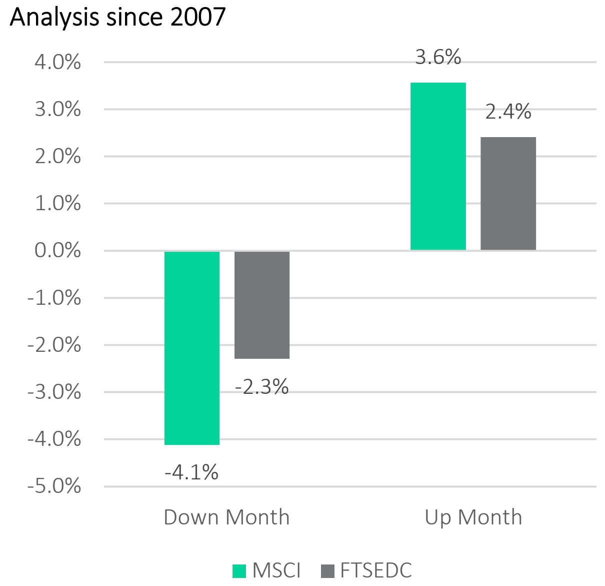
2.2 Up / Down Market Capture

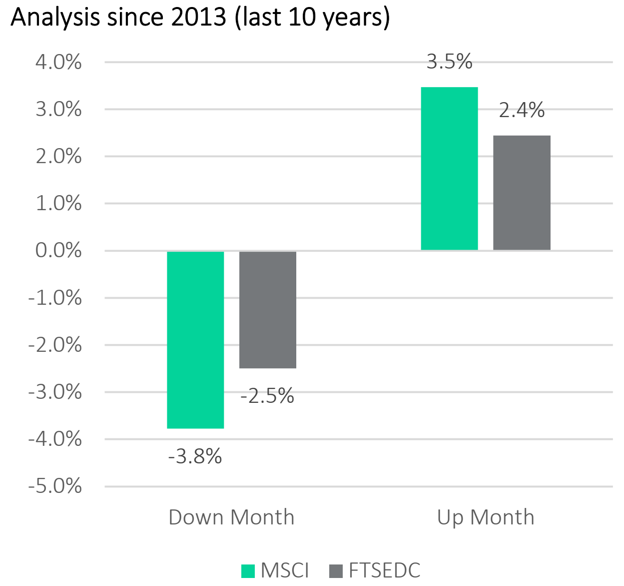
In the analysis below we have looked at the up market and down-market capture of the FTSE Developed Core relative to the MSCI All World index since 2007.

Since 2007, the FTSEDC index has shown strong down-market resilience with a 56% down market sensitivity. It has also been relatively conservative in up-markets with a 0.68% up market sensitivity.

If we look only at the past 10 years (and therefore eliminate the Financial Crisis, which may skew the data), we still see that listed infrastructure has a down market capture of 66% and an up-market capture of 70%. This is much closer to the beta of listed infrastructure vs MSCI which we discuss further in Section 3.4

FTSE Developed Core Infra Index – Up/Down Market Capture (vs. MSCI World TR)





Source: FactSet, ATLAS Calculations. Time period is 1 January 2007 to 31 December 2023

This analysis is consistent with analysis undertaken by GLIO which shows that listed infrastructure has displayed a downside capture of 44% (when measured quarterly) and an upside capture of 81%.

2.3 Earnings

The asset class's stable returns are underpinned by the consistent cash flows of its constituent companies. Listed infrastructure has historically demonstrated higher EBITDA growth than the wider market: for calendar years 1999 through 2021 the 8.9% average EBITDA growth for global infrastructure equities meaningfully exceeded the 3.3% average annual EBITDA growth of global equities.

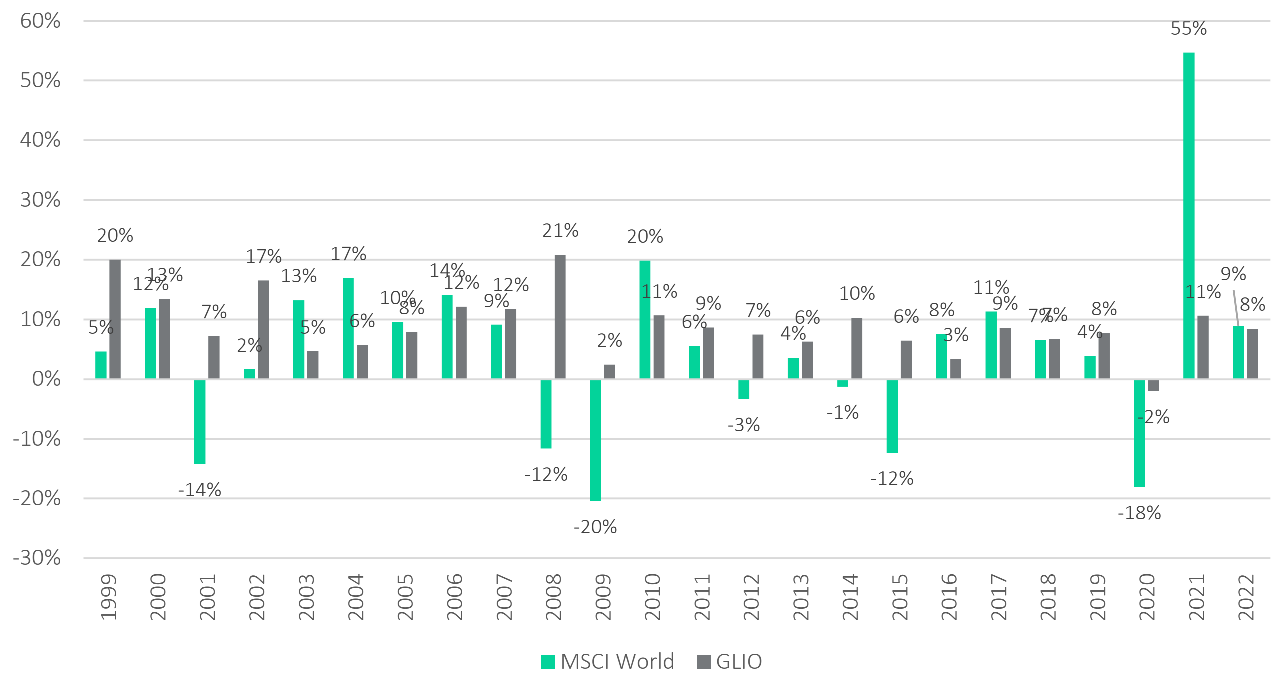
It is particularly relevant to highlight the resilience of EBITDA even during periods of economic disruption. This is a much better measure of the risk than short term volatility of an asset class, given that it is ultimately cash flows that underpin valuations.

We note that since 1999 there has only been one year, 2020, in which there has been negative EBITDA growth for listed infrastructure companies in aggregate, which was not unexpected given the impact on airports and roads from the Covid lockdowns. This compares to seven years of negative EBITDA growth in this timeframe for the wider market, averaging -11.4% over those seven years.

If we look at the average EBITDA growth, we also see that the MSCI and listed infrastructure have shown very similar average rates of growth, with both MSCI and GLIO recording 7% EBITDA growth over the past 10 years.

The takeaway from this analysis is that listed infrastructure companies have shown the same level of earnings growth but with significantly better stability than the broader equities market. This is despite the equities market being heavily biased towards "growth" companies.

Year on year EBITDA growth vs general equities



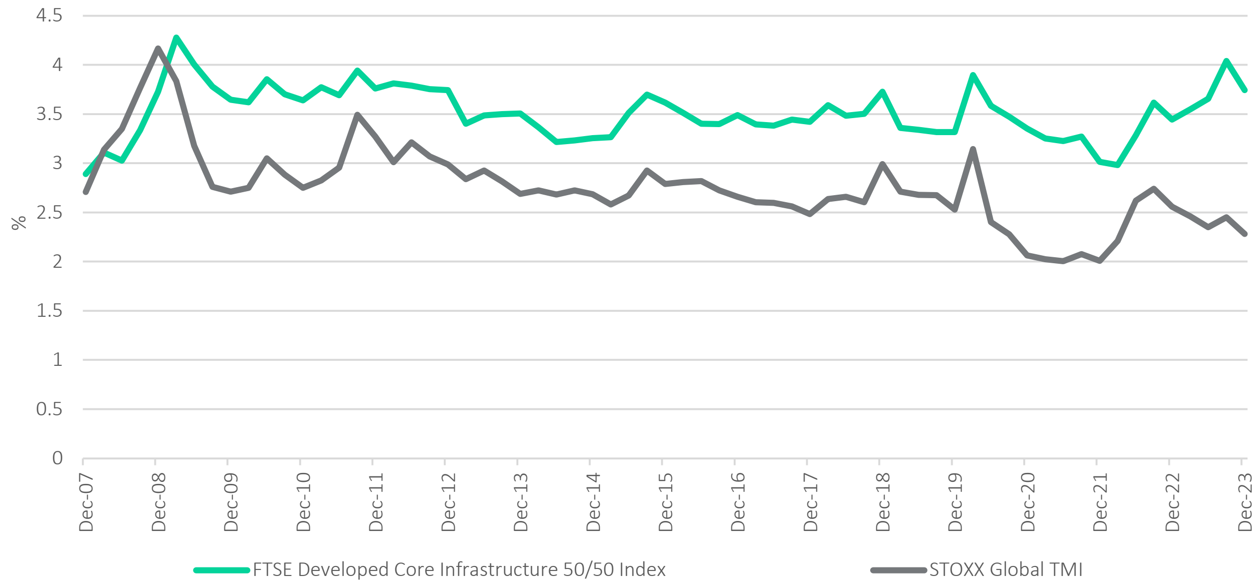
Source: GLIO

2.4 Dividend Yields

The following chart provides the running dividend yield for both the FTSE Developed Core 50/50 and the STOXX Global TMI, representing global equities. Listed infrastructure has historically provided a dividend yield of around 3.5%, between 50-100bps above the dividend yield offered by general equities.

We have seen recently that there has been a noticeably widening of the dividend spread between listed infrastructure and general equities, such that it is now close to 1.5%.

Dividend Yield – Infrastructure vs General Equities December 2007 to December 2020



Source: FactSet, ATLAS calculations, Time period: December 2007 to December 2023

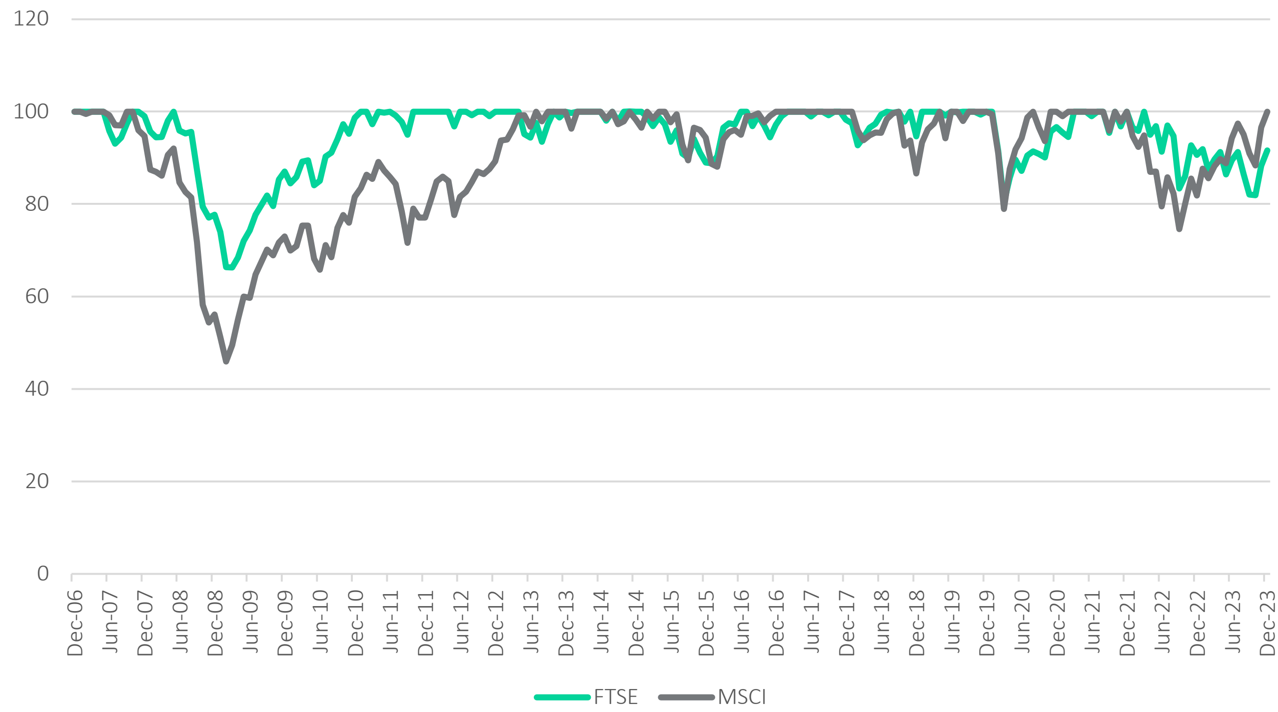
3 RISK METRICS

Consistent with being a long term focussed investor, ATLAS supports a definition of risk that is focussed on the potential for permanent and material impairment of capital. Nonetheless, we recognise that other market participants consider other market-based risk metrics. We have outlined some of these below:

3.1 Drawdowns

Historically listed infrastructure has seen lower drawdowns than listed equities and a faster recovery (particularly during large market disruptions). The exception is the most recent market in which whilst listed infrastructure had a smaller drawdown than the MSCI but has not recovered as quickly. This is a combination of the effect of large tech stocks in the MSCI as well as the high weighting of US utilities in the FTSE Developed Core index which have been impacted by higher rates.

Rolling 12-month volatility (US$ unhedged)

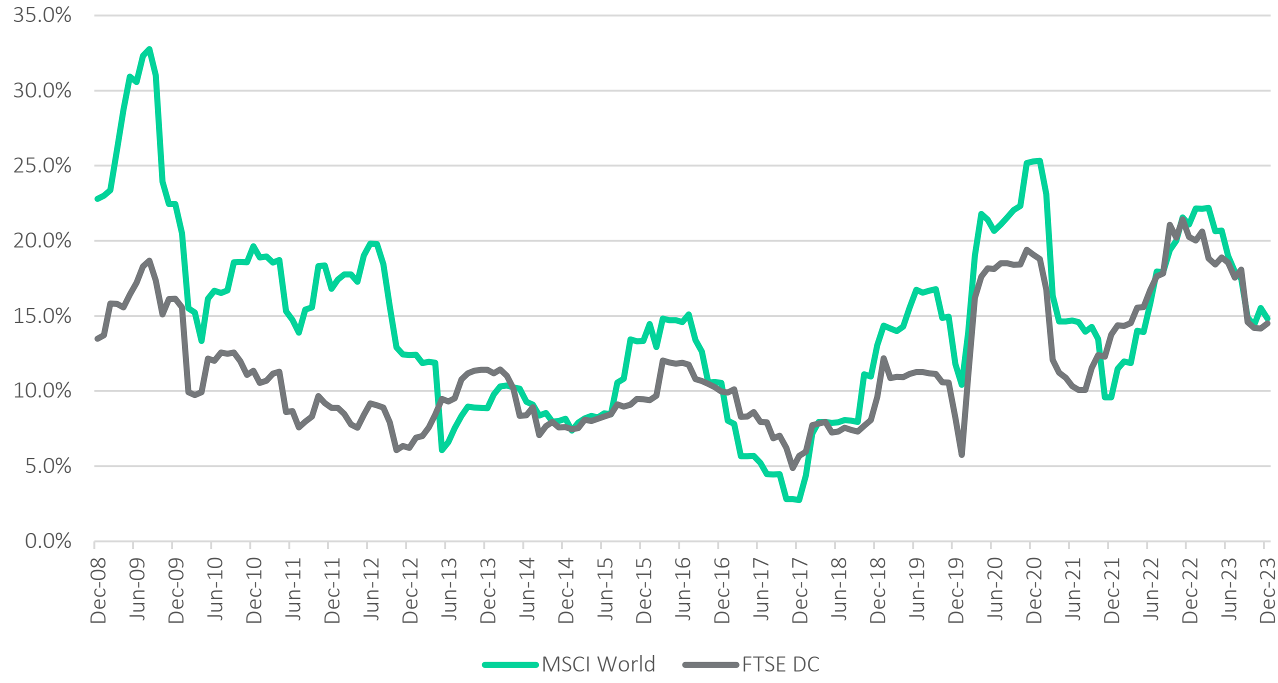


Source: FactSet and ATLAS calculations, Time period: 31 December 207 to 31 December 2023

3.2 Volatility

The chart below plots the rolling 12-month volatility for the Dow Jones Brookfield Infrastructure Index and the FTSE Infrastructure and Utilities index against the MSCI World.

Rolling 12-month volatility (US$ unhedged)



Source: FactSet and ATLAS calculations, Time period: 31 December 207 to 31 December 2023

Volatility of listed infrastructure indices is below that of the broader equities market in almost all environments. Crucially, it has been materially below the broader equities index during times of economic and market disruption – namely the Global Financial Crisis in 2008/09 and the European Crisis in 2011/12. The listed infrastructure volatility was also lower through Covid despite the significant impact of Covid on transportation assets.

3.3 Correlation

A common concern with listed infrastructure is that it is perceived as being correlated to listed equities. Whilst this may be true over very short time periods, we have demonstrated in Section 2.1 that the listed infrastructure and the broader equities market have shown materially differentiated performance over time.

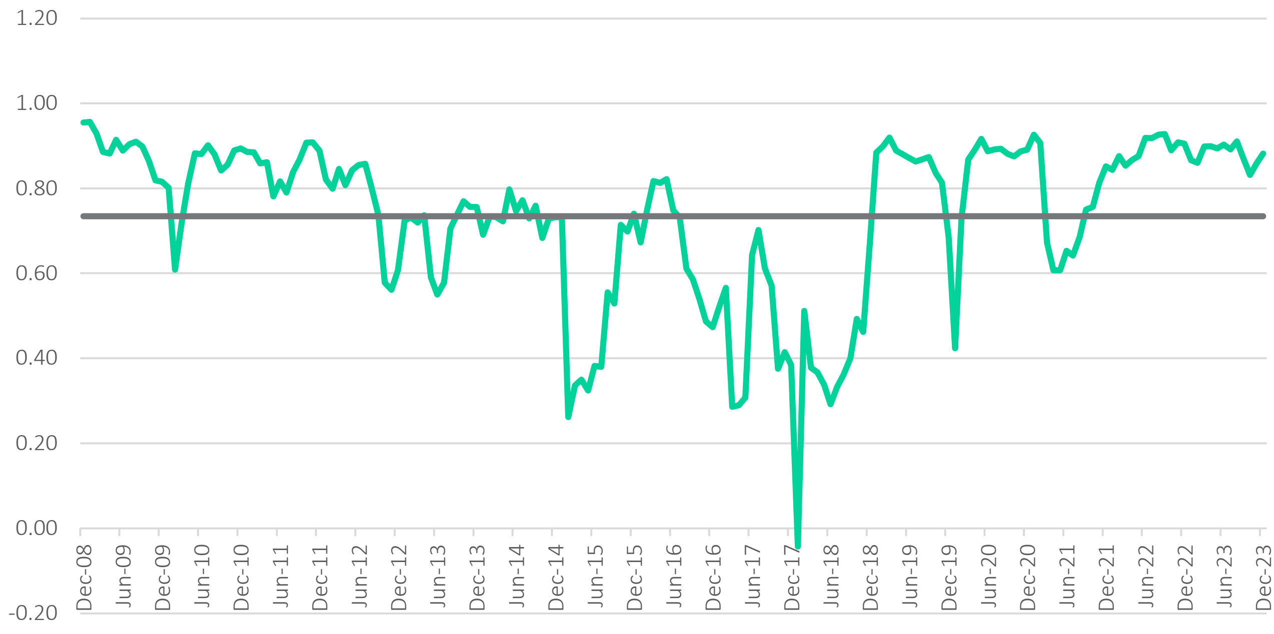
Based on a time series dating back to 2008, listed infrastructure has a rolling 12-month correlation of 0.72 and a total correlation over all time periods of 0.80.

There are two issues with the use of short-term correlation metrics as a proxy for risk concentration:

1. The correlation is between share prices, rather than underlying company valuations.
2. The calculation of correlation is highly dependent on the timeframe of measurement. Unlisted infrastructure has been deemed to have a low measured correlation due to the infrequency and smoothing approach to valuations. If we were to look at listed infrastructure correlations with equity markets on a 6-month basis, the correlation would be significantly lower.

The following chart plots the rolling 12-month correlation of the FTSEDCI Index against the MSCI World.

Correlations of Indices to MSCI World



Source: FactSet, ATLAS Calculations. Time period: 31 December 2008 to 31 December 2023

Correlation of Annual Returns

If one is to look at correlation as a way of understanding the underlying correlation between infrastructure and broader equities, we believe that looking at the correlation of annual returns is more useful as it removes much of the noise in the daily returns.

On this measure, listed infrastructure has a correlation to listed equities of 0.6. This is much closer to the beta of listed infrastructure (see below) and also the up/down market performance.

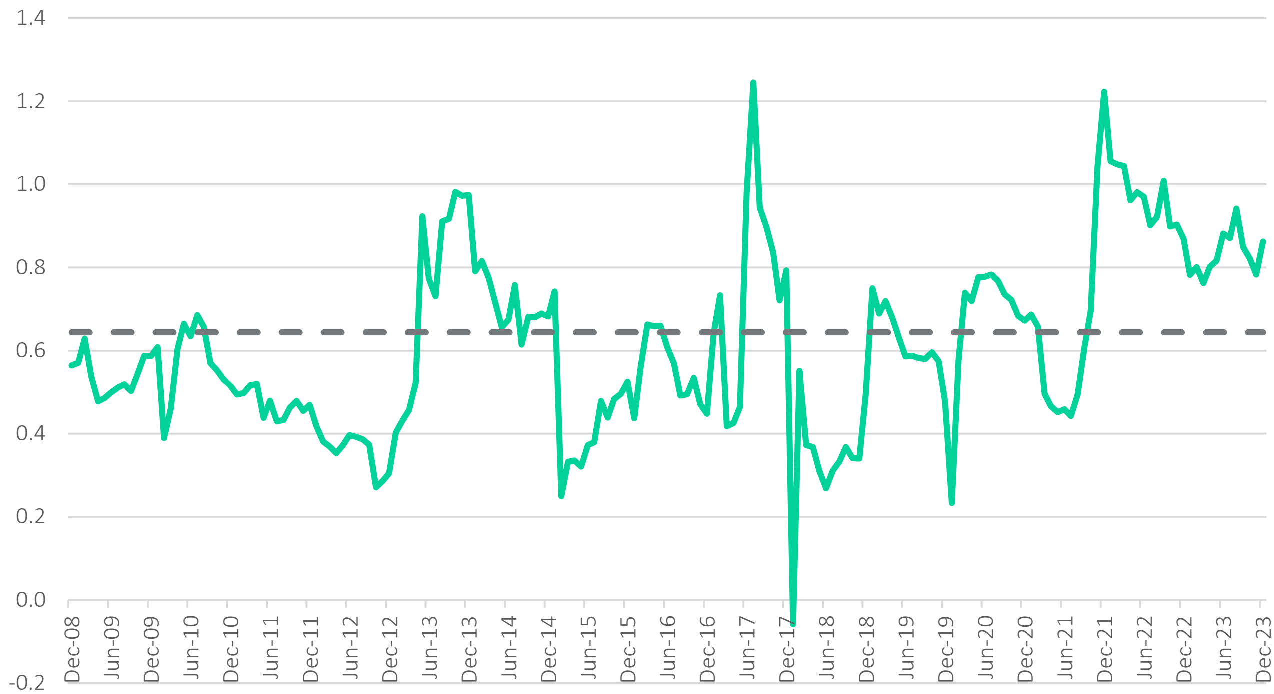
3.4 Beta

Below we have charted the rolling 12-month market betas for the FTSE Developed Core against the MSCI World.

The FTSEDCI has had a ~0.65 beta over the past 10 years and an even lower beta during 2008 to 2011, being a period of particularly high market volatility.

When taken together with the correlation data on the previous page, a key conclusion is that although the listed infrastructure market shares the same directionality of movements as the broader equities market, the sensitivity to those movements is considerably more muted. In other words, listed infrastructure does display strong defensive characteristics.

Main infrastructure indices – Rolling 12-month Beta to the MSCI World TR



Source: FactSet, ATLAS Calculations. Time period: December 2008 to 31 December 2023

4 LISTED VS UNLISTED COMPARISON

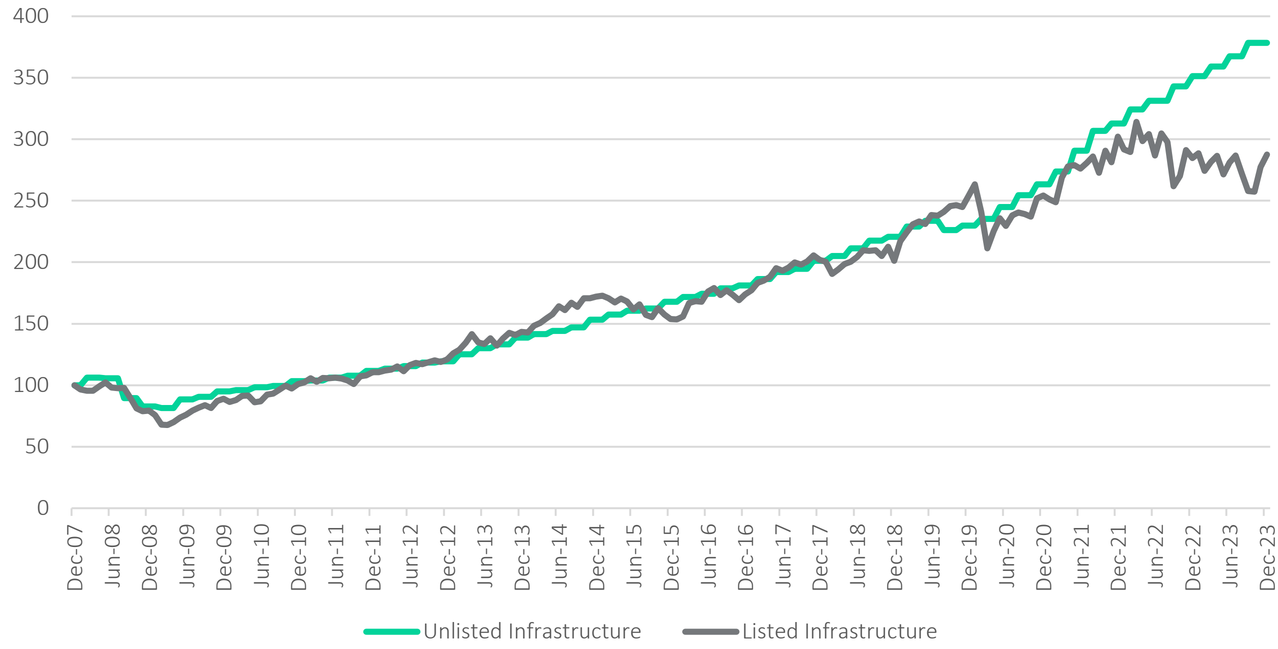
4.1 Comparison of long-term investment returns

Given that listed infrastructure funds are investing into a similar subset of assets as firms in the unlisted market, all else being equal, the investment returns on both products should in theory be broadly similar. There are some factors which may lead to a divergence of returns, including different fee structures, leverage and the potential for unlisted infrastructure managers to add value.

Below we have compared the performance of the FTSE Developed Core Index, against the Preqin index of returns from unlisted infrastructure managers over the past 15 years.

From this analysis we see that on average the listed and unlisted infrastructure sectors have achieved almost identical longer-term returns, albeit that we have seen a material discrepancy in the past 12-18 months as unlisted infrastructure has continued to increase in value, whilst the listed market has seen a small correction from June 2022 through to the end of 2023. This change was largely driven by increasing bond yields and the impact on company valuations. We would expect to see unlisted infrastructure valuations also see some moderation or decline as higher rates are factored into valuations, however, we have not yet seen this come through in the valuations applied by unlisted managers to their portfolios.

Cumulative Investment Returns to 1 January 2002 to 31 December 2023



Source: GLIO, Preqin

We do not see any evidence of a material illiquidity premium being earned in the unlisted market, nor do we see that the unlisted infrastructure managers have been able to add value to compensate for the higher fees that are charged.

4.2 Valuations

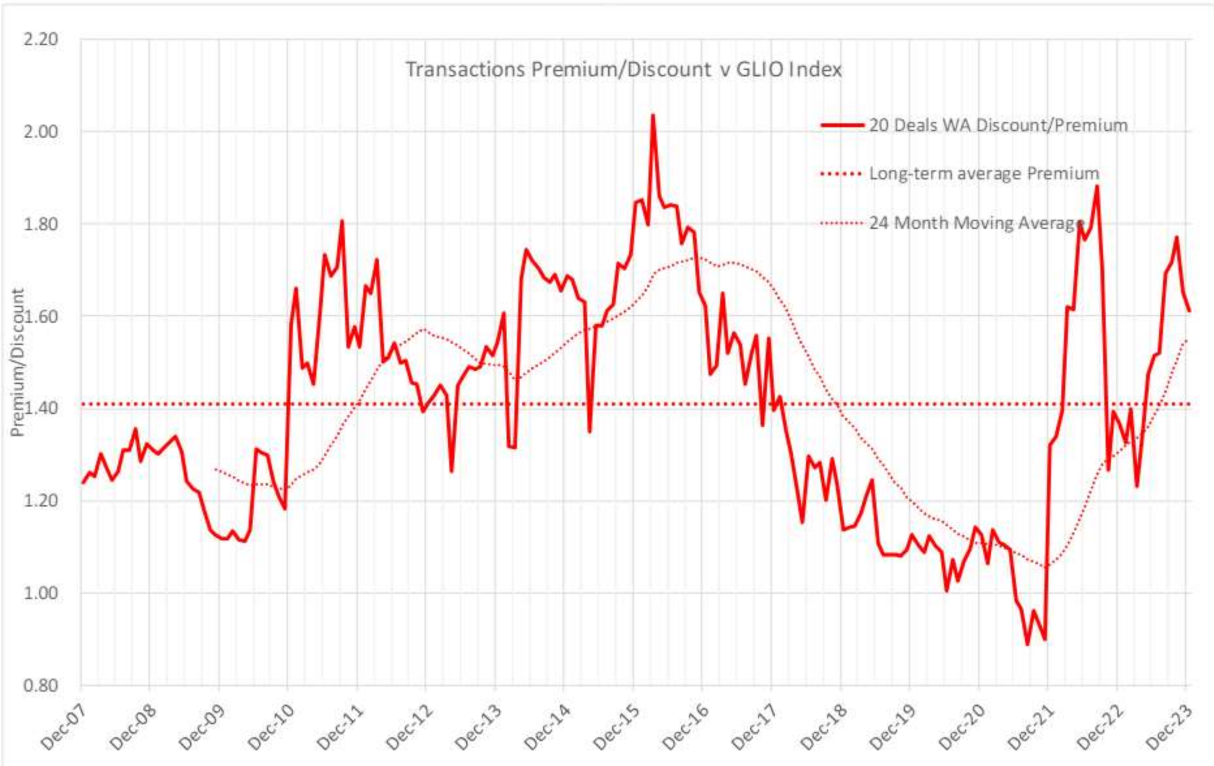
Listed infrastructure has historically traded at significantly lower valuation multiples than the unlisted market. Given the variance in performance between the listed and unlisted infrastructure performance, it is unsurprising that this variance has significantly increased in the past 18 months.

One outcome of this valuation disparity is that we have seen a large number of listed infrastructure firms being taken-private over the past three years.

One of the drivers of take-private activity in the listed market is that the unlisted market appears to value companies at a premium to equivalent companies in the listed market. In other words, the listed infrastructure market provides unlisted investors with an opportunity to acquire companies at attractive prices, even after accounting for the take-private premium which is typically c.20-30% over the company's previous trading level.

The following chart from GLIO shows a significant recent increase in the average premium of unlisted deals over the equivalent listed infrastructure assets. This is broadly consistent with the chart on the previous page which shows that there appears to be a divergence between private markets infrastructure and their public market equivalents.

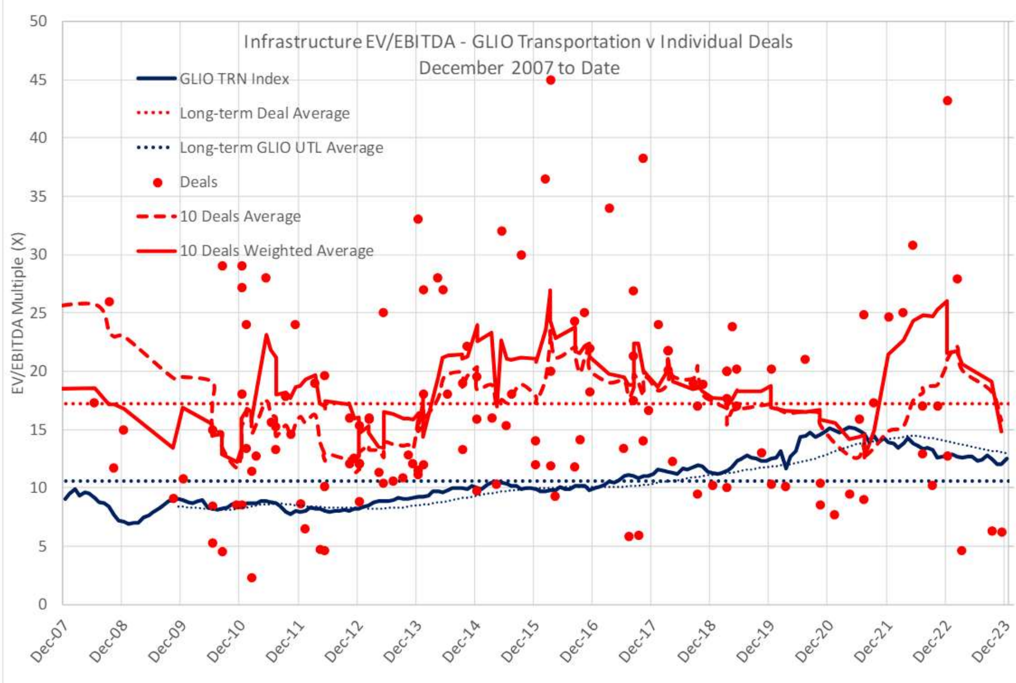
GLIO Index vs Unlisted Asset Transactions (EV/EBITDA)



Source: GLIO Index Monthly Update December 2023

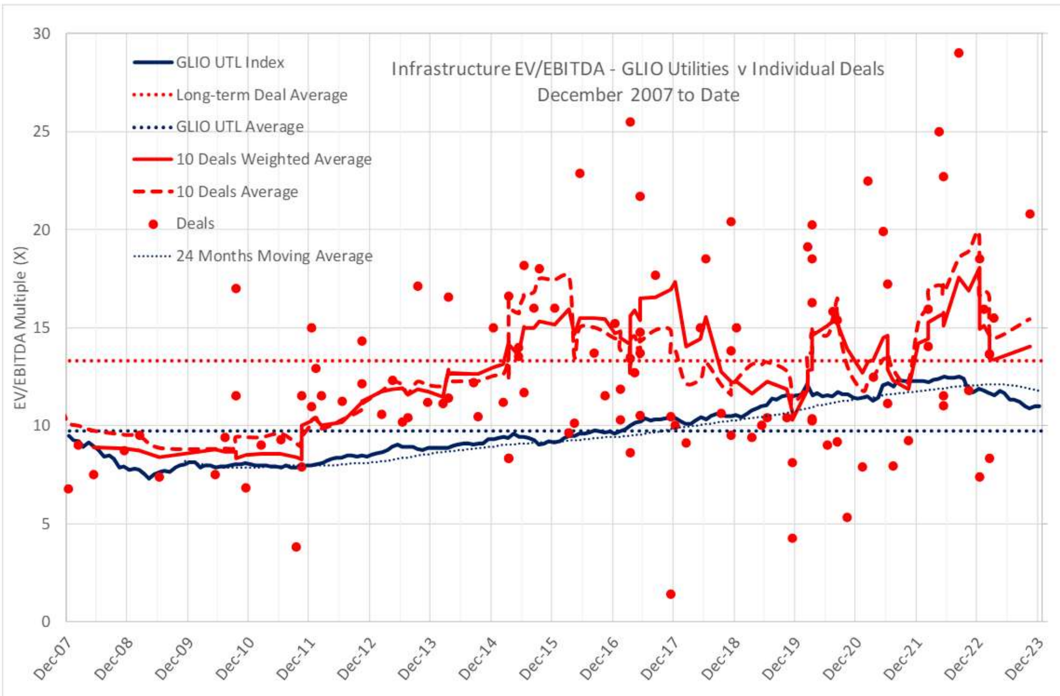
The following two charts from GLIO provide further insights into the relative valuations in both utilities and transportation assets and confirm that in both cases the transactions have occurred at materially higher valuations than their listed counterparts. We would also note the relatively small number of deals, particularly for transportation assets, highlighting the difficulty for investors in securing high quality transportation assets.

GLIO Transportation Index vs Transportation Asset Transactions (EV/EBITDA)



Source: GLIO Index Monthly Update December 2023

GLIO Utilities Index vs Utility Asset Transactions (EV/EBITDA)



Source: GLIO Index Monthly Update December 2023

5 STRATEGY AND DEPLOYMENT OPTIONS

Listed Infrastructure offers investors in the infrastructure sector a complementary strategy to unlisted infrastructure investment, without a material increase in risk or an expected diminution in returns. This opens up a number of ways in which investors might think about the sector in their asset allocation decision.

5.1 Listed infrastructure as a "first step" into infrastructure

Listed infrastructure can be used as a cost-effective means of quickly and easily gaining access to infrastructure assets. Where an investor has decided to make its first allocation to infrastructure as a separate asset class and is in the process of building an in-house infrastructure capability, the sector listed offers institutions several benefits:

- Access to a diversified portfolio of infrastructure assets in a short period of time;
- The implementation and ongoing management of a listed infrastructure portfolio provides in-house investment personnel exposure to the infrastructure asset class, enabling them to learn more about the asset class over time. Such knowledge and experience may be beneficial in any subsequent review of transactions and managers in the context of subsequent unlisted infrastructure investments; and
- Oversight of a listed infrastructure portfolio (where that portfolio is managed by an external provider) requires relatively limited resources, which may be useful for organisations with small infrastructure teams, or where it is being managed by a combined "real assets" team which also, for instance, oversees property investment.

5.2 Holding vehicle for unlisted deployment

Subsequent to an allocation to unlisted infrastructure and where allocations to unlisted infrastructure funds have yet to be deployed, an investor will usually retain those funds in a combination of cash, equities and/or bonds. Thus, whilst an institution may have a desired allocation to infrastructure for its portfolio, it may still take many years to achieve its desired level of exposure. In the intervening period, while the infrastructure portfolio builds out, that institution may consider it has a sub-optimal asset allocation.

Listed infrastructure can provide an exposure to infrastructure assets over an intermediate time frame whilst an institution builds out its unlisted infrastructure portfolio. Whilst listed infrastructure does exhibit equity like characteristics over shorter time periods (1-2 years), over longer time periods the daily/weekly/monthly market volatility gives way to the underlying cash flow characteristics of the underlying assets. Thus, a sensibly developed portfolio, particularly one with an emphasis on risk management and capital protection, should provide a good proxy for unlisted infrastructure over the time scales normally required to build out a large unlisted infrastructure portfolio.

5.3 Permanent allocation to listed infrastructure

ATLAS believes that when correctly structured and managed, a listed infrastructure portfolio should deliver the performance characteristics sought by infrastructure investors over the medium to long term. For this reason, we believe that listed infrastructure warrants a permanent position within an institution's infrastructure portfolio.

The specific level of that position will depend on a range of factors including:

- The total allocation to infrastructure;
- The opportunities for capital deployment in the unlisted market;
- The desired exposure to particular sub-sectors;
- The institution's preference for liquidity and tolerance of volatility;
- The size of the organisation's infrastructure team; and
- The relative returns available in the listed and unlisted infrastructure markets.

In ATLAS's experience, many larger institutions with a dedicated allocation to infrastructure have an allocation to listed infrastructure of between 10-20% of their total infrastructure portfolio. Given the time taken to deploy capital in the unlisted market and the relatively speedy deployment possible in the listed market, institutions may have higher percentages of their total infrastructure portfolio in the listed environment during the early years of implementation of their chosen infrastructure strategy.

5.4 Hybrid approach

Of course, a decision on listed/unlisted need not be an either/or decision for investors, who may adopt one or a combination of the above options as it suits their specific requirements. Listed infrastructure may initially represent a sizeable portion of an organisation's total infrastructure allocation as it is used as holding space for undeployed capital. As the institution builds out its unlisted portfolio, a listed infrastructure allocation can be drawn down to a base level, designed, for example, to provide exposure to particular sectors that are hard to access in the unlisted market. That allocation may then be increased as the unlisted portfolio realises capital, before it is again deployed into unlisted assets. In this way a listed infrastructure allocation allows the investor to remain close to fully invested in the asset class (i.e., with the desired exposure from a whole of institution perspective) and can absorb both capital calls from funds and returns of capital.

ATLAS believes that it is this last option which provides sophisticated infrastructure investors with the most flexible approach to the broader infrastructure universe. By utilising a higher initial listed infrastructure allocation, it has a higher exposure to infrastructure assets through time, and by retaining a portion of listed in the portfolio it maintains a balanced portfolio and the capability to quickly deploy capital returns into listed infrastructure assets. This strategy also allows for a close view on the valuations available in the listed environment and so for arbitrage between listed and unlisted as valuations and prospective returns change through time.

5.5 Tactical allocation within an equity portfolio

This paper has for the most part has focussed on the versatility of listed infrastructure within a given portfolio allocation to infrastructure. Given its defensive characteristics the asset class might also be used as a means to provide any given equity portfolio a more defensive tilt: as the prognosis for equity markets becomes less certain the cash flows underpinning listed infrastructure equities and the dividends those cash flows support can help mitigate the volatility of equity portfolios and assist with liability matching. This will be the subject of another paper – of course, we'd be happy to discuss the idea in detail at any time.

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