

Investment horizon a key risk/return driver in infrastructure

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This paper examines the similarities and differences between the investment options and returns available to investors with short-, medium-, and long-term investment horizons and provides investors with some key factors to consider when implementing an optimised infrastructure portfolio.

EXECUTIVE SUMMARY

For investors looking to achieve stable, inflation-linked absolute returns, the infrastructure asset class provides a number of attractive characteristics. Over the past 10 years, infrastructure has emerged as a stand-alone asset class and many large institutions have made sizeable allocations within portfolios. For the most part, allocations to the infrastructure asset class have been considered through a long-term investment horizon lens and therefore directed towards private market transactions and unlisted infrastructure funds. The listed infrastructure market, however, provides investors with a broad, deep and liquid range of infrastructure investment opportunities. As a result, listed infrastructure is an alternative option for capital deployment to this asset class, while providing the flexibility to choose, or amend the investment horizon.

This paper evaluates the availability and performance characteristics of infrastructure investment through both the listed and unlisted markets, drawing the following conclusions:

- **Listed and unlisted infrastructure should be regarded as complements rather than substitutes.** The available investment universes are very different and unlikely to converge in the near term. The persistent availability of market mispricing and supply-demand arbitrage allow for greater returns to investors with dual allocations.
- **Asset-level returns are very similar.** Differences in observed returns from infrastructure investment vehicles are unlikely to arise from asset-level performance and instead represent differences in sector and regional allocations of infrastructure investments, gearing choices taken at the investment vehicle level, and measurement bias based on time interval given the volatility associated with short- and long-term changes in the cost of capital.
- **Infrastructure portfolio composition can be optimised for investor preferences.** Investor allocation between different infrastructure investment vehicles should be determined by liquidity preferences, sensitivity to short-term price volatility, choice

of underlying asset risk exposure and opportunistic use of market mispricing and arbitrage.

A SECTOR THAT CANNOT BE IGNORED

Infrastructure investment has grown strongly over the last 20 years and, in particular, since 2000. While there has been sustained increase in investment in advanced economies, the growth in developing economies has been particularly strong. Detailed modelling by David Hale Global Economics (DHGE) indicates that this will continue over the next two decades and beyond, and in order to facilitate this growth, the role of the private sector will increase dramatically. Infrastructure investment is a secular trend providing long-term opportunities that investors cannot ignore.

Infrastructure investment has grown strongly in the last 20 years

- Electrical capacity has grown by 3.2% CAGR (Compound Average Growth Rate).
- The total length of paved roads has grown by 1.8% CAGR.
- Rail network length has grown by 0.4% CAGR.
- Port traffic has grown by 9.9% CAGR.
- Airport runway capacity has grown by 1.2% CAGR.
- Water and sanitation connections have grown by 2.7% and 3.1% CAGR, respectively.

The rapid economic growth of emerging economies – Asia, in particular – has been a driver of much of this growth, but advanced economies have also shown strong growth, in particular in port throughput. Investment trends are likely to be higher than these figures, as the quality of infrastructure has also improved.

This growth is set to continue

DHGE has developed a detailed model relating historic infrastructure investment across the world to underlying economic, demographic and urbanisation trends, and other data. Using this, DHGE has forecast regional and sectoral growth rates.

Overall rates of growth in underlying infrastructure are likely to slow from those observed in the last 20 years, but nevertheless there will still be strong underlying growth. DHGE projects that the value of global infrastructure assets will grow by 5.4% CAGR (or 3.4% in real terms) over the period to 2030.

This is driven by a growth in: electrical capacity (2.5% CAGR); a 2.2% CAGR in road network length; a 0.6% CAGR in rail networks; a 5.2% CAGR in port traffic; a 0.6% CAGR in runway

capacity; and, a 1.8% to 2.3% CAGR in water and sanitation connections. Again, future growth will be higher in emerging economies.

This analysis suggests an overall spend on infrastructure of US\$67 trillion over 2010 to 2030 (in constant 2010 US\$ terms). This is similar to the estimate made by McKinsey (2013)¹ which projects US\$62 trillion to US\$67 trillion, based on a top-down methodology.

Infrastructure drives economic growth

Infrastructure investment has become a focus of public debate, particularly because it is believed that infrastructure drives economic growth by facilitating trade and investment, stimulating enterprise opportunities, generating employment and provision of essential services. In fact, as part of its role in hosting the G20 meetings in 2014, the Australian government highlighted infrastructure investment as one of the elements in its plan to raise global growth by 2% over the coming five years.²

There has been much research analysing the relationship between growth and infrastructure investment. The relationship goes both ways – infrastructure investment can cause growth, because it contributes to raising productivity but growth also prompts investment in infrastructure as existing facilities become congested. There is, however, good quantitative evidence of the impact of investment on growth. The most thorough of these was published by the World Bank in 2011, which analysed data from 88 countries over 40 years (1960 to 2000). It found that a 10% increase in infrastructure investment leads to a 0.7% to 10% increase in GDP.³

Using more recent data, in 2014, DHGE analysed 57 countries over the period 1990 to 2011, and found that a 1% increase in the capital stock leads to over 0.1% increase in GDP in the following five years (which could be expected to be sustained).

Infrastructure and growth are intimately related, and this is increasingly becoming reflected in government policy in both advanced and emerging economies.

The role of the private sector will increase

For centuries, private investors have been involved in the development of economic infrastructure, but public ownership was dominant in many countries until the latter part of the twentieth century. Policy changes in the UK and other countries from the 1980s highlighted the benefits of private ownership, combined with more effective economic regulation of infrastructure and/or move to greater role for markets. Subsequently, many billions of assets have been sold by governments to the private sector and governments have also been actively finding ways to facilitate new private investment in infrastructure assets. With these shifts, the role of the private sector in electricity, gas, water, road, rail, airport and other infrastructure industries has become well accepted. DHGE (2014) estimates that the private sector owns between half to three-quarters of all infrastructure in advanced

economies. In developing economies, the value of investments in infrastructure with private sector participation has grown from US\$10 billion in 1990 to US\$180 billion in 2012.

There is enormous scope for further private sector involvement. For example, in the US, private road ownership is very limited and no airport is yet in private hands, although there is a long history of private ownership of electricity, water and rail assets.

In advanced economies, government debt as a share of GDP has risen from 60% in 1995 to 107% in 2012 and, as a result of the Global Financial Crisis, many countries have entered a period of fiscal consolidation. There is, however, a need for infrastructure investment in these same countries – but fiscal consolidation is related to lower not higher public infrastructure investment. There is evidence, for example, that maintenance spend (e.g. in transport) in the US has been a casualty of poor public finances. In addition, pressures on governments' fiscal positions will increase as a result of aging populations, and the related transfer and subsidy payments for social services including healthcare and social security. At the same time, the appetite for infrastructure investment from the private sector has increased markedly.

DHGE suggests that the private sector share of infrastructure assets could rise from 56% to around two-thirds by 2030. This would increase the value of private infrastructure investments from US\$15 trillion in 2012 to US\$40 trillion or more in 2030. With large pools of capital available from listed equity markets, the share of listed investments is likely to at least triple over this time period. This work shows that:

- There is a long-term secular trend for investment in infrastructure. The strong investment growth observed over the last 20 years is set to continue for the next 20 years and beyond. Investment volumes are likely to be around 4% of global GDP, and asset values are expected to rise at around 3.4% CAGR.
- Due to the high level of government debt following the GFC, the role of the private sector will increase. Private investment will be needed for investment in new projects, and in addition governments will sell existing assets. As a result of these trends, DHGE estimates that private sector investments in infrastructure will grow from US\$15 trillion to US\$40 trillion by 2030, with potentially more rapid growth in listed infrastructure.
- Governments now recognise the importance of infrastructure in facilitating growth, and are actively developing policies to encourage investment. This includes establishing appropriate regulatory and contractual frameworks, and supporting specialist financing. Supporting infrastructure growth is being spearheaded at top level inter-government summits, including the G20.
- The need for investment means that regulatory and contractual frameworks to support investment and transfers to the private sector are likely to have a balance of risk and reward that will be attractive to investors. The current characteristics of the

sector – long-duration assets and inflation protection – should continue, and match the long-term cash flow needs of investors.

The infrastructure sector is now one that investors avoid at their peril.

INFRASTRUCTURE OPPORTUNITY SET

Figure 1 shows the breakdown of the estimated ‘investable’ universe of equity in global infrastructure assets. The sources of data are as follows:

- For the listed universe, the RARE200;
- For the unlisted universe, data from Preqin (showing the total enterprise value included in each sector/region) on private infrastructure transactions over the past 10 years. Privately held assets that have not been transacted in the past 10 years are not considered investable due to their unavailability to private buyers.

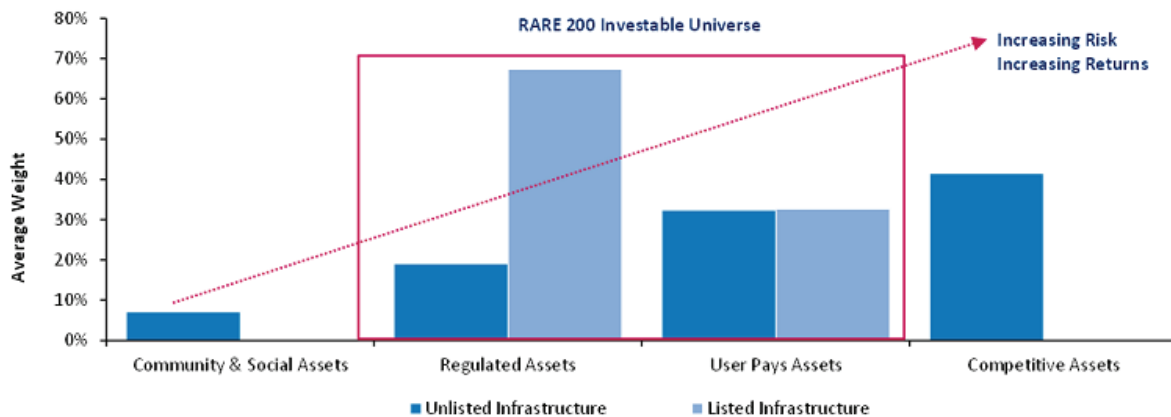
Figure 1: Breakdown of global infrastructure assets
(30 June 2016)

	North America		Europe		Asia Pac		Developing		Totals	
	Unlisted Market	Listed Market	Unlisted Market	Listed Market	Unlisted Market	Listed Market	Unlisted Market	Listed Market	Unlisted Market	Listed Market
Investable market (USDbn)										
Community & Social Assets	18		42		15		7		81	
Regulated Assets	70	1,544	100	512	23	111	25	495	218	2,663
User Pays Assets	75	390	102	249	52	226	108	161	337	1,026
Competitive Assets	182		155		26		143		506	
Total (Infrastructure)	344	1,934	399	761	116	337	283	656	1,142	3,688

Sources: FactSet Research Systems, Preqin (last 10 years of transactions, duplicates removed) and RARE calculations

Based on the above analysis, the listed environment provides infrastructure investors with access not only to an additional suite of assets but also a different subsector exposure. There are a large number of high-quality, liquid infrastructure assets which are available either through listed vehicles, and conversely, other assets only available in the private, unlisted market (Figure 2)

Figure 2: Sector weightings of listed and unlisted infrastructure universe
(30 June 2016)



Sources: RARE Research and Prequin. The RARE 200 is the investible universe of 200 companies as determined from time to time. Equity value only. Unlisted assumes constant gearing across all subsectors.

There is sound evidence that the investable universes for listed and unlisted infrastructure are not substitutes. There are meaningful differences in risk exposures of the two universes which can lead to different observed performance. This provides investors in both listed and unlisted infrastructure the opportunity to improve portfolio construction efficiency and control unintended portfolio biases and/or risks.

COMPARISON OF ASSET-LEVEL RETURNS

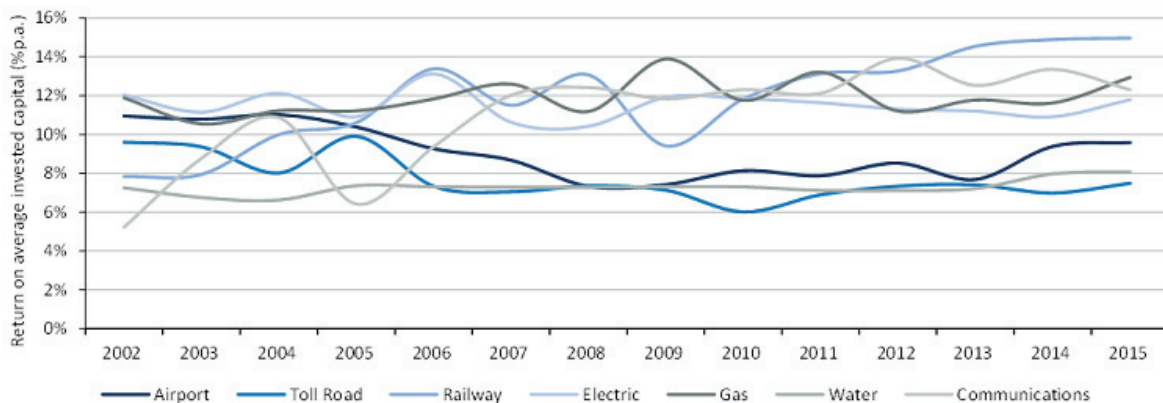
All things being equal, ownership structure (listed or unlisted) does not change the underlying asset characteristics and operating cash flows of infrastructure assets. Therefore, while listed infrastructure assets will mostly trade like equities in the short term – largely due to the influence of index-aware equity investors – in the long term, these stocks will reflect their underlying asset and cash flow characteristics. This also feeds through to consideration of whether there is any material difference between the relative riskiness of listed and unlisted infrastructure assets, as discussed below.

Asset earnings and cash flows ultimately drive investor returns and the impairment of equity cash flows ultimately leads to loss of shareholder value. When assessing and quantifying risk, it is more useful for long-term infrastructure investors to evaluate the volatility of earnings and, by extension, the unpredictability of future earnings, rather than share price volatility.

Volatility of earnings also provides a useful measure for comparing unlisted and listed infrastructure assets as it provides a consistent basis to compare the two asset classes from a quantitative risk perspective.

A key characteristic of infrastructure assets is the defensiveness of cash flows particularly through periods of economic instability. In order to assess whether the listed infrastructure assets display this defensiveness, Figure 3 shows the cash return on invested capital of listed infrastructure assets over time.

Figure 3: Cash flow return on average invested capital (Cash ROIC)
(31 Dec 2002 – 31 Dec 2015)



Sources: FactSet and RARE analysis

Overall, cash flow return volatility across the utilities and infrastructure space shows remarkable resilience even during periods of economic instability. This is consistent with the risk and return characteristics that infrastructure investors are seeking and provides evidence that listed infrastructure companies provide a source of assets which deliver the stable earnings characteristics valued by infrastructure investors.

COMPARISON OF FUND LEVEL RETURNS

The above analysis demonstrates that the returns at the asset-level are very similar between comparable assets in the listed and unlisted sectors. This is unsurprising given that the holding structure should not materially impact the cash flows at the asset-level.

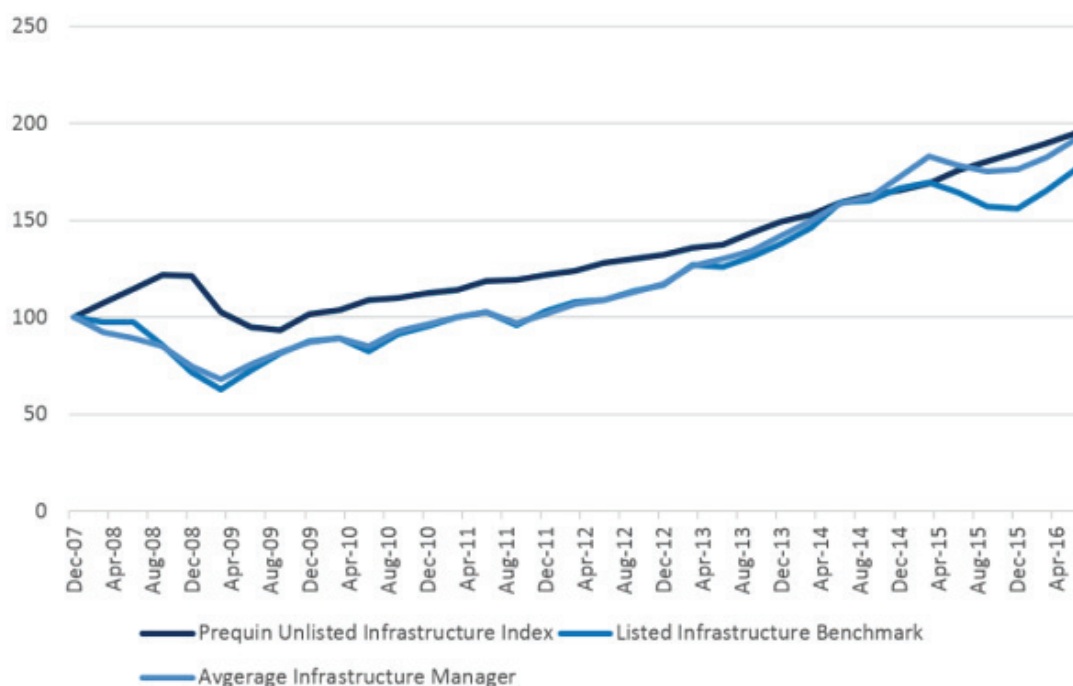
However, investors are chiefly concerned with the achieved returns, rather than the returns at the asset-level. The next logical questions are:

- How efficiently are the asset-level cash flows translated into the hands of investors?

- How comparable are the long-term returns for investors in listed and unlisted infrastructure?

In order to evaluate this, Figure 3 compares the Preqin Unlisted Infrastructure Index against returns for listed infrastructure managers. The Preqin index includes the average fund return and, accordingly, it is compared against the average return for the average of the main listed infrastructure managers.

Figure 4: Preqin unlisted index vs average listed infrastructure manager
(31 Dec 2007 – 30 Jun 2016)



Sources: Bloomberg, Preqin and RARE Analysis

Over a period of the eight years shown, there were almost no net material differences between the total return for the average listed and unlisted infrastructure funds.

There can be a significant valuation lag between the listed and unlisted markets. The unlisted funds continued to write-up the value of their assets through the GFC in 2008. During this time, the listed market had corrected significantly. Valuations in the unlisted market only start to be reduced in late 2008 and early 2009. Overlaying deal volumes, there was a significant (approximately 40%) drop in transactions in 2009, as there was a significant divergence between the price expectations of sellers and buyers.

The listed infrastructure managers had very strong returns following the correction, reflecting the fact that the assets became undervalued during this period. Given that the underlying cash flows of the infrastructure assets did not materially change, the listed

infrastructure assets recovered all of their losses after three years and continued to perform strongly thereafter.

Listed infrastructure asset prices rose in late 2014 and early 2015 on the back of ongoing monetary stimulus and overly optimistic valuations, particularly in the US pipeline sector. This mispricing corrected somewhat in late 2015. Note, from late 2015 to mid-2016 there has been a significant run up in the utilities sector, particularly in the US, driven by an unexpected decline in bond yields and general equity market volatility, resulting in a desire by many general equity managers to hold "safer" companies.

Another option for analysing fund level returns is to assess the investment returns based on particular vintages. In addition to the index data provided above, Preqin also publishes data on the returns for different vintages. Figure 5 below plots returns of the median fund from each of the vintages against the return for the average listed infrastructure fund, assuming an investment on 1 January in each of the vintage years. Note the difference is starker than in Figure 4, reflecting both different starting points and the assumption of a 1 January inception date for listed infrastructure.

Figure 5: Preqin unlisted vintage vs. equivalent listed vintage (2006 – 2014)



Sources: Bloomberg, Preqin and RARE Analysis.

Given that asset-level returns are very similar, the differences in observed returns from listed and unlisted infrastructure are unlikely to arise from asset-level performance and instead represent:

- Differences in sector and regional allocations between listed and unlisted infrastructure funds;

- Gearing choices taken at the investment vehicle level; and,
- Measurement bias based on investment horizon.

Simple performance and volatility measures will often be dominated by the ownership structure (listed equities vs private equity) rather than the underlying assets. Therefore, investors should ensure that risk/return measures used in asset allocation are appropriate to the investment horizon of the portfolio and are as close as possible to the underlying asset expected returns.

Case Study: UK Water

The UK water sector represents one of the largest clear discrepancies between listed and unlisted valuations, especially given the close substitute nature of the underlying assets (same regulation and similar macro-economic drivers). It is for this reason that a large number of the listed UK water companies have been privatised over the past five years.

In the past 10 years, listed UK water companies have traded at between a 0% and 25% premium to their regulated asset base, while private transactions have mostly occurred closer to a 30% premium to asset base.

'Regulatory allowed return on capital' is the main driver to returns in this sector. While there is scope to marginally outperform allowed return through operational skill, in practice, all companies within the sector have shown very similar return on capital over the past 10 years. Differences in returns to equity have primarily been driven by the higher leverage in the unlisted water companies, however, with this comes a commensurate increase in risk.

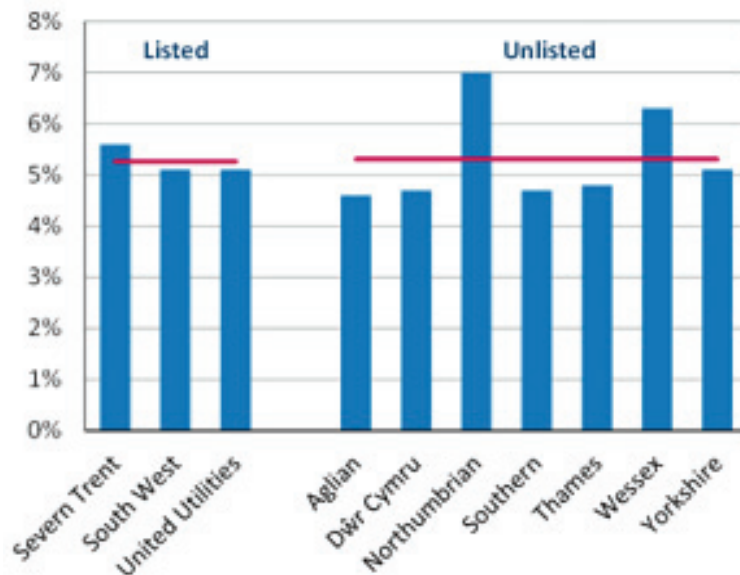
The two most likely outcomes for long-term holders of listed UK water companies are:

- The company performs broadly in line with its peers and, given a lower entry price, earns a higher return on investment; or,
- The company is taken private by an unlisted fund, providing a very attractive exit valuation.

Either way, over the long term, holders of the listed stock are highly likely to generate better risk/return outcomes than their unlisted counterparts. This is almost entirely the result of the more favourable entry price.

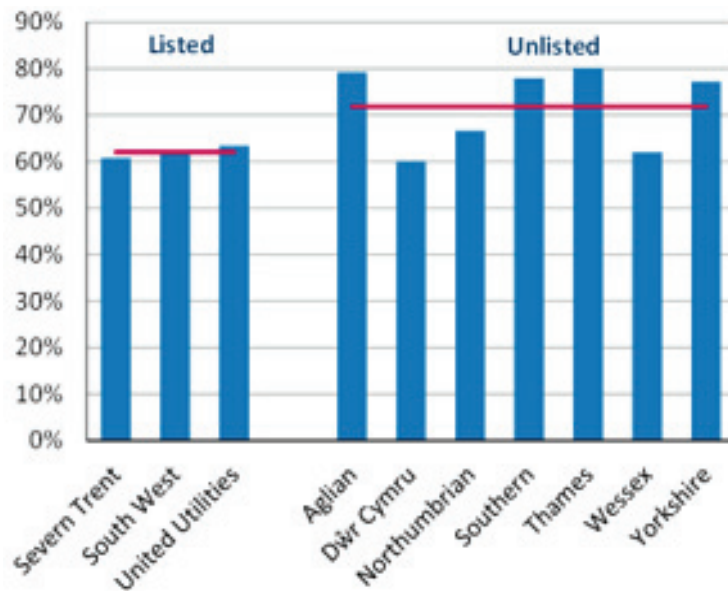
Figures 6a and 6b demonstrate the current returns and gearing (or leverage) of the companies comprising the UK water industry.

Figure 6a: UK water companies – return on capital



Sources: Ofwat, data as at year end 2015.

Figure 6b: UK water companies – gearing

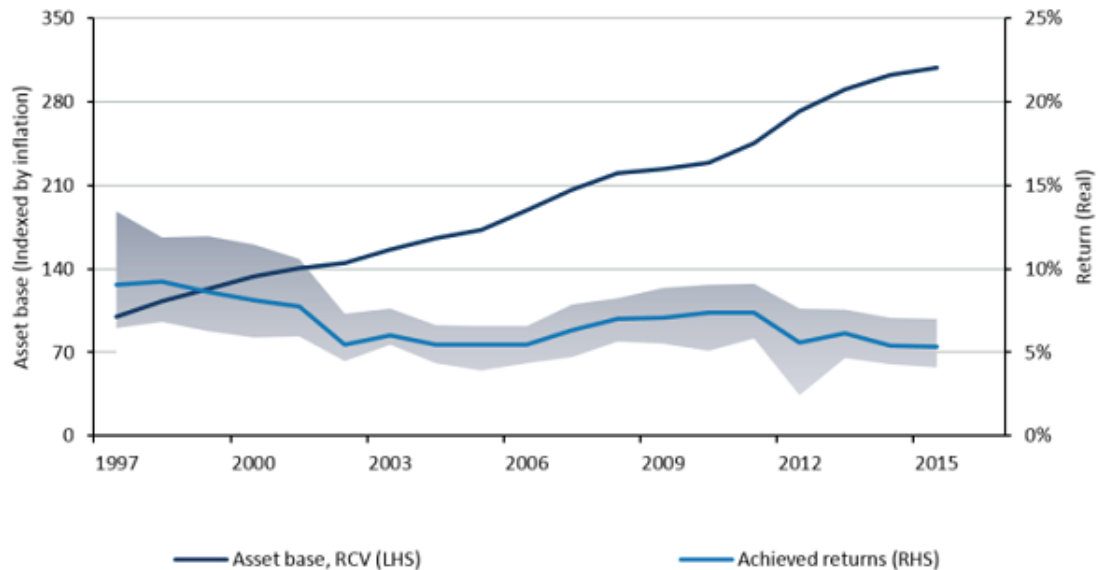


Sources: Ofwat, data as at year end 2015.

The average return on capital for 2015 was similar between the listed and unlisted companies (albeit with a couple of outliers) and, as displayed in Figure 7, has been remarkably consistent over the last few years. (Note, the grey shaded area represents the

range of returns from the best performer to worst each year). While there is a wide range on gearing, approximately 60% to 80% debt-to-regulated asset base, the unlisted companies generally carry higher debt (and may include holding company debt, not shown here). The regulator deems an "appropriate" gearing level to be 62.5%.

Figure 7: Water industry return on asset base, Regulated Capital Value (RCV)



Sources: RARE analysis of OFWAT information.

This presents a strong case for acquiring these companies in the listed market where an entry point closer to a 15% premium to regulated asset base is likely to be achievable at different points in the cycle. The liquidity of the stocks in the listed market therefore allows investors to increase or decrease holdings of particular stocks depending on how they are being valued by the market.

INFRASTRUCTURE INVESTMENT OPTIONS AND IMPLICATIONS

Infrastructure investors are faced with a range of options for accessing high-quality infrastructure assets. Within the unlisted infrastructure sector, there are various access options including direct investment in assets, co-investment with managers and investment in pooled funds. Within the listed infrastructure sector, there are options including investment in listed investment trusts, investing with a high conviction manager with a moderately diversified portfolio or investing in a more highly diversified index-aware strategy.

Each of these options provides the investor with a range of investment outcomes in terms of aspects such as the availability of assets, the resource intensity to make an investment, fees, liquidity, volatility of valuation measurement and portfolio diversification. An investor's choice between one or more of the investment options should be based on their preference between these various attributes.

Figure 8: Investment characteristics of infrastructure investment options


	Unlisted Direct	Unlisted Co-Invest	Unlisted Fund	Listed Inv.Trust	Listed Portfolio
Asset quality	High	High	High	High	High
Diversity of asset type	High	High	High	Low	High
Speed of deployment	Low	Low	Mod	High	High
Internal resource req.	High	Mod	Low	Low	Low
Asset-level control	High	Mod	Low	Low	Low
Liquidity	Low	Low	Low	Mod	High
Measurement volatility	Low	Low	Low	Mod	High
Diversification	Low	Mod	Mod	Mod	High
Cost	Mod	Mod	High	Mod	Low
Arbitrage opportunity	Low	Low	Low	High	High

Source: RARE

Impact of investment horizon on measured performance

As previously noted, over short-term horizons (e.g. less than one year), the performance of listed infrastructure securities will more closely resemble general equities, as the largest driver of short-term returns is often day-to-day movements in the listed equity market.

Figure 9: The long and short of it

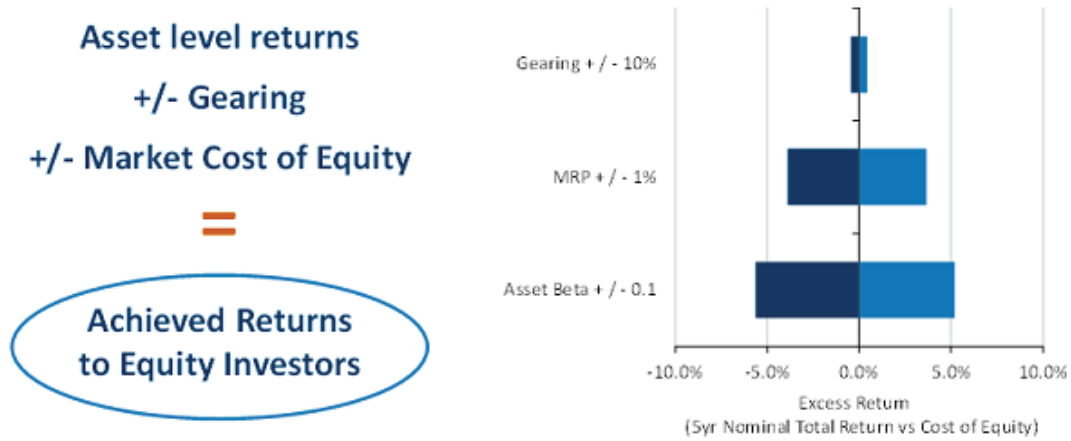
	Unlisted	Listed		
				
Investor Time Horizon	Long	Short	Medium	Long
Return Objective	Absolute	Relative (vs Equities)	Relative (vs Infra benchmark)	Absolute
Analysis	Asset Level	Market view	Market view	Asset Level + Market view
Valuation drivers	Cash flows, LT Discount Rate	P/E, Yield, P/B, momentum	P/E, Cash Flows/Disc (Short-medium term)	Cash flows, LT Discount Rate
Turnover	Very Low	High	Med	Low

Source: RARE

As the investment horizon extends, investor returns and focus, become more heavily influenced by underlying asset performance. Conversely, the shorter the horizon, the more returns are driven by short-term changes in the cost of equity. Figure 10 demonstrates the links between asset-level returns and equity returns, identifying the relative importance of the key linkages, including:

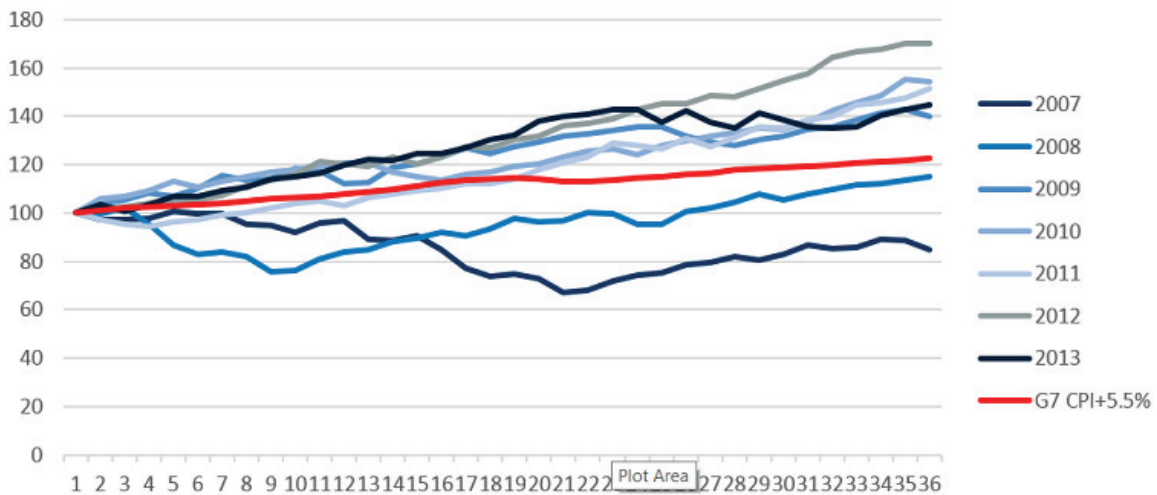
- **Gearing (or leverage)** – generally not a significant driver of equity returns. While higher gearing increases equity returns, it also increases the financial risk and therefore the cost of equity. It is, therefore, largely a zero-sum-game unless the gearing becomes excessive.
- **Market risk premium** – theoretically a relatively stable input, although open to much conjecture. In practice, the 'risk on, risk off' nature of markets results in significant short-term fluctuations of this measure and the final result, the forward-looking return relative to the cost of equity, which is moderately sensitive to this linkage.
- **Asset beta** – measuring the riskiness of the underlying cash flows. Again, theoretically a relatively stable input, however, these can be derived from market observations and are influenced by market cycles. In addition, different investors (particularly those with different investment horizons) may have markedly different views as to what an 'appropriate' asset beta may be for any given company.

Figure 10: The link between asset and equity returns



Sources: RARE. This shows the three-year return of an investment made in June of each year for seven years from 2007 through to 2013. The resulting analysis demonstrates that over a three-year investment horizon, month-to-month volatility becomes relatively insignificant, and the underlying absolute return trend dominates.

Figure 11: Three-Year Total Return vs. Benchmark



Sources: FactSet and RARE calculations.

A key observation from this analysis is that in five out of the seven periods, the investor would have significantly exceeded the G7 CPI + 5.5% benchmark, a common real benchmark for infrastructure investors. In one period, the three-years from June 2008 – which included one of the worst market corrections in recent history – the investor would have been only

marginally short of meeting that benchmark and would have met that benchmark in the following 12-month period.

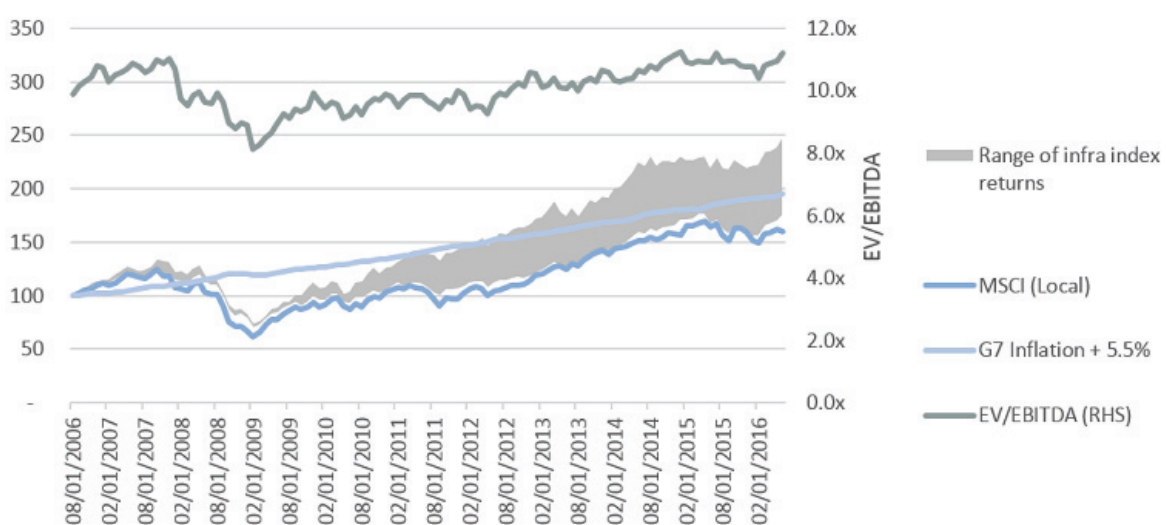
Therefore, the key risk to longer-term investment performance is not day-to-day market volatility, but the risk of acquiring assets at excessive valuations (i.e. in 2007 and 2008). In an environment of significant demand for unlisted infrastructure assets combined with constrained supply, the risk of overpaying for assets would appear to be heightened.

COMPARISON AGAINST LISTED EQUITIES

Infrastructure is a long-term asset class and should be evaluated over the longer term. In the same way as a manager would not judge the performance of a fund investment after only one or two years, so too should listed infrastructure be evaluated based on longer term metrics. It is only over these longer time periods that the underlying investment characteristics of the assets as well as the skill of the manager in selecting quality assets and managing risk becomes most apparent.

Figure 12 below shows the performance of listed infrastructure (using a range of listed infrastructure benchmarks as a proxy) over a 10-year period. Over this time period, listed infrastructure has materially outperformed the broader equities market. It has achieved this performance with materially lower volatility and significantly lower drawdowns during the 2008 financial crisis.

Figure 12: Total return – listed infrastructure benchmarks vs MSCI World
(30 June 2016)



Sources: FactSet, RARE calculations.

The strong absolute and relative performance of listed infrastructure cannot be explained by expansion of valuation metrics. Over the performance period, the average EV/EBITDA of the listed infrastructure universe has moved from 10.0x in August 2006 to 11.0x in June 2016. This contributed less than 1.0% of the 5.1% per annum excess return over the period.

There is, of course, no guarantee that listed infrastructure will continue to outperform the broader equities market in the same way it has done over the last 10 years. The relative performance will be driven by the performance of the broader equity market. But, importantly, the long-term performance of listed infrastructure will, as always, be driven by the steady inflation-linked growth of the underlying assets.

CONCLUSION

An investor's infrastructure portfolio composition can be tailored by liquidity preferences, sensitivity to short-term price volatility and choice of underlying asset risk exposure. Listed infrastructure is an alternative option for capital deployment in this asset class and provides investors with flexibility to choose, or amend, their investment horizon. By accessing listed infrastructure, investors benefit from a broad and deep investment universe of high-quality infrastructure stocks. Listed infrastructure has performed very consistently with unlisted infrastructure, over the longer term, reflecting the stable performance characteristic of the underlying assets.

ENDNOTES

1. [McKinsey \(2013\). Infrastructure productivity: how to save \\$1 trillion a year.](#)
2. [G20 \(2014\). Communique from February 2014 meeting in Sydney.](#)
3. DHGE (2014). Infrastructure industry report 2014. David Hale Global Economics Inc.

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