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THE ROLE OF INFRASTRUCTURE IN A PORTFOLIO

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Abstract

We believe that investors seek to benefit from the essential service nature and strong strategic positions of infrastructure assets. Such investors also look for inflation protection and more stable income relative to certain other asset classes such as global equities and global REITs. The growing global interest in infrastructure has been supported by a historically lower volatility and a less than perfect correlation with global equities. We have previously analysed the role of infrastructure in a portfolio including capital preservation, downside protection during market weakness, reduced correlations with other assets, and a long-term inflation-linked growth in income. In this report, we review whether these attributes still hold true.

Note: All commentary contained in this paper has been referenced to returns in US dollar terms.

What are investors looking for in an infrastructure investment?

Generally, in our experience we have seen investors look to infrastructure assets to deliver lower cash flow volatility and higher earnings stability compared with broader global equities. We have also seen investors target the asset class for its historically higher income as well as the perceived inflation-linked growth of that income – both attributes with which we agree.

Infrastructure assets typically have strong strategic positions by being natural monopolies. These monopolies are the physical networks and structures that provide services essential to the basic functioning of society and its economic productivity. Ultimately, it is the commercial frameworks that underpin these assets that result in what we see as attractive investment characteristics.

What does the empirical evidence show?

To many asset allocators, infrastructure is often referred to as a "diversifier" in a portfolio. The cash flows being generated by infrastructure assets are supported by very different commercial frameworks than the typical company within a global equities basket. Most infrastructure assets have their earnings or revenues linked to contracts or concessions with built-in inflation escalators, or have returns set based on a regulated asset base with limited or no link to volumes or cyclical demand. Many regulated environments offer return formulae that allow the ability for an asset to earn a target return, regardless of market conditions and often detached from the economic cycle. This results in the cash flows and value of infrastructure behaving differently to general equities in both up and down markets, resulting in reduced correlations.

Modern portfolio theory suggests that increasing asset diversification in a portfolio, e.g. adding a strategic allocation to infrastructure, can help in reducing overall portfolio volatility[1]. The march-forward in time since our prior research on the role of infrastructure in a portfolio suggests little has changed. Our updated analysis reconfirms that global infrastructure[2] over both shorter and longer time periods (**Figure 1**) has both (1) lower volatility than and (2) reduced correlations to global equities, as well as other asset classes. Meeting specific risk-return objectives necessitates accounting for risks not only at the stock or investment level, but at a portfolio level, and so we believe ensuring reduced correlations between assets classes within a portfolio is an important step in this process.

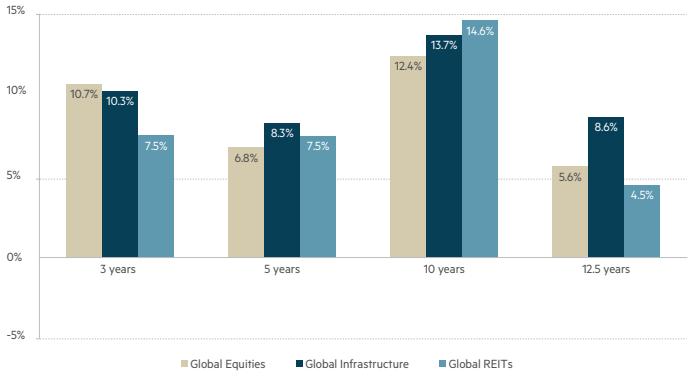
Infrastructure has historically provided a strong risk-return outcome

As part of a diversified portfolio, investors allocating to global infrastructure may be able to improve both their portfolio income and risk-return objective due to the more sustainable yields generally produced by global infrastructure, and the lower inter-asset class correlations and volatility.

We believe global infrastructure can provide investors with lower volatility than certain asset classes over shorter and longer term periods, on the basis that this asset class has historically been less volatile than global equities generally, which has also resulted in a higher Sharpe Ratio for global infrastructure.[3] This can be seen in **Figure 1**, which highlights not only how infrastructure has outperformed other key assets classes over multiple time periods but how it has done so at a lower level of risk, particularly evident over the longer time horizons.

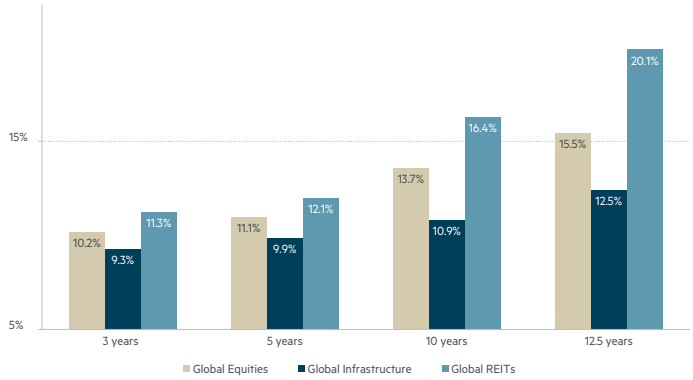
Figure 1: Historical total returns, volatility and Sharpe ratio comparions for global equities, global infrastructure and global REITs

Total Return (Annualised %, USD)



Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Volatility (Annualised %, USD)



Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

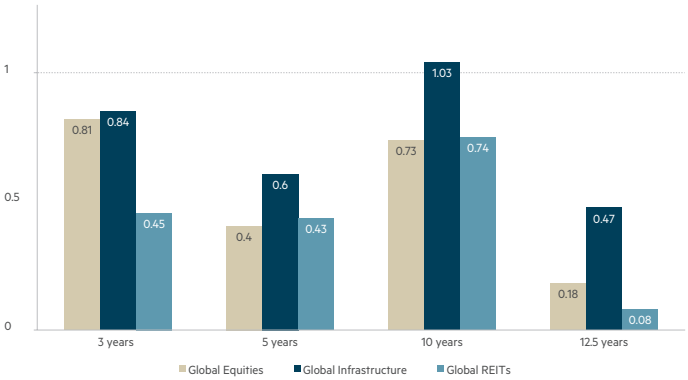
These longer time periods include unprecedented economic events and sharp bouts of market weakness, such as the Global Financial Crisis (GFC) of 2007-08 and the start of European Debt Crisis of 2009, where the lower volatility, lower drawdowns and reduced correlations of global infrastructure would have been favourable to a broader portfolio. Even more recent events such as the Brexit vote, increase levels of geopolitical stress or trade wars, have done little to effect returns.

1 Markowitz, H (1952) Portfolio selection. Journal of Finance, 7(1)

2 Throughout this White Paper unless specified otherwise, data referring to Global Infrastructure is based on the returns of the FTSE Global Core Infrastructure 50/50 Index, which was launched on 2 March 2015, although FTSE have back filled the history of the index back to 31 December 2005. In June 2015, we published a research paper entitled "Evaluating Global Listed Infrastructure Indices" where we considered the most prevalent issues with the existing infrastructure indices. We concluded that, based on our analysis, the FTSE Global Core Infrastructure 50/50 Index was the most appropriate index due to its constituents exhibiting superior infrastructure "purity" characteristics and strong inflation-linkage compared with other indices. However, Maple-Brown Abbott does not use this index as a primary benchmark, instead selecting stocks from a proprietary "Focus List", which contains assets that we believe will provide the strongest possible combinations of inflation protection and low volatility. We believe that in targeting the benefits of infrastructure, investors need to consider a tight and pure definition of 'infrastructure in order to achieve the often-touted benefits of the asset class. Nevertheless, for transparency purposes and availability of historical data we have used the FTSE index in our analysis.

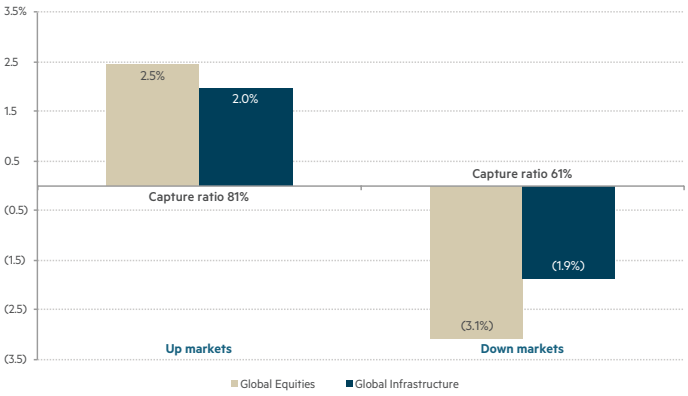
3 The Sharpe Ratio measures the return per unit of deviation, characterising how well the return compensates an investor for the level of risk taken. A higher Sharpe Ratio is seen as superior to a lower Sharpe Ratio.

Sharpe Ratio (USD)



Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Figure 2: Upside/downside capture comparison of global equities vs. global infrastructure



Note: All returns are quoted in USD.

Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Figure 3: Upside/downside capture data

	Months GLI Outperformed	Months GLI Underperformed	Average Mthly Outperformance	Capture Ratio
Up Markets	42%	58%	-0.5%	81%
Down Markets	80%	20%	1.2%	61%

Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Differences can seen across strong and weak markets

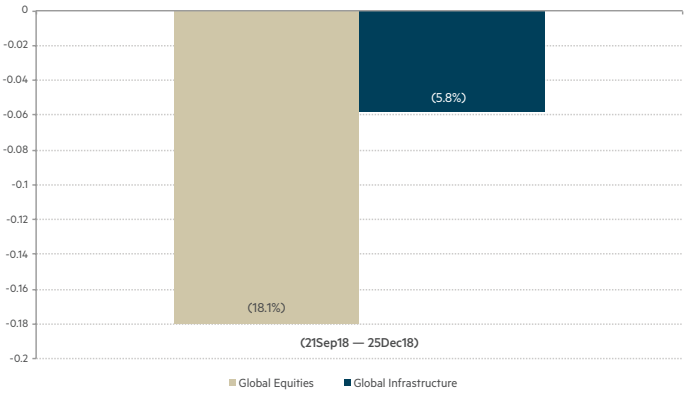
Global infrastructure has historically provided a non-uniform return outcome. Traditional update/downside capture ratios[4] continue to support the notion that the asset class' returns are disproportionately-skewed between up and down markets.

Since index inception[5], global infrastructure has disproportionately outperformed in down markets compared with global equities. In up-markets, global infrastructure has kept about 81% of the upside, whilst in down-markets, it has only seen 61% of the downside. In an average up-month, global infrastructure has lagged global equities by 0.5%, but in an average down-month global infrastructure has outperformed by 1.2%

Steep sell-offs are where the asset class shows its stripes

The large market correction in late-2018 is worth highlighting. During this period global equities were down 18% in USD terms, whilst global infrastructure was down only 6%. Whilst there is, and always will be, an element of equity market beta embedded in global infrastructure, as can be seen in **Figure 4**, the differential in drawdowns is not unique or isolated to this single event.

Figure 4: Infrastructure's defensiveness was a bright spot during the most recent market correction (2018)



Note: All returns are quoted in USD.

Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

Global Infrastructure has consistently outperformed in all severe market corrections.[6]

2018 wasn't a unique occurrence and investors may have learnt from the past to expect this. We have analysed each drawdown in global markets of 10% or greater – peak-to-trough – and compared the returns to infrastructure over the same time frames. Without fail, in each market sell-off, global infrastructure has exhibited better downside protection and capital preservation than global equities. Over an almost 15-year time horizon[7], global infrastructure has consistently outperformed in all severe market corrections.[8]

4 Upside/downside capture ratio refers to whether a given fund or index has outperformed – gained more or lost less than a broad market benchmark – during periods of market strength and weakness, and if so, by how much.
5 Analysis is back to the start of the FTSE Global Core Infrastructure 50/50 Index in December 2005
6 Defined as >10% decline in Global Equities.
7 Analysis is back to the start of the FTSE Global Core Infrastructure 50/50 Index in December 2005.
8 Defined as >10% decline in Global Equities.

It is interesting to note from **Figure 5** that even ignoring the "GFC-effect", the average outperformance of the asset class in such corrections is not materially affected – that is, approximately 6% average outperformance over these distinct periods.

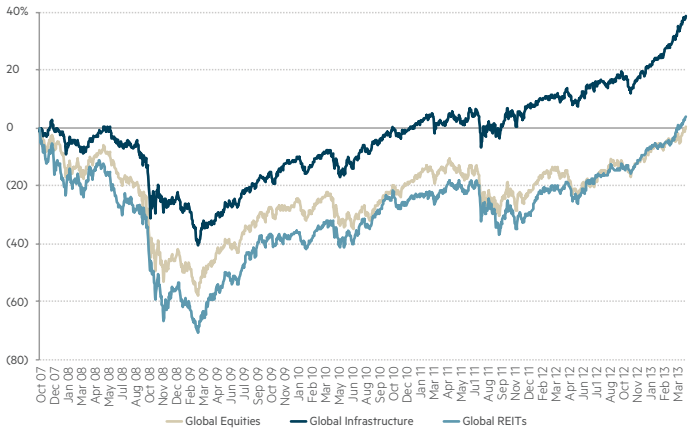
Figure 5: Market corrections > 10% between 2006 and 2018

Market corrections greater than 10%	Global Equities	Global Infrastructure	Global Infrastructure Outperformance
10May06 - 13Jun06	-11.1%	-8.6%	2.5%
13Jul07 - 16Aug07	-10.8%	-9.7%	1.1%
31Oct07 - 09Mar09	-57.8%	-48.2%	9.6%
14Apr10 - 05Jul10	-16.1%	-8.7%	7.3%
02May11 - 04Oct11	-22.0%	-10.9%	11.1%
27Apr12 - 01Jun12	-10.8%	-5.7%	5.2%
21May15 - 29Sep15	-13.8%	-11.4%	2.5%
21Sep18 - 25Dec18	-18.1%	-5.8%	12.3%
Average	**-20.1%**	**-13.6%**	**6.4%**
Average (ex-GFC)	-14.7%	-8.7%	6.0%

Note: All returns are quoted in USD.

Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Figure 6: Much shallower drawdown and quicker recovery for global infrastructure during the Global Financial Crisis than seen for either global equities or global REITs



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

An analysis of the GFC impact on returns from a drawdown perspective is in itself interesting. Whilst global infrastructure experienced negative returns during the GFC, the magnitude was materially less (~10% better) and perhaps more importantly the recovery time far shorter. As can be seen in **Figure 6**, it took three years from the market peak in October 2007 for global infrastructure to recover its capital – whilst global equities took approximately five-and-a-half years despite seeing a sharper initial bounce back from March 2009. Surprisingly, global REITs were similarly weak and took as long to recover. Whilst many investors continue to bucket infrastructure and real estate into the same allocation, the return differences have historically been quite stark.

Looking at drawdowns in discrete quarterly periods is another way to highlight the defensive characteristics of global infrastructure as an asset class and further dispel the notion that all real assets (i.e. REITs) are the same. Whilst some view real estate and infrastructure as providing similar risk-return outcomes, our analysis of the data suggests they are actually quite different.

Many of our investors will recognise **Figure 7**, which we have now extended through more recent periods. The chart captures 15 discrete quarters global equity returns were negative. In 14 out of 15 periods, global infrastructure outperformed global equities. Yet, global REITs only outperformed in 7 out of 15 of these periods i.e. less than half the time. Global infrastructure and global REITs are clearly not the same..

Interestingly, in these weak periods, the average return for global equities and global REITs was surprisingly similar – not so the case for global infrastructure, which exhibited better downside protection.

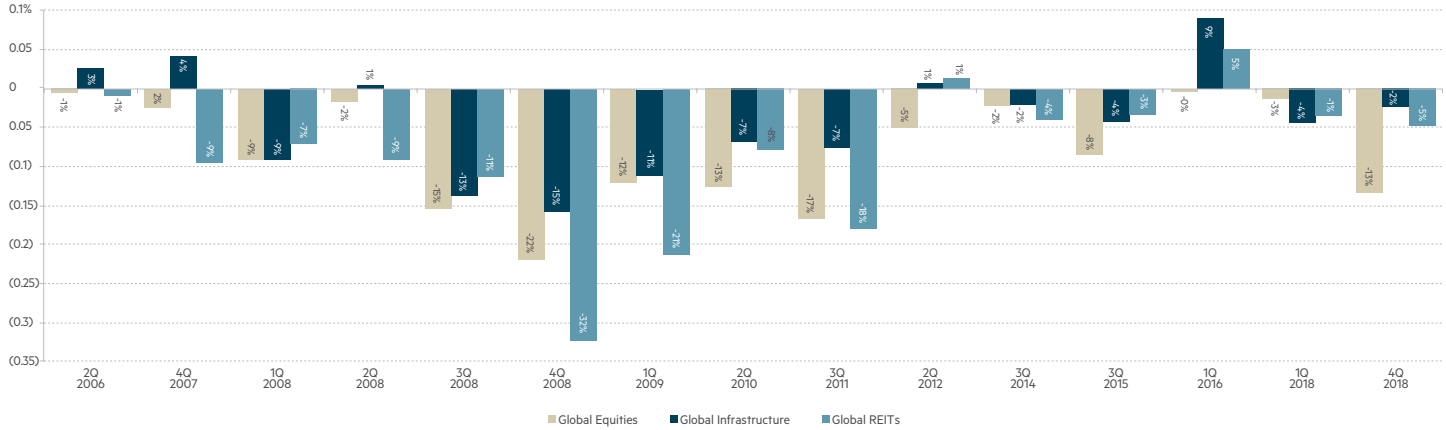
Figure 8: Average returns during negative quarters table

Global Equities	Global Infrastructure	Global REITS
-8.2%	-3.9%	-8.3%

Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Global infrastructure and global REITs are clearly not the same.

Figure 7: Global infrastructure performance has outperformed global equities in 14 of the 15 negative quarters

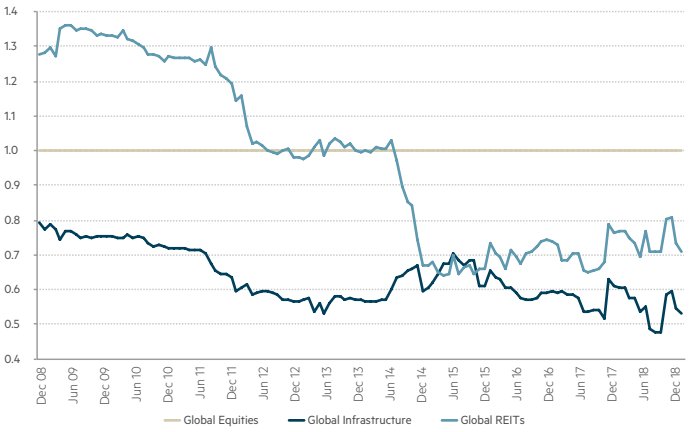


Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

Measures of risk highlight a long-term distinction

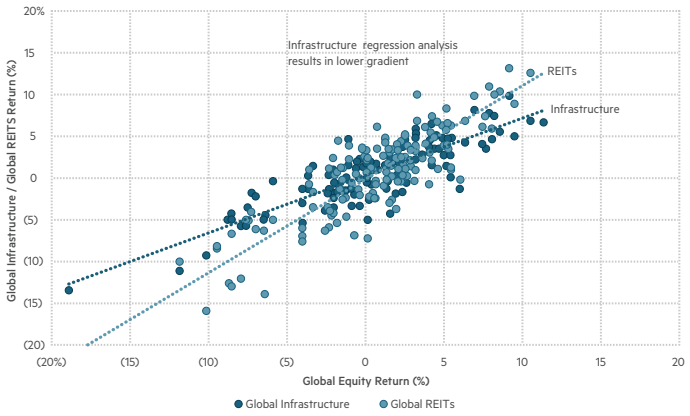
In allocating to infrastructure, many investors consider its reduced equity beta and correlation with other asset classes. We believe these measures need to be considered side-by-side. Historical equity betas for global infrastructure have remained a relative constant – generally range-bound either side of 0.6. This is unsurprising to many given the relative defensiveness exhibited by the asset class as previously discussed. Global REITs as an asset class has seen its equity beta drop since the GFC from higher than 1.3 to a low of about 0.7 but has been more volatile as a measure of risk overall and has sustained a structural premium over infrastructure over almost all periods.

Figure 9: Rolling equity betas for global infrastructure and global REITs



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

Figure 10: Regression analysis of monthly returns highlights the relative defensiveness of global Infrastructure vs. both global equities and global REITs



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

Over time, as previously noted we have seen structurally lower equity betas for global infrastructure. Visually, the return dispersions are stark. An analysis of the spread and scatter of these returns indeed highlights the overall distinction between global infrastructure and global REITs – noting the lesser slope of the regression of global equity returns relative to that of global REITs, as seen in **Figure 10.**

The sustained lower beta of global infrastructure is only an indication of its defensiveness. It shows how global infrastructure responds to systemic volatility in the broader market and whilst it can be a measure of magnitude of the risk, it does not show how dependent, or independent, infrastructure returns are to the broader market. In comes correlation. When investors look for assets that are uncorrelated from one another, they do so to improve the risk and return objectives of the broader portfolio. The correlation coefficient is a directional measure and tells investors how completely movement in the broader market explain a movement in an asset's return. The lower the number, the less correlated.

Both global infrastructure and global REITs have provided a less than perfect correlation with global equities and an allocation to either or both in a portfolio is therefore expected to help to reduce portfolio volatility. A summary of these correlations can be seen in **Figure 11.**

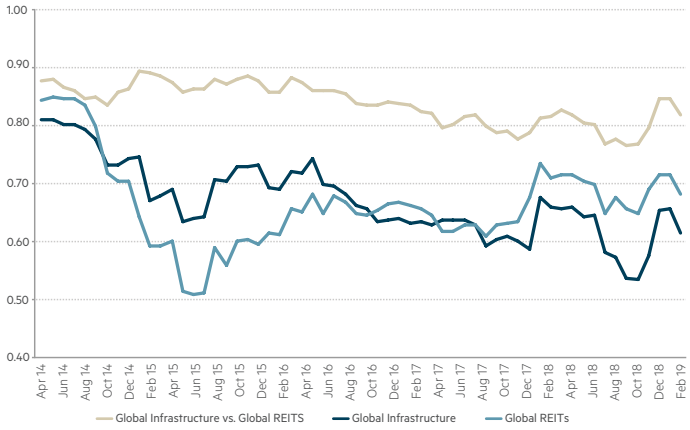
Figure 11: Upside/downside capture data

Period to 31-Mar-19	3 Years	5 Years	10 Years
Global infrastructure	0.61	0.67	0.79
Global REITS	0.68	0.69	0.83

Source: MBA GLI internal research; Bloomberg. Data to 31Mar2019. Past performance is not a reliable indicator of future performance.

Looking at each of the two real assets more broadly, as seen in **Figure 12**, both have sustained less than perfect correlations with global equities to similar levels, albeit the 'volatility' of the correlation for global REITs has been a little higher.

Figure 12: Rolling correlations of real assets with global equities over time, and against one another



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

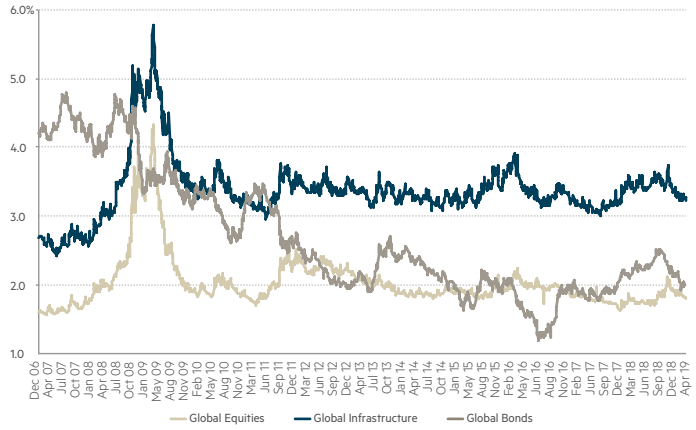
Does infrastructure remain an income play?

When investing in infrastructure for yield, two big considerations we often point to is the stability of income through time and that income's resilience to long term inflation.

Dividends from global infrastructure have demonstrated strong inflation protection

Global bond yields[9], have continued to remain fairly range-bound for many years now – with flat coupons providing relatively limited returns for investors. In addition, for more than a decade, the flat coupons of bonds have provided structurally lower income than infrastructure. Conversely, the observed rising dividends of global infrastructure[10] continue to provide investors with an increasing income yield over time and highlights that decision to allocate away from bonds to infrastructure can actually enhance total portfolio income. In this era of low growth and low inflation, infrastructure is often seen as one of the few genuine "yielding" asset classes.

Figure 13: Trailing income yield (%), by asset class

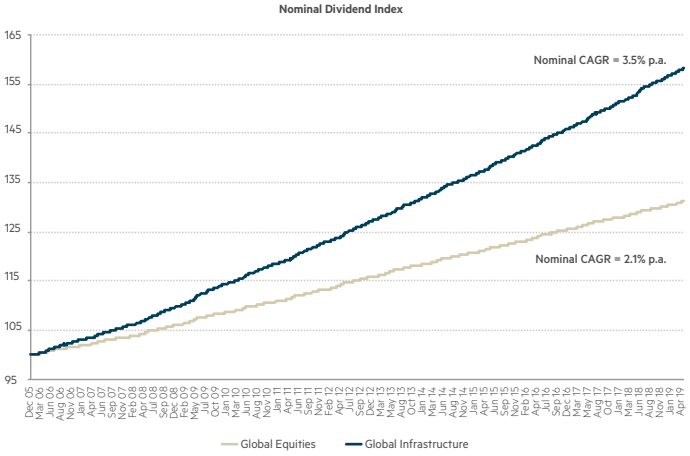


Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

As seen in **Figure 13**, global infrastructure has historically provided a more stable and higher yielding income stream than global equities, which has grown over the longer term in line with, if not greater than, inflation. Over the last decade, the dividend yield of global infrastructure has averaged approximately 3.4%, whilst global equities has averaged a lower 2.0%. global bonds have yielded about 2.4%.

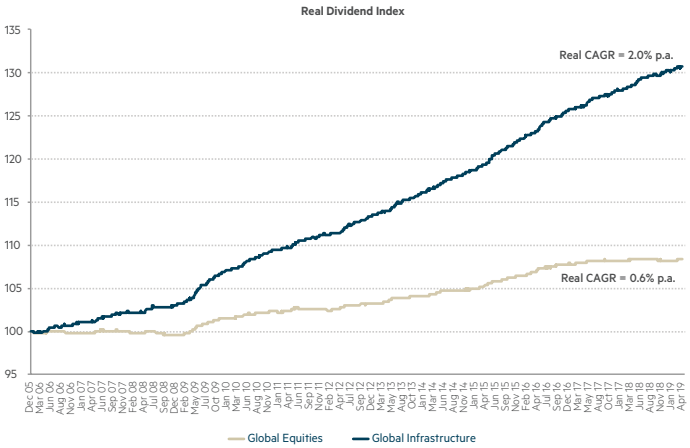
Perhaps more importantly, over this same period our analysis, as seen in **Figures 14 and 15** has shown global infrastructure to have provided dividend growth at least commensurate with inflation (as measured by OECD Total CPI), whilst global equities have struggled to provide stable real income levels. In particular, between June 2006 and June 2009, dividends from global equities did not grow at all in Real Terms. **Figures 14 and 15** highlight not only that global infrastructure dividend growth has outpaced global equities, but also that the dividends from global infrastructure have demonstrated strong inflation protection.[11] That is, infrastructure has delivered a positive real income stream over most short- and long-term periods.

Figure 14: Nominal dividend growth comparison



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

Figure 15: Real dividend growth comparison



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

9 As measured by the J.P. Morgan Global Aggregate. Bond Index. This index is a comprehensive global investment grade benchmark, and extends the J.P. Morgan US Bond index to also include multi-currency, investment-grade instruments. The index contains nine distinct asset classes: Developed Market Treasuries, Emerging Market Local Treasuries, Emerging Markets External Debt, Emerging Markets Credit, US Credit, Euro Credit, US Agencies, US MBS and Pfandbriefe.

10 As observed from returns for the FTSE Global Core Infrastructure 50/50 Index

11 We have created dividend indices to illustrate the growth in come over time for both Global Equities and Global Infrastructure based on the dividend return components of the total return indices. The Real Dividend Index chart (right) calculated by netting the nominal income from the index with inflation as defined by the OECD Total Inflation Index, published monthly by the OECD.

Summary

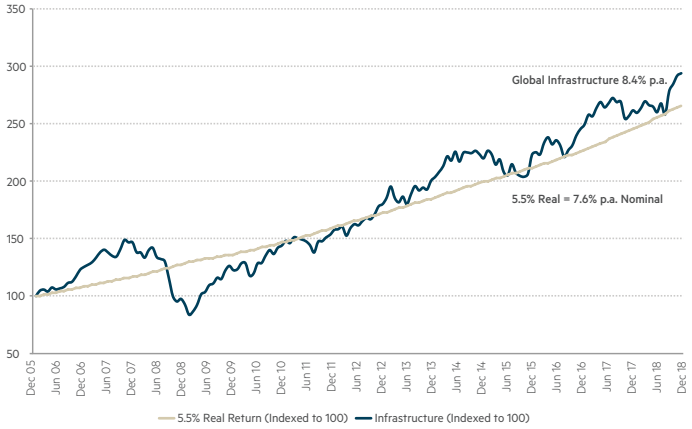
Given the increasing size of the asset class and reasonable time series[12] of data now available, we see many investors, advisors, asset consultants, pension funds and superannuation funds reserving a long-term strategic asset allocation for global infrastructure. Our updated analysis since 2016 has shown that a permanent allocation in a diversified portfolio could help to not only improve portfolio income, but the less than perfect correlations with other asset classes means that any allocation, however small, may have a positive impact on reducing overall portfolio volatility. It also increases the likelihood of a diversified portfolio outperforming the broader equities market during 'risk off periods'. We believe that in targeting these benefits, a tight definition of infrastructure is critical to any investment process and an important consideration when selecting an infrastructure investment manager in order to achieve the often-touted benefits of the asset class.

We often explain to investors that we see global infrastructure taking on qualities of both debt and equity and sits somewhere between the two in terms of volatility and returns. We continue to find strong downside protection relative to global equities in weak markets, and this was especially noteworthy in late-2018 when global equities sold-off more than 18%. Finally, our updated analysis continues to show that contrary to popular belief, global infrastructure and REITs have historically provided very different risk and return profiles to investors, suggesting an allocation to either or both asset classes should be made as two separate decisions.

Whilst a target allocation is an individual decision for every investor, given the specific characteristics of the asset class, we believe an allocation to global listed infrastructure could provide positive risk-return levels to a portfolio compared to one without.

Whether an investor chooses to invest in global infrastructure for its downside protection, for its reduced correlations with global equities, or for its inflation-linked income, a final thought should be given to return expectations. While past performance is never indicative of future returns, as seen in **Figure 16**, the absolute real return generated by the asset class over the long term shouldn't be ignored.

Figure 16: Longer term returns for global infrastructure



Source: MBA GLI internal research; Bloomberg. Past performance is not a reliable indicator of future performance.

12 We note that investors can now analyse returns for the FTSE Global Core Infrastructure 50/50 Index back to December 2005.

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