Index Insights

Infrastructure

Practical considerations for listed infrastructure

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Introduction

Infrastructure is an investment category which is frequently perceived by investors as a diversifying asset from other asset classes. It has been known to provide a hedge to long-term liabilities by offering exposure to stable returns and a steady income.

This research uses the FTSE Core Infrastructure Index series[1] as a proxy for equity infrastructure investors to verify these attributes and considers the:

- Relatively high dividend yield, inflation protection combined with stable income.
- Defensive qualities in the periods of market downturns and relatively high risk-adjusted returns overall.
- Overall diversification properties of infrastructure in a listed equity portfolio.

[1] FTSE Russell. Ground Rules. FTSE Infrastructure Index Series. V2.5. May 2019. http://www.ftse.com/products/downloads/FTSE_Infrastructure_Index_Series.pdf

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Listed infrastructure investment theses

From an investment perspective, infrastructure assets cover a range of sectors, including transportation, energy, utilities, communications and social infrastructure. FTSE Russell defines core infrastructure companies as those that own, manage or operate structures or networks used for the processing or moving goods, services, information and data, people, energy and necessities from one location to another. This definition, therefore, includes the businesses that provide the means of processing (or moving) goods or services, but not the goods or services themselves.

Infrastructure is an investment category often seen by investors as a diversification tool that can provide a hedge to long-term liabilities by offering exposure to potentially stable returns and steady income.

Infrastructure is an investment category often seen by investors as a diversification tool that can provide a hedge to long-term liabilities by offering exposure to potentially stable returns and steady income. Developed markets, listed infrastructure indexes allow investors to measure the performance of an increasingly important segment of global equity markets.

Infrastructure assets have shown the ability to generate a steady income stream, which has become an increasingly valuable feature in an environment dominated by low interest rates. In addition to higher dividend yields, listed infrastructure investments have historically offered higher risk-adjusted return and a more resilient income profile during downturns. In this paper, we seek to substantiate these infrastructure investment theses in practice.

Core Infrastructure Indexes snapshot

The FTSE Infrastructure Index Series is a comprehensive set of indexes, diversified across six FTSE-defined infrastructure sectors, to reflect the performance of infrastructure and infrastructure-related listed securities worldwide. The series is based on the FTSE Global All Cap Index Series, which is a part of the FTSE Global Equity Index Series ("GEIS"). Both developed and emerging markets are included.

The FTSE Infrastructure Index Series is a comprehensive set of indexes, diversified across six FTSE-defined infrastructure sectors, to reflect the performance of infrastructure and infrastructure-related listed securities worldwide.

FTSE Core Infrastructure Indexes are a subset of the FTSE Infrastructure Index Series. They comprise companies, which derive at least 65% of their revenues from core activities of development, ownership, management and/or maintenance of transportation, energy or telecommunication infrastructure assets.

The indexes were introduced on April 4, 2011 with the history calculated from December 29, 2005 using hypothetical data. In March 2015, the FTSE Infrastructure Index Series was complemented by a stock- and sector-capped version of Core Infrastructure Indexes, called the FTSE Core Infrastructure 50/50 Indexes.

Statistics and performance of the FTSE Core Infrastructure Indexes

Table 1. FTSE Core Infrastructure Indexes snapshot.

Parameter	Global	Developed	Emerging
Market capitalization (USD tn)	2.16	2.03	0.13
Number of stocks	227	145	82
Countries represented	35	19	16
Largest stock MCap (USD bn)	126.0	126.0	9.2
Median MCap (USD bn)	3.1	6.1	0.9
Minimum stock MCap (USD mn)	104.9	145.8	104.9

Source: FTSE Russell. Data as of May 14, 2019. Free float adjusted.

Table 2. ICB® Sector breakdown of FTSE Global Core and 50/50 Infrastructure Indexes.

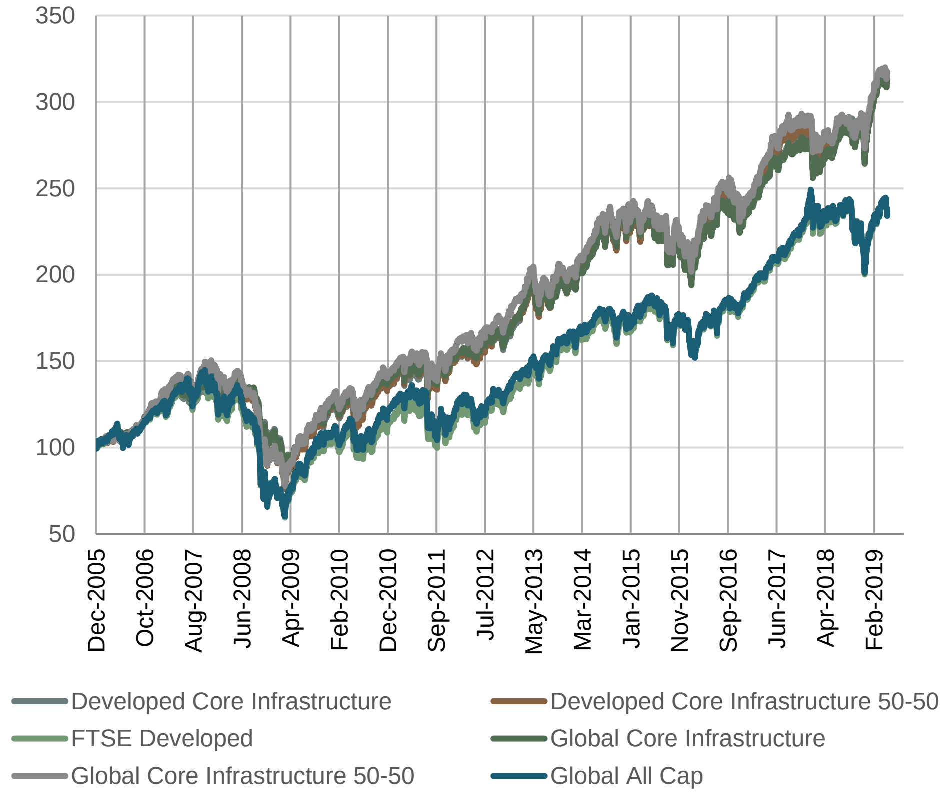
ICB Code	ICB subsector	No. of Constituents	Core Weight %	Core 50/50 Weight %
0577	Pipelines	14	12.8	12.0
2357	Heavy Construction	2	0.2	0.8
2775	Railroads	11	17.1	6.1
2777	Transportation Services	45	6.5	22.0
5553	Broadcasting and Entertainment	3	0.5	0.4
5759	Travel and Tourism	6	4.3	1.5
6535	Fixed Line Communication	3	0.1	0.1
6575	Mobile Telecommunications	6	0.7	0.7
7535	Conventional Electricity	68	31.6	31.0
7573	Gas Distribution	32	5.7	5.6
7575	Multiutilities	12	9.9	9.7
7577	Water	17	2.9	2.9
8675	Specialty REITs	5	7.6	7.1
9578	Telecommunication Equipment	3	0.1	0.1
	Total	**227**	**100.0**	**100.0**

Source: FTSE Russell. FTSE Core Infrastructure Indexes data as of May 14, 2019.

A review of the performance of infrastructure indexes shows that since December 2005, the FTSE Core Infrastructure Indexes have outperformed the wider market capitalization benchmarks by almost 70 percentage points (Chart 1). Since the infrastructure stocks are included in the market capitalization index, the outperformance margin would be even wider if we compare the Core Infrastructure Indexes to the market capitalization indexes, excluding infrastructure stocks.

FTSE Core Infrastructure Indexes have outperformed the wider market capitalization benchmarks by almost 70 percentage points.

Chart 1. Cumulative total return of FTSE Global Core Infrastructure Indexes and selected benchmarks, rebased, in USD.



Source: FTSE Russell. FTSE end-of-month data from December 2005. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Characteristics of listed infrastructure

Yield enhancement

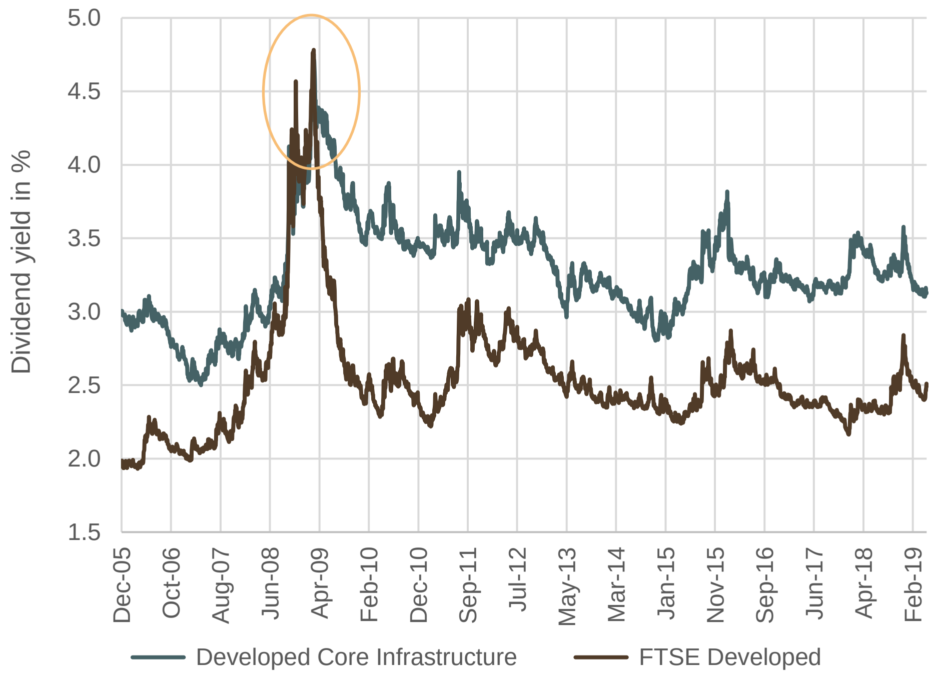
High dividend yield is one of the primary attractions of infrastructure stocks. This characteristic is particularly appealing in low interest-rate environments.

In Chart 2, we compared the dividend yields of the FTSE Developed and FTSE Core Developed Infrastructure Indexes. It is notable that during the Global Financial Crisis dividend yields rose substantially as a result of falling share prices. As the wider market fell more than the infrastructure stocks, the dividend yield on the Market Capitalization Index and the Infrastructure Index reached the same levels, before diverging again.

A comparison of the FTSE Developed Index with FTSE Core Developed Infrastructure 50/50 Index shows the same picture.

High dividend yield is one of the primary attractions of infrastructure stocks, particularly in the current low interest-rate environment.

Chart 2. Dividend yield history of FTSE Developed Core Infrastructure and FTSE Developed Indexes.



Source: FTSE Russell. FTSE Core infrastructure and Market Capitalization Indexes from December 29, 2005 to May 14, 2019. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Defensive qualities of listed infrastructure

This brings us to another important characteristic of Infrastructure − its defensive qualities.

In Table 3, we show the maximum drawdown of infrastructure and market capitalization indexes. We can see that the drawdowns of Core Infrastructure Indexes have been significantly lower than those of the global indexes (represented by the FTSE Global All Cap, FTSE Developed and FTSE All-World Indexes) during periods of market stress.

Table 3. Drawdowns of FTSE Core Infrastructure and Market Capitalization Indexes.

Index	Drawdown (%)
FTSE Global Core Infrastructure	42.0
FTSE Global Core Infrastructure 50/50	48.5
FTSE Developed Core Infrastructure	40.7
FTSE Developed Core Infrastructure 50/50	48.4
FTSE Global All Cap	58.4
FTSE Developed	57.4
FTSE All-World	57.9

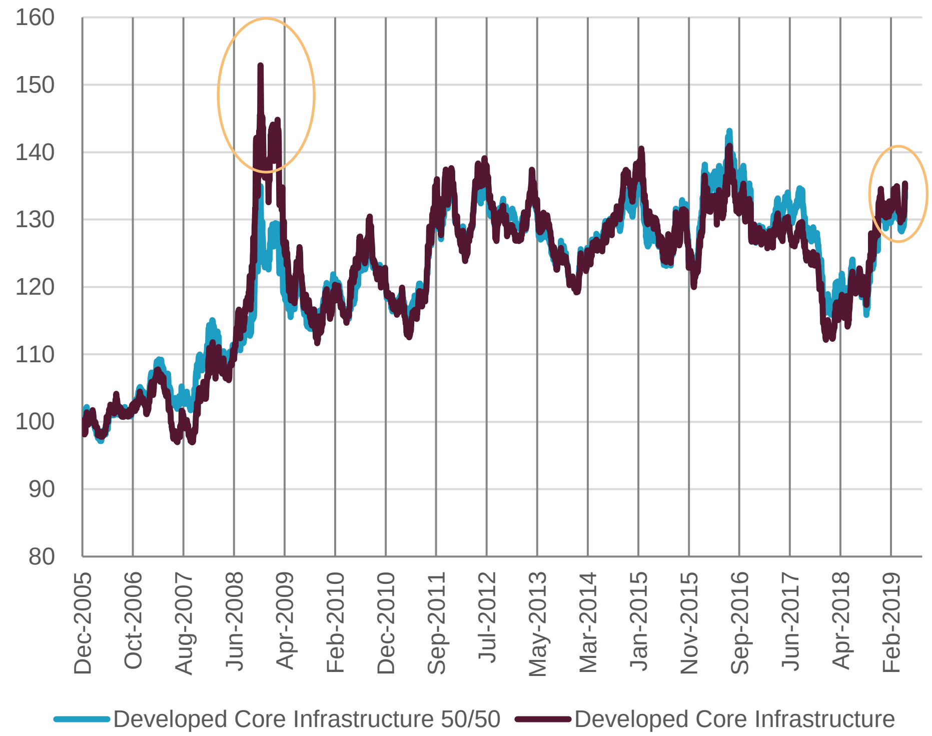
Source: FTSE Russell. Daily data from December 29, 2005 to May 14, 2019. Past performance is no guarantee of future results. Data shown prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Listed Infrastructure is becoming increasingly more popular with investors, looking for tactical defensive plays during market downturns.

As a result, interest in defensive tools and strategies has increased (we have covered them extensively in our papers [1], [2]) with infrastructure becoming increasingly more popular with investors, looking for tactical defensive plays during market downturns.

In Chart 3, we show why. During the Global Financial Crisis, the FTSE Core Infrastructure Indexes outperformed the corresponding Market Capitalization Indexes by around 30% from June 2008 to February 2009. More recently, during the correction at the end of 2018, the FTSE Core Infrastructure Indexes also outperformed the corresponding Market Capitalization Indexes.

Chart 3. Cumulative total return of FTSE Developed Core Infrastructure and Core Infrastructure 50/50 Indexes relative to FTSE Developed Index, rebased (USD).



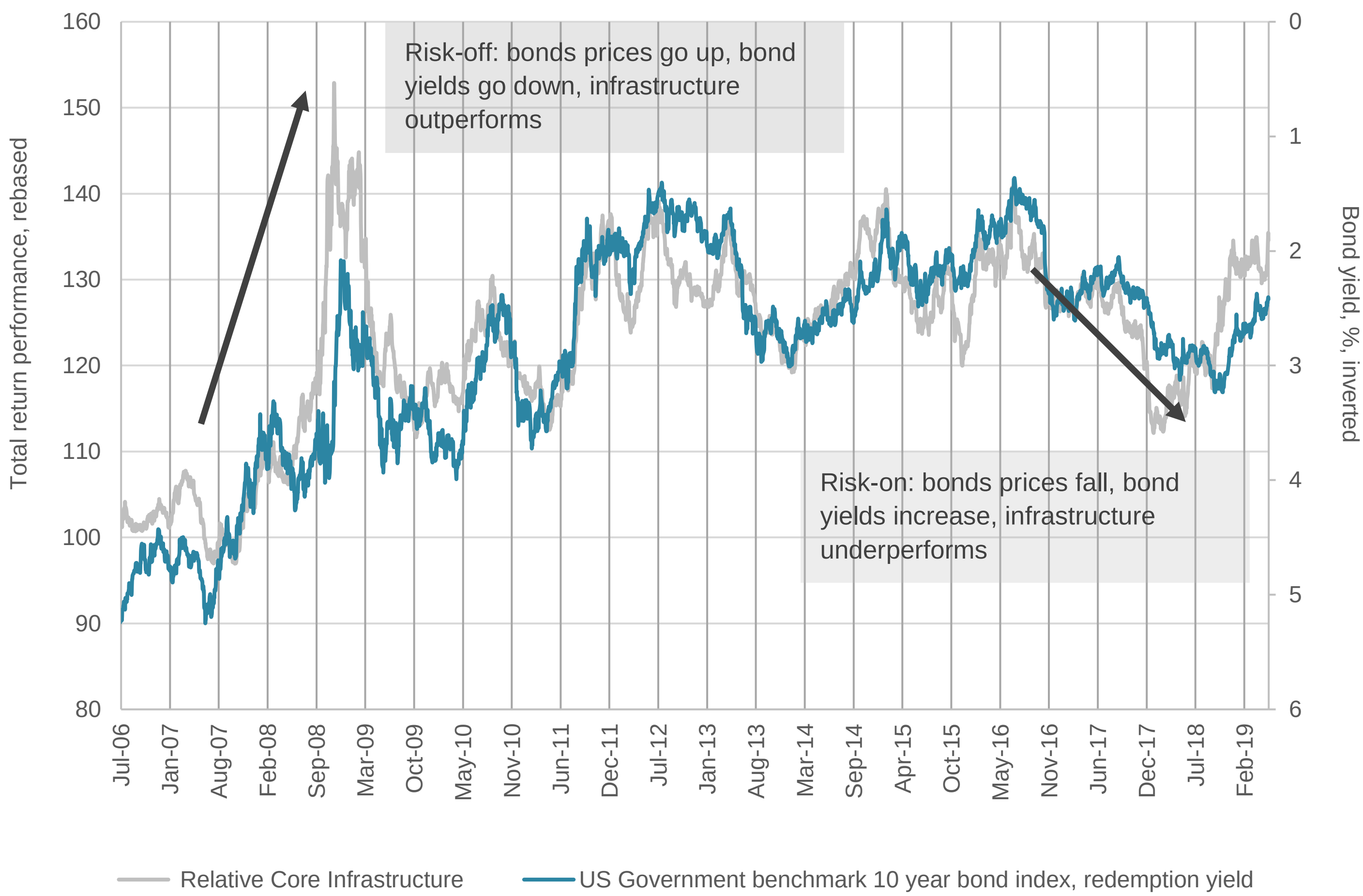
Source: FTSE Russell. Daily data from December 29, 2005 to May 14, 2019. Past performance is no guarantee of future results. Returns for the FTSE Developed Core Infrastructure Index shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

The striking similarity between the performance of US government bonds and the FTSE Core Infrastructure Indexes relative to the wider market capitalization benchmark is another good illustration of the defensive characteristics displayed by infrastructure.

In Chart 4, we plot the performance of the FTSE Developed Core Infrastructure Index relative to the FTSE Developed Index (left-hand axis) and yield to maturity of the 10-year US government bond index (inverted scale on the right-hand axis).

During periods of market stress, investors will typically switch from riskier assets (like equities) to more defensive ones (like bonds), causing bond prices to rise and bond yields to fall. During the 2007-2008 Global Financial Crisis, the Core Infrastructure Index outperformed the FTSE Developed Index, displaying similar defensive attributes as bonds, whose yields fell. The converse is also true; when investors turn to more risky assets, bonds sell off (yields rise), and infrastructure underperform as highlighted in Chart 4 from 2016 to 2018.

Chart 4. Performance of FTSE Developed Core Infrastructure Index relative to FTSE Developed Index versus 10-year US bond yield (inverted RH-scale).



Sources: FTSE Russell, for Infrastructure Index, daily observations from December 29, 2005 to May 14, 2019. Refinitiv, for the bond index. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

A comparison of the FTSE Global Core Infrastructure Index and the capped 50/50 version of the indexes shows a similar performance behavior.

Inflation hedge

The relative performance of listed infrastructure and its segments was examined by AMP Capital [4]. They considered three different macroeconomic scenarios in terms of inflation expectations and real bond yields: diminishing inflation expectations, reflation and normalization. In the first scenario, when the nominal yields are declining, they expect infrastructure overall, especially longer duration infrastructure (like utilities and communication) to outperform. In the reflation case, when inflation is increasing as a result of macroeconomic stimuli, they expect the performance of infrastructure to be relatively neutral. In the normalization scenario, when both inflation expectations and nominal growth return to historical trends, the performance favored general equities over infrastructure.

Inflation protection is another reason why investors may be interested in adding infrastructure to their portfolio. Typically, after an initial (positive) shock to inflationary expectations, equities recover as companies adjust their prices. This adjustment process is turbulent and uneven across equities. However, it is normally more predictable for infrastructure companies as their revenue streams are frequently directly linked to inflation.

The issue with empirical testing the inflation protection characteristic of infrastructure is that inflation generally has been benign over the calculated history of the infrastructure index. It has been particularly low after the Global Financial Crisis, so beating inflation has not been challenging. First State Investments [5] showed that since 2002, Global Infrastructure have outperformed US consumer price inflation by more than 10% per annum.

Conceptual arguments for the inflation-hedging characteristic of infrastructure rather than statistical evidence were given by Martin [6] and quoted by Inderst [7]: "…the relationship between inflation and infrastructure are primarily ex ante claims based on the assumed properties of the underlying assets, i.e. the explicit link of cash flows to inflation, pricing power and economies of scale".

However, academic research on the subject has been limited. In 2012, in his dissertation [8], Maximilian Roedel puts rather strongly that "[n]o academic research has yet comprehensively analyzed this [infrastructure being a good hedge against inflation] proposition. The existing studies are limited by short and insufficiently granular data (and methodology)", he says.

Earlier research of Armann and Weisdorf [9] looks at the relationship between inflation and fundamental performance of infrastructure companies. They show that there is a relatively high 0.53 positive correlation between inflation and EBITDA of infrastructure companies. No statistical significance of the correlation is given, however.

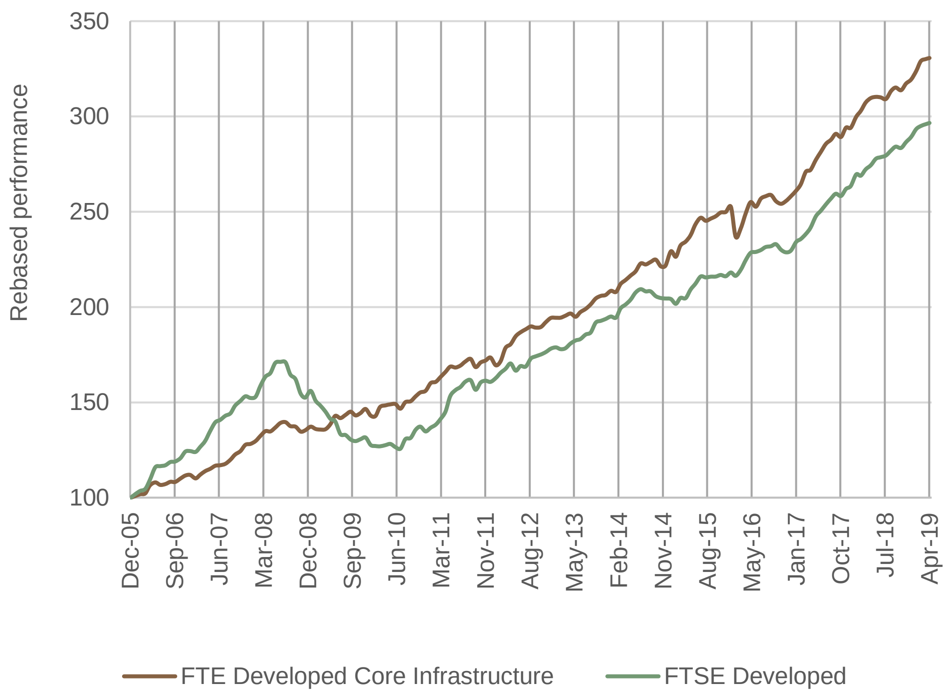
Both Roedel and First State suggest that not all infrastructure companies are the same in hedging inflation. Roedel introduces notions of high and low pricing power subsets of infrastructure companies. He concludes in his dissertation that "[l]isted infrastructure with high pricing power hedges inflation robustly".

Stable income profile

One of the reasons behind the defensive qualities of infrastructure could be its stable income profile. In Chart 5, we compare the dividend per share (DPS) of infrastructure and market capitalization indexes. Infrastructure DPS has been more stable than the wider market dividends. It is particularly apparent around the time of the Global Financial Crisis period in 2007-2011, which resulted in overall faster Infrastructure DPS since December 2005, although recently the wider market and infrastructure exhibited similar dividend growth rates.

The defensive qualities of infrastructure are based on a stable income profile, which also demonstrates inflation protection characteristics.

Chart 5. Rebased DPS of FTSE Developed Core Infrastructure Index and FTSE Developed Index.



Source: FTSE Russell. FTSE Developed Core Infrastructure and FTSE Developed Indexes based on monthly data from December 2005 to April 2019. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Return/risk profile

Over the last 14 years, the return-to-risk ratio has also been significantly greater for the FTSE Core Infrastructure Indexes compared to the market capitalization indexes, as shown in Table 4. Certainly, the past performance is no indication of the future performance and there were short periods when infrastructure underperformed the wider market.

The fundamental reasons provided by a stable income profile and a relatively long period (which encompasses different market and macroeconomic environments) may provide some foundation to the perception that infrastructure tends to offer superior risk-adjusted returns over the wider market in the long term.

Table 4. Annualized return/risk ratio of FTSE Core Infrastructure Indexes and market capitalization benchmarks.

Infrastructure Index	Return (% p.a.)	Volatility (% p.a.)	Return/risk ratio
FTSE Global Core Infrastructure	9.3	10.9	0.85
FTSE Global Core Infrastructure 50/50	9.5	12.2	0.78
FTSE Developed Core Infrastructure	9.4	10.7	0.87
FTSE Developed Core Infrastructure 50/50	9.4	12.2	0.77
FTSE Global All Cap	8.0	15.8	0.51
FTSE Developed	7.9	15.2	0.52

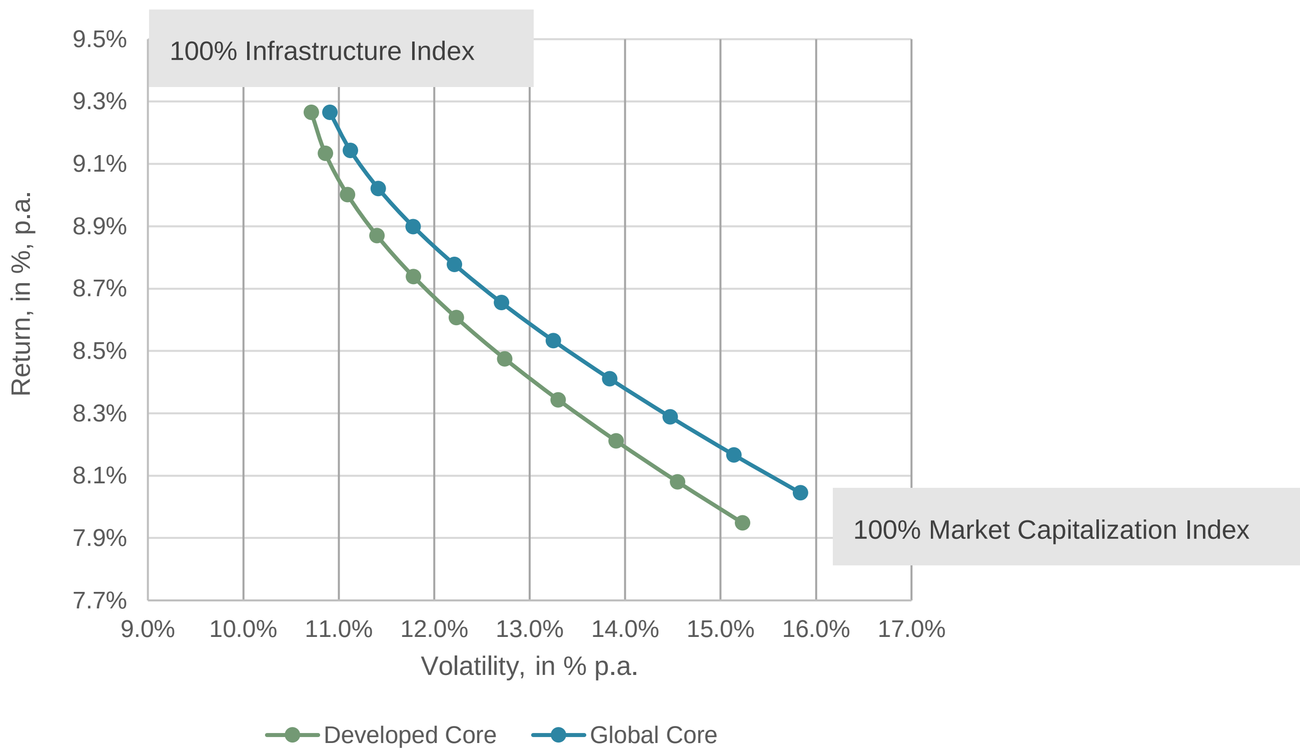
Source: FTSE Russell. Monthly observations from December 2005 to April 2019. Past performance is no guarantee of future results. Data shown prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Diversification

In Chart 6, we demonstrate the risk and return outcomes as infrastructure is gradually added to a hypothetical index. Each dot represents a 10% incremental allocation to Infrastructure.

This exercise has more illustrational than practical utility. It shows the direction of impact when infrastructure weight in a hypothetical portfolio is increased, since most wide international equity indexes already have 3-4% of their weight in infrastructure stocks. In practice, every fund will have its own liquidity and diversification constraints on how much it is allowed to increase its infrastructure holdings.

Chart 6. Risk/return profile of hypothetical blended Infrastructure and Market Capitalization portfolios.



Source: FTSE Russell. The portfolios presented is a hypothetical combination of FTSE Core Infrastructure Indexes and FTSE market capitalization indexes based on monthly observations from December 2005 to April 2019. All data is hypothetical, historical data. Please see the end for important legal disclosures.

We also calculate the correlation of infrastructure indexes with their corresponding market capitalization indexes. The correlation coefficients range from 0.77 for the FTSE Developed Core Infrastructure Index to 0.93 for the FTSE Emerging Core Infrastructure Index. Since the correlation is less than one, adding infrastructure to the portfolio provides some additional diversification, in addition to the greater risk-adjusted return.

Since the correlation is less than one, adding infrastructure to the portfolio provides some additional diversification, in addition to the greater risk-adjusted return.

Table 5. Correlation coefficients between FTSE Core Infrastructure and Market Capitalization Indexes.[2]

Infrastructure Indexes	Correlation
Developed Core	0.77
Global Core	0.80
Emerging Core	0.93
Developed Core 50/50	0.84
Global Core 50/50	0.86

Source: FTSE Russell. Calculations are based on end of the month index values from December 2005 to April 2019. Past performance is no guarantee of future results. Data used prior to index launch represents hypothetical, historical data. Please see the end for important legal disclosures.

Listed vs unlisted infrastructure

In the past, many institutions have preferred to invest in infrastructure via unlisted vehicles. Unlisted infrastructure assets under management exceeded US$ 500 billion in 2019 [10], while those of listed infrastructure were around US$ 100 billion [11]. Unlisted infrastructure investments can often involve high investment minimums, extended lockout periods, and only represent a limited portion of the infrastructure opportunity set. Many infrastructure assets are unique, so listed companies could be the only way to gain exposure to them. Unlisted funds are also quite static in their holdings, due to the size of the individual infrastructure assets and the time it takes both to acquire and dispose of them. Therefore, this limits the diversification capability of an unlisted fund. Minimum size requirements on investments in unlisted funds also put constraints on diversification for investors in unlisted vehicles.

An investment in publicly-traded infrastructure equities, can offer several potential advantages compared to an unlisted fund.

According to asset manager Maple-Brown Abbott [12]-[13], a firm specializing in the global listed infrastructure sector, an investment in publicly traded infrastructure equities can offer several potential advantages relative to an unlisted fund:

- A larger opportunity set − investors have greater choice in the listed infrastructure equities market.
- Greater diversification − the listed equity market provides greater opportunities for diversification, as the minimum investment amount is likely to be much lower than for an unlisted infrastructure fund.
- Transparency − as part of regulated stock markets, listed infrastructure companies provide high levels of disclosure and information to investors.
- Daily liquidity − investors in listed infrastructure equities can exit their positions at will, whereas investors in unlisted infrastructure funds may have to wait years to redeem their holdings.
- Lower fees − a listed infrastructure fund typically carries substantially lower fees than an unlisted fund, which may levy a management fee and a performance fee.

[2] The correlation coefficients are calculated in respect of corresponding market capitalization benchmarks: FTSE Developed Core Infrastructure and FTSE Developed Core 50/50 vs FTSE Developed; FTSE Emerging Core Infrastructure vs FTSE Emerging; FTSE Global Core Infrastructure and FTSE Global Core Infrastructure 50/50 vs FTSE All Stocks.

Summary

Listed infrastructure is a subset of global equities, which has a number of attractive characteristics and can be suitable for tactical and strategic asset allocation.

As opposed to unlisted infrastructure, infrastructure provides a practical and easy way to gain exposure, as well as being cost effective and transparent in implementation.

The primary appeal of infrastructure is historically higher dividend yield relative to the broad market, backed by defensive qualities.

The defensive qualities of infrastructure are based on a stable income profile, which also demonstrates inflation-protection characteristics.

References

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[11] Brookfield. The Case for Global Listed Infrastructure. 2019

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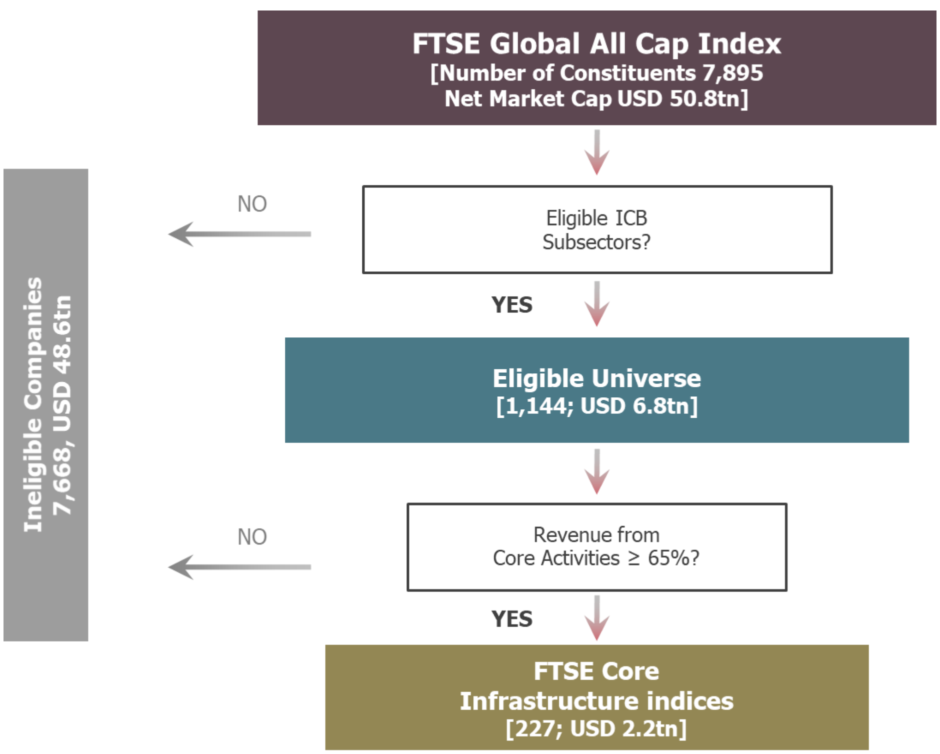
[13] Steven Kempler. Global Infrastructure in a Portfolio. Maple-Brown Abbott. November 2013.

Appendix

FTSE Core Infrastructure methodology overview

- Publicly-listed companies. Transparent approach of creating investible indexes. The widest possible initial universe: FTSE Global Equity Index Series.
- Eligibility. Infrastructure companies with at least 65% of revenues derived from core infrastructure activities.
- Market-capitalization weighting. The standard market-capitalization weighting is applied with free-float adjustments.
- Sector and stock constraints. For the core 50/50 indexes, 5% individual stock weight limit is imposed as well as 50% limit on utilities, 30% limit on transportation (including 7.5% limit for railways/railroad) and 20% for the other sectors in the 50/50 index.
- Rebalance. Semi-annual in March and September.
- Flexibility. Definitions and approaches of investors can vary, so we provide clients an opportunity to customise indexes to fit their specific requirements.

Chart 9. FTSE Core Infrastructure Index construction stages



Source: FTSE Russell as of May 14, 2019.

About FTSE Russell

FTSE Russell is a leading global provider of benchmarks, analytics and data solutions with multi-asset capabilities, offering a precise view of the markets relevant to any investment process. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indexes to benchmark their investment performance and create investment funds, ETFs, structured products and index-based derivatives. FTSE Russell indexes also provide clients with tools for performance benchmarking, asset allocation, investment strategy analysis and risk management.

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