Invesco White Paper Series: Investing in Infrastructure

This white paper was generated in conjunction with Invesco's global Investors Forum, based on research conducted by Invesco Real Estate. The Investors Forum brings together each of Invesco's 750-plus investment professionals from around the world to discuss issues that are critical to global investors.

Investing in infrastructure: What you should know about this growing asset class

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Executive summary

Real assets – physical or tangible assets, including land, buildings and machines that have intrinsic value – have drawn renewed attention from a variety of investors seeking opportunities that offer lower correlation to traditional asset classes.

With a combination of historically attractive underlying fundamentals, portfolio diversification characteristics and inflation-protection capabilities, institutional investors have been including real assets in their portfolios for years – whether through an allocation to commercial real estate or a focus on energy equities. Within the "real" asset class are several subcategories, including real estate, commodities, natural resources and infrastructure. The latter – which historically has had limited investor access – is a growing segment that has recently garnered more attention from investors who are looking for the characteristics that real assets can offer.

As infrastructure's potential benefits have become more well-known, more retail investors have become interested in allocating to this subcategory. To support this growing demand, a number of infrastructure-related strategies have been launched in recent years. As a result, infrastructure has emerged as a growing asset class among retail and institutional investors alike.

This paper highlights the following:

- The growing inclusion of real assets in investor portfolios
- How infrastructure is classified and ways it is available to investors
- Increased use of infrastructure assets in institutional portfolios
- The current demand for infrastructure investment
- The key benefits, and risks, of investing in infrastructure

Investors realize the benefits of real assets

Real assets have the potential to buffer portfolios against the effects of inflation, currency price movements and other macroeconomic factors. Real assets typically include commodities, real estate, timberland, natural resources and infrastructure. For years, investors have had some exposure to the various real asset subcategories, predominately through real estate investments.

The potential diversification benefit of real assets – which have low correlation with traditional equity and bond investments – was highlighted by the 2008 global financial crisis. In today's post-financial crisis environment, additional benefits have come to the fore, including income generation and attractive performance during high-inflationary periods.

As a result of these potential benefits, targeted allocations to real assets have increased. Given the unique benefits and risks to each subcategory, investors generally select which assets to include in their portfolio based on their individual goals.

Infrastructure as a 'real' asset

While some real assets are quite familiar to investors – including real estate, commodities and metals – others may be less known. For many, infrastructure is a relatively new investment option within the asset class.

The evolution of the infrastructure subcategory is similar to real estate's progression over the years. About 50 years ago, real estate investing entailed institutions owning direct real estate in their portfolios. Since then, it has expanded to the point where individual investors can buy a listed real estate security through a broker, generally in the form of a real estate investment trust, or "REIT."

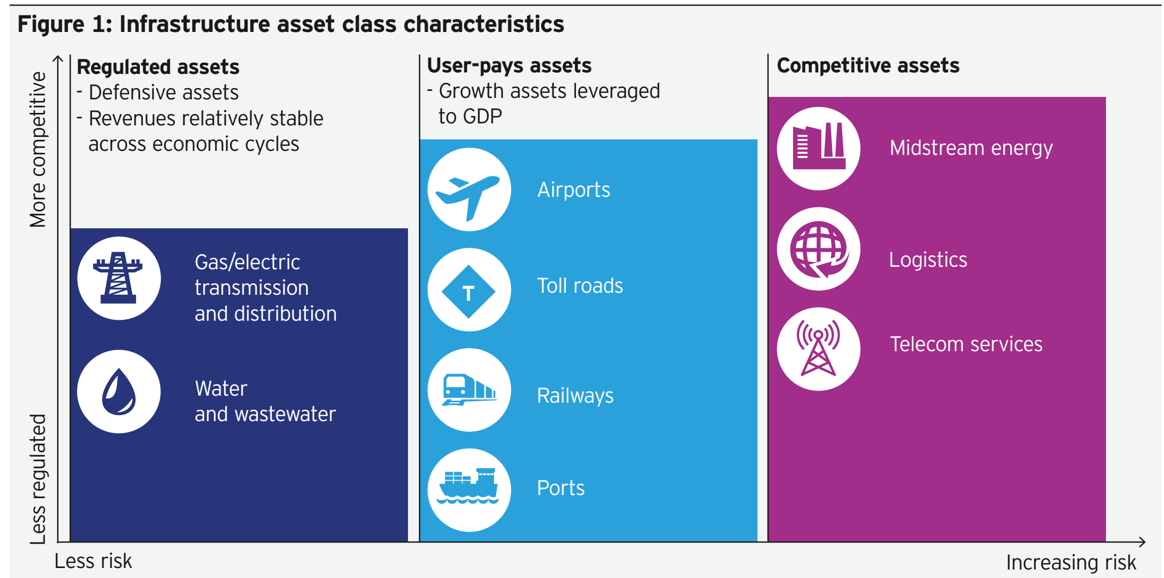
As investors have realized that the underlying characteristics of infrastructure and real estate are very similar – that is, long-lived assets that generally have stable underlying cash flows normally tied to some form of contract – they have been expanding their allocations under the "real asset" umbrella.

How infrastructure is defined

Infrastructure is a critical, yet often overlooked, part of our daily lives. We drive on infrastructure, need it for electricity and water, and use it to talk on our cellphones.

Infrastructure assets like airports, ports, railroads and water utilities tend to have long, useful lives and can generate cash flow over a long duration – sometimes a century or more. Infrastructure assets essentially operate as quasi-monopolies – for example, electric transmission lines have little or no competition because the upfront investment for construction is substantial and usually irreversible. Thus, infrastructure comprises long-lived assets in industries with high barriers to entry, typically supported by resilient demand for essential services.

Figure 1: Infrastructure asset class characteristics



Source: Invesco Real Estate

Ways to invest in infrastructure

There are two ways to access equity investments in infrastructure assets – through listed infrastructure securities or via unlisted infrastructure investments, which could include private ownership of assets or shares of unlisted funds.

Whereas the values of unlisted assets are based on their net tangible asset value (or the underlying value of the asset), listed assets are valued daily by the stock market. And while unlisted assets are noted for their diversification benefits, predictable cash flow and low volatility, a listed portfolio can provide investors greater liquidity and lower expenses.

Infrastructure can also be classified in terms of timing: For example, infrastructure investments can be made pre-construction (or "greenfield") or when the asset is mature and operating (or "brownfield"). While the underlying assets may be the same, the decision of when to invest can have

a significant impact on the risk-return profile. Typically, greenfield investments have higher risk due to the natural construction risk and forecast patronage, while brownfield assets are usually generating cash and could be more likely to pay cash yields.

Institutional interest in real assets

During the 1990s, about 70% o f investment in infrastructure came from the public sector, about 22% fr om the private sector and about 8% fr om the World Bank.[1] However, public investment in infrastructure dropped disproportionately in the 1990s as the result of fiscal retrenchment. As the result of this large-scale privatization of infrastructure assets, institutional investors became interested in unlisted infrastructure. Since that time, institutional investors have been growing their investments in infrastructure, attracted by its long-term, steady cash flow and inflation-protection capabilities, which are appealing to pension funds and life insurance companies that typically seek both to earn yield and to offset or hedge their long-term liabilities.

Institutional investors, who were the early adopters of infrastructure as an asset class, are significantly increasing or plan to increase their allocations to real assets to combat today's climate of sluggish growth, low interest rates and general volatility. This has implications for retail investors who are now beginning to initiate or increase their exposure to alternative investments, such as infrastructure.

As shown in Figures 2 and 3, a recent survey of more than 460 institutions found that 52% o f investors surveyed reported that they planned on increasing their allocation to infrastructure in the long term, while 48% s aid they plan to commit more capital to infrastructure portfolios in 2016 than they did in 2015.[2]

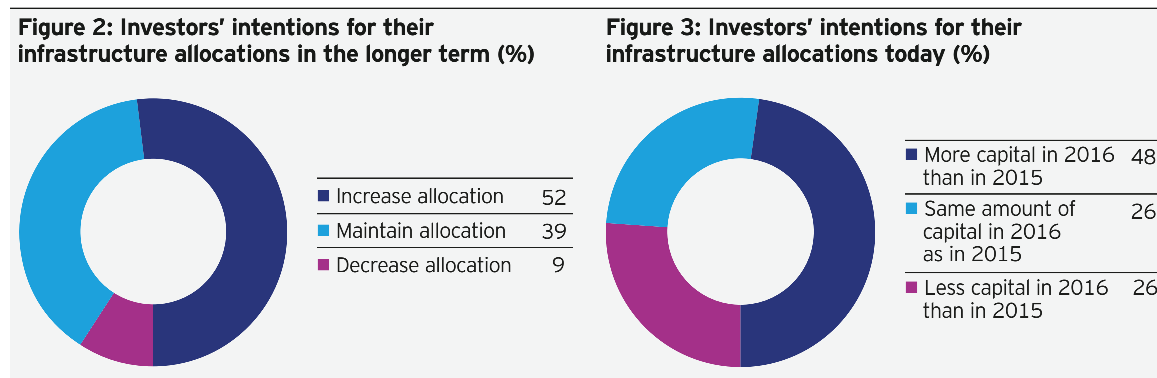


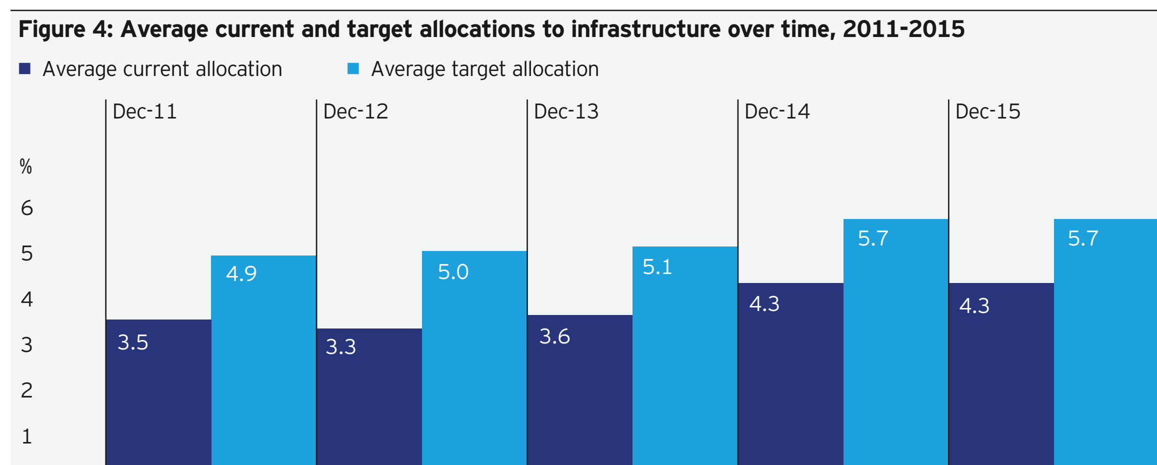
Figure 2: Investors' intentions for their infrastructure allocations in the longer term (%)

Figure 3: Investors' intentions for their infrastructure allocations today (%)

Source: "Preqin Investor Outlook: Alternative Assets," H1 2016

Since the global financial crisis, infrastructure investment by institutions has grown steadily as investors have sought return and income in today's low interest-rate environment. As shown in Figure 4, investors' average current and target allocations have, for the most part, risen since 2011.

Figure 4: Average current and target allocations to infrastructure over time, 2011-2015



Source: "Preqin Investor Outlook: Alternative Assets," H1 2016

1 Source: The World Bank "The Challenge of Financing Infrastructure in Developing Countires." Chapter 6 in Global Development Finance 2004: Harnessing Cyclical Gains for Development.
2 Source: "Preqin Investor Outlook: Alternative Assets," H1 2016

Institutional vs. retail interest in infrastructure

Institutional investors traditionally dominated the investment landscape for unlisted infrastructure, as there were limited opportunities for retail investors to gain exposure to the asset class. In recent years, however, retail investors have also entered the asset class in a meaningful way. In fact, over the past 10 years, total net assets in Lipper's Global Infrastructure Funds Category have swelled from below $150 million to over $45 billion currently.[3]

Retail investors are attracted to infrastructure because of its defensive characteristics and low correlation with traditional equity investments. As the options available to retail investors continue to grow, along with their understanding of the importance of diversification, demand for infrastructure investments is expected to increase.

Case study

The privatization of water systems in England and Wales

While "infrastructure as an asset class" is a comparatively new concept in the US, it has an established track record in other countries. For example, in the UK, Canada and Australia, infrastructure has been considered its own asset class for some time. In the mid-1990s, many Australian investment banks set up infrastructure portfolios, which first attracted local pension plans as investors. Several large Canadian pension plans were also early adopters of the asset class.

One well-known infrastructure investment example is the water systems in England and Wales, which were privatized in 1989 when the government sold 10 publicly owned water companies.[4] The change was part of a broader government strategy, which also encompassed the telecom and energy sectors, to privatize the ownership and management of public assets. The creation of the water companies also brought a new regulatory structure to the UK to ensure the quality of the water. (The water systems in Scotland and Northern Ireland remained controlled and operated by public authorities.)

Before the UK privatized its water assets, there was great debate over the implications of such a move. Created by the Water Act of 1973, 10 regional water authorities (RWAs), covering England and Wales, had responsibility for water supply, sewerage, sewage treatment, flood prevention, land drainage, pollution prevention, fisheries and water abstraction.

However, this proved to be a challenge for water authorities, as each organization had its own management structure. What's more, the water industry was faced with aging infrastructure and chronic underinvestment, coupled with little interest from the public for higher water bills to pay for such investment. For years, water authorities bemoaned the limits on public-sector borrowing that were imposed by the government to contain inflation, which made it challenging to maintain and improve the infrastructure of the water systems.

The government's solution to closing the funding gap was to privatize the water authorities. Ultimately, privatization made investment in England's and Wales' water infrastructure possible through newly created holding companies that operated the new water companies. The water holding companies were traded on such markets as the London Stock Exchange, while a number of smaller water-only companies were created in the private sector.

Since privatization in 1989, the water industry in England and Wales has matured, with water companies undergoing changes in ownership and structure. In recent years, more institutional investors have sought ownership in water assets. Nearly a decade after the privatization, The World Bank Group summarized the results: "These reforms have delivered an impressive volume of new investment, full compliance with the world's most stringent drinking water standards, a higher quality of river water and a more transparent water pricing system."

The need for infrastructure

Emerging economies need infrastructure to support increased urbanization as well as the expansion of their middle class. Developed countries need investment for upgrading and improving existing aging infrastructure, which often has become inadequate to support current demand.

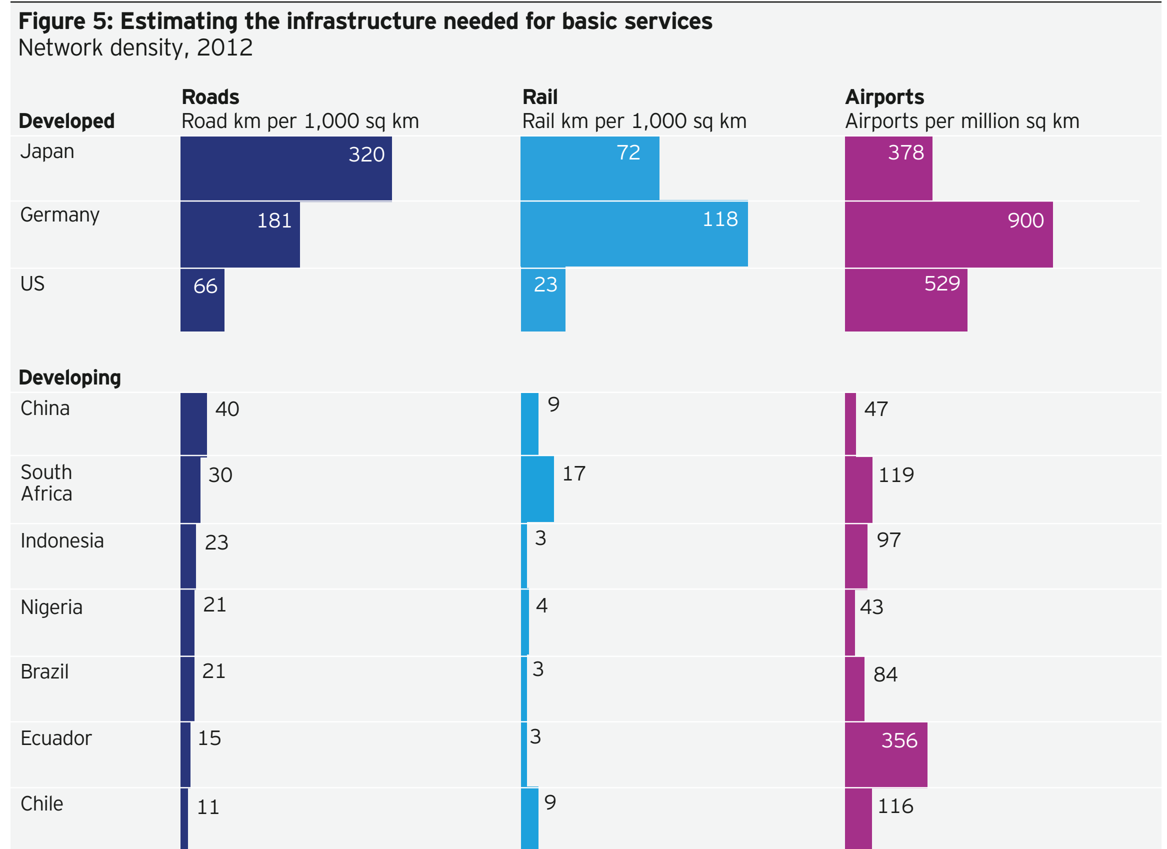
The demand for infrastructure encompasses two critical characteristics:

- **It's relatively independent of business cycles.** Therefore, infrastructure assets tend to produce regular, stable cash flows during downturns, and allow pricing adjustments for booming economies and rising inflation rates. Fees for using a toll road or a pipeline, for example, are normally linked to an inflation rate.

3 Source: Lipper, Inc.
4 Source: "UK Water Privatisation – A Brie fing," University of Greenwich, Emanuele Lobina, February 2001.

- **It's self-perpetuating.** Infrastructure investments help stimulate economic growth, thus creating an even greater need for infrastructure. The World Economic Forum estimates that every dollar spent on infrastructure generates an economic return of between 5% and 25%. Simply put, infrastructure is the backbone of the world's economy.

Figure 5: Estimating the infrastructure needed for basic services
Network density, 2012



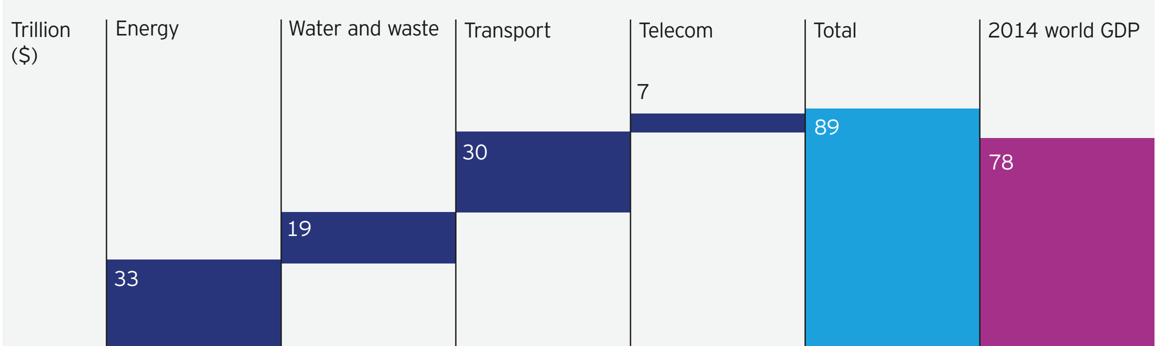
Sources: CIA World Factbook 2012; Infrastructure Africa; Economic Research Institute for ASEAN and East Asia; World Economic Forum, Global Competitiveness Report 2011-2012; McKinsey Global Institute Analysis.

Current estimates place the global infrastructure investment need at $58 trillion to $90 trillion. To put this in perspective, worldwide gross domestic product (GDP) was $78 trillion in 2014.[5]

- The Organization for Economic Cooperation and Development (OECD) estimates that the total cumulative infrastructure requirements for transportation, communication, energy and water total more than $70 trillion between 2007 and 2030.
- In a January 2016 report, McKinsey & Co. forecasted that an $89 trillion investment is required on core infrastructure alone between now and 2030, just to keep up with GDP growth.
- In 2014, PricewaterhouseCoopers suggested that annual global infrastructure investment would need to increase from $4 trillion currently to $9 trillion by 2025 for all infrastructure sectors, which amounts to a $78 trillion global investment overall for the next two decades.

5 Source: The World Bank.

Figure 6: Global infrastructure investment need is estimated at $89 trillion
Global infrastructure investment by infrastructure class (2015-2030)



Sources: McKinsey Center for Business and Environment and the World Bank. Investment need projection was as of January 2016, and does not include projections for sustainable costs. GDP data as of April 2016. There is no guarantee that the projections shown will come to pass.

In the US in particular, lack of government spending has left infrastructure assets in poor shape. As shown in the infrastructure "report card" from the American Society of Civil Engineers (Figure 7), the spending gap between infrastructure funding and needed improvements was a staggering $3.6 trillion in 2013. That number is expected to grow to $10 trillion by 2040.

Figure 7: Grading US infrastructure: D+ with a $3.6 trillion spending gap

Category	1988*	1998	2001	2005	2009	2013
Aviation	B-	C-	D	D+	D	D
Bridges	-	C-	C	C	C	C+
Dams	-	D	D	D+	D	D
Energy	-	-	D+	D	D+	D+
Levees	-	-	-	-	D-	D-
Rail	-	-	-	C-	C-	C+
Roads	C+	D-	D+	D	D-	D
Transit	C-	C-	C-	D+	D	D
Ports	-	-	-	-	-	C
America's infrastructure GPA	**C**	**D**	**D+**	**D**	**D**	**D+**
Cost to improve	**-**	**-**	**$1.3 trillion**	**$1.6 trillion**	**$2.2 trillion**	**$3.6 trillion**

Source: American Society of Civil Engineers
*The first infrastructure grades were given by the National Council on Public Works Improvements in its report Fragile Foundations: A Report on America's Public Works, released in February 1988. ASCE's first Report Card for America's Infrastructures was issued a decade later.

With the US national debt just over $18 trillion, the federal government has limited resources to close that infrastructure funding gap, which has been building over the last decade due to a notable decrease in government infrastructure spending at all levels. More significantly, the last decade saw a decrease of 23% in c apital expenditures for infrastructure, while operations and maintenance spending increased 6% o ver the last decade.

Looking ahead, we believe there's potential for increased securitization of infrastructure assets, and that private investment will play a larger role in helping to close the public funding gap confronting many nations today.

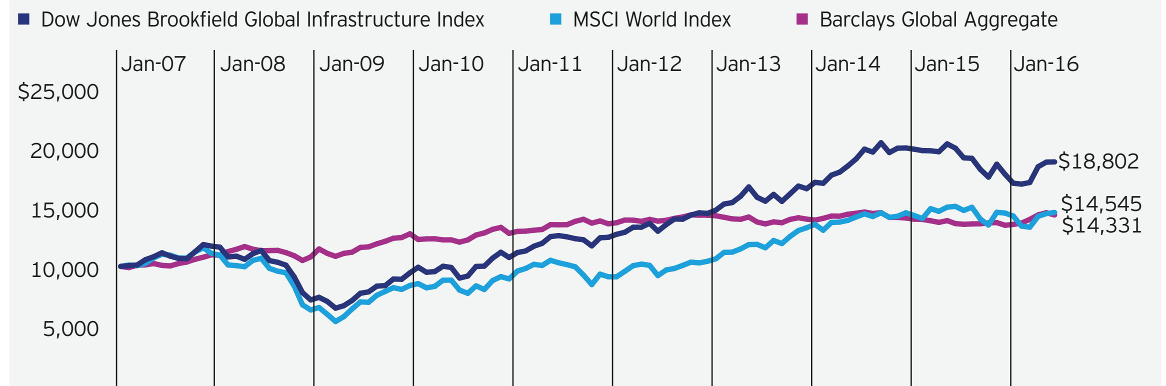
So why global infrastructure?

Investors can gain diversification benefits by allocating a portion of their assets to infrastructure in a multi-asset portfolio, as infrastructure shows low correlation to general bond and equity markets. For example, correlation of global infrastructure relative to US fixed income is low at 0.27.[6] Diversification can also be enhanced by owning a portfolio of global infrastructure securities that has moderate to negative correlation at the country level.

Additional benefits may include:

- **Attractive total returns** – Global infrastructure has historically provided competitive returns relative to broad markets. For the 10 years ending May 31, 2016, the Dow Jones Brookfield Global Infrastructure Index returned 8.8% in a verage annual returns versus the MSCI World Index return of 4.6%.

Figure 8: Growth of $10,000



Source: StyleADVISOR. Dow Jones Brookfield Global Infrastructure Index is a net return index. Past performance is not a guarantee of future results; current performance may be lower or higher. An investment cannot be made directly into an index.

- **Attractive risk-adjusted returns** – The contractual nature of infrastructure cash flows tends to both enhance their predictability and lower financial risk, thus potentially boosting the risk-adjusted performance of the asset class.

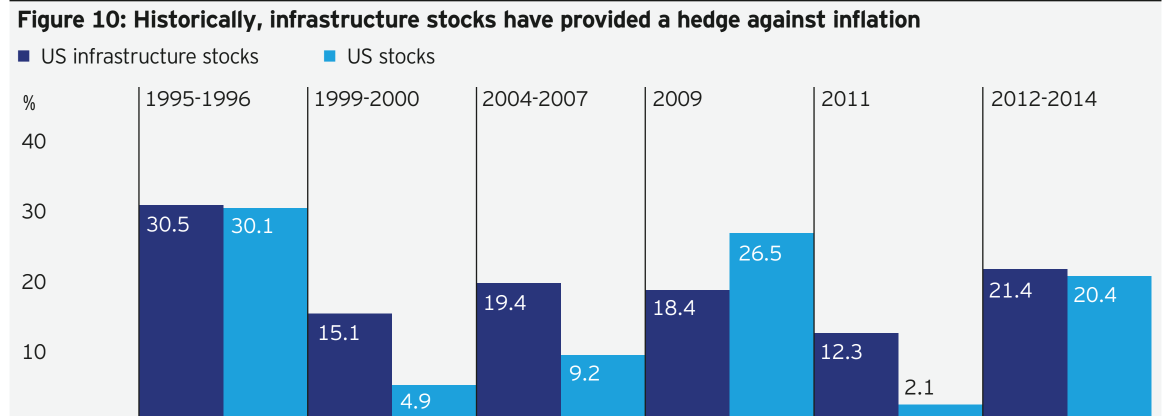
Figure 9: Infrastructure has historically provided attractive risk-adjusted returns
10 years as of May 2016

Source: StyleADVISOR, annualized statistics. Past performance is not a guarantee of future results; current performance may be lower or higher. An investment cannot be made directly into an index. Global infrastructure represented by the Dow Jones Brookfield Global Infrastructure Index (net index); US stocks represented by S&P 500 Index; global stocks represented by MSCI World Index; US bonds represented by Barclays US Aggregate Index, global bonds represented by Barclays Global Aggregate Index; US REITs represented by FTSE NAREIT All Equity REIT Index; global REITs represented by FTSE EPRA/NAREIT Developed Index (net index).

6 Source: Lipper, Inc. Global infrastructure as measured by the Dow Jones Global Infrastructure Index and US fixed income as measured by the Barclays Capital US Aggregate Index. Past performance is not a guarantee of future results; current performance may be lower or higher. An investment cannot be made directly into an index.

- **Inflation-linked returns** – Historically, infrastructure has provided inflation-hedging characteristics. In a review of inflationary periods – defined as the US consumer price index above 2.5% – US infrastructure stocks outperformed US stocks by 6.5% annualized. (See Figure 10.)

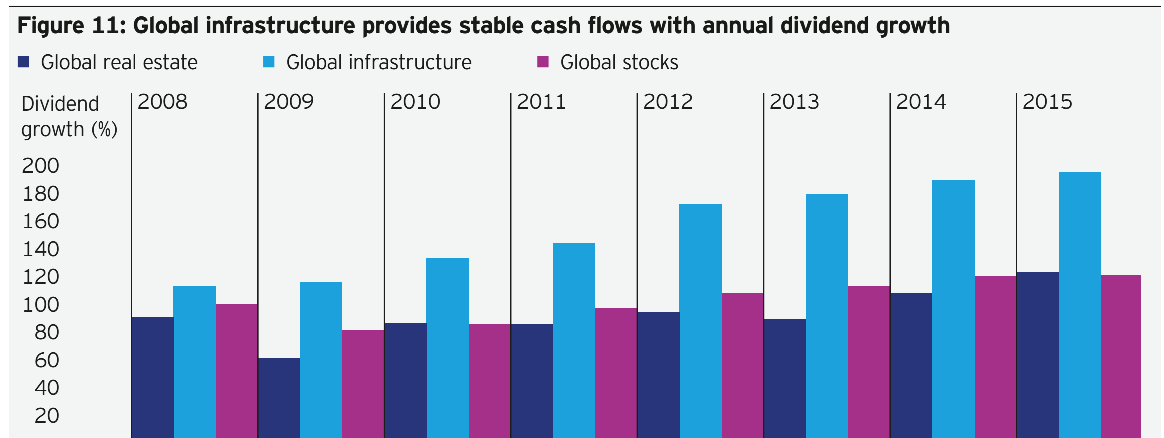
Figure 10: Historically, infrastructure stocks have provided a hedge against inflation



Inflationary period defined at CPI above 2.5%. CPI is represented by the US consumer price index.
Sources: Invesco and StyleADVISOR. US infrastructure stocks average calculated using a simple average of annual returns of the S&P 600 Water Utilities, S&P 500 Utilities Sector and S&P 500 Road & Rail indexes. US stocks represented by S&P 500 Index.

- **Low volatility compared with traditional asset classes** – The long-term horizon of infrastructure assets has historically made this asset class less susceptible to short-term market swings than other global investment strategies.
- **Stable long-term yields with the potential for capital growth** – A significant portion of infrastructure returns comes from recurring income. The dividend yield for the Dow Jones Brookfield Global Infrastructure Index was 3.4% versus 2.7% for the MSCI World Index, as of Dec. 31, 2015. Moreover, global infrastructure has experienced 12% annual dividend growth in the years following the global financial crisis, compared with 2% and 3% annual dividend growth for global stocks and global real estate, respectively. The path of dividend growth is important as well. As Figure 11 shows, infrastructure has experienced annual consecutive growth since 2008 – even in 2009, when dividends on both global stocks and global real estate shrank.

Figure 11: Global infrastructure provides stable cash flows with annual dividend growth



Sources: Invesco Real Estate estimates as of Dec. 31, 2015, Bloomberg L.P.
Global real estate represented by FTSE EPRA/NAREIT Developed REITs Index, global infrastructure represented by Dow Jones Brookfield Global Infrastructure Index and global stocks represented by MSCI World Index.

- **Defensive characteristics emanating from the provision of essential services** – Infrastructure can benefit the community while delivering sound, long-term returns without taking huge amounts of risk. The contractual nature of infrastructure cash flows tends to both enhance their predictability and lower financial risk, thus providing potentially defensive behavior during market downturns.

Mitigating infrastructure risks with active management

Infrastructure assets are typically regarded as having relatively lower risk. However, as with any asset class, there are unique risks to consider when investing in infrastructure – in particular, infrastructure projects can face particular risk from uncertainties regarding regulation, taxation and other government policies. That's why Invesco Real Estate believes an active approach to infrastructure – with experts who examine every detail of an asset before investing – is critical to success. Our portfolio managers believe that managing for risk is just as important as managing for returns, and our investment process and philosophy include a comprehensive approach to risk management.

Conclusion

We believe growing acceptance and understanding of the real asset category may lead to a growth in allocations to the infrastructure subcategory. Heightened demand for infrastructure spending over the next few decades may also increase the number of opportunities to invest in infrastructure.

In addition, continued bouts of volatility in the global markets may prompt investors to consider new ways of diversifying their portfolios. We believe infrastructure investing may help with this task, as many infrastructure companies are less sensitive to changes to the economy, which may help them outperform the broader market when stocks are selling off.

With attractive risk-adjusted returns, diversification properties, relatively low correlation and volatility, as well as stable and predictable cash flows, infrastructure investing continues to gain traction among investors. Invesco Real Estate believes these potential benefits make a compelling case for considering an investment in the infrastructure that you likely take for granted every day.

Types of infrastructure companies

The following are examples of the types of companies that may be included in an infrastructure portfolio.

Regulated assets

Gas/electric transmission and distribution: Companies that own and maintain power grids and transmission pipelines or lines that distribute gas and electricity to end users. Gas/electric transmission and distribution companies, more commonly known as gas/electric utilities, own defensive assets that are regulated and offer relatively stable revenues across economic cycles.

Water and wastewater: Companies that store, treat and deliver water supply and wastewater. Given the essential nature of these services, water and wastewater companies own fairly defensive assets that offer relatively stable revenues across economic cycles. They are also regulated and tend to exhibit relatively lower risk than user-pays or competitive infrastructure assets.

User-pays assets

Airports: Companies that develop and manage airports, including retail stores as well as food and beverage services. Airports are considered user-pays assets. They provide an unregulated service and, therefore, tend to be impacted by the economic cycle with their growth leveraged to GDP.

Toll roads: Companies that develop, manage and maintain urban toll roads, at times providing essential connectivity to the main routes around major cities. Toll roads are also considered user-pays assets, with growth leveraged to GDP.

Railways: Companies in the railway category have exposure to freight, commodities and passengers. Railways are considered user-pays assets, with growth leveraged to GDP.

Ports: Companies in the seaports category have exposure to freight, commodities and passengers. Ports are economically sensitive, with growth leveraged to global GDP, and are considered user-pays assets.

Competitive assets

Midstream services: Companies involved in the gathering, processing, storage and transportation of oil and gas. Midstream assets are considered competitive assets as opposed to regulated assets such as utility companies which have returns on equity set by regulators.

Logistics: Companies involved in the global transportation and storage of goods between the source and the consumer. Logistic assets are considered competitive assets.

Telecom services: Companies that own and operate telecommunications infrastructure, including satellites, wireless towers and networks. Telecom service companies own competitive assets, which exhibit greater risk but also increased opportunity for growth.

About risk

Investment in infrastructure-related companies may be subject to high interest costs in connection with capital construction programs, costs associated with environmental and other regulations, the effects of economic slowdown and surplus capacity, the effects of energy conservation policies, governmental regulation and other factors.

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