

Combining equity and fixed income listed infrastructure – approaches and outcomes

March 2021

AUTHOR

Sergiy Lesyk

Director, Research and Analytics

+44 0 207 866 8082

sergiy.lesyk@lseg.com

Overview

In our previous study, [Practical considerations for listed Infrastructure, June 2019](#), we explained that listed equity infrastructure has a number of distinctive properties from the rest of listed of equities that justifies its consideration from investors. A combination of listed infrastructure equities and listed fixed income infrastructure provides investors with a wider choice of vehicles and investment strategies.

- In this paper, we demonstrate that combining listed equity and fixed income infrastructure in a single portfolio improves its risk and return profile compared to a pure infrastructure fixed income or equity portfolio. We also explain some of the other benefits of this combination.
- Combining listed fixed income and equity infrastructure into a single portfolio can also be viewed as a transparent way to access liquid exposures to the whole underlying infrastructure asset class, as opposed to a single exposure to either equity or fixed income infrastructure.
- We also discuss different options for combining fixed income and equity listed infrastructure assets and their historical performance.

Contents

Executive summary	3
Possible benefits of multi-asset infrastructure investing?	4
Infrastructure diversification dilemma	4
Income component and defensive properties	7
Different impact of inflation on fixed income and equities infrastructure	9
Vehicles of investment in multi-asset infrastructure	11
Multi-asset construction methods	12
Summary	17
References	18

Executive summary

We have discussed the benefits of investing in listed infrastructure equities in a previous paper[1]. The analysis showed that listed equity infrastructure could provide superior risk-adjusted returns, higher dividend yield, defensive characteristics and diversification benefits for equity investors.

In this publication, we are looking at the potential benefits of combining listed infrastructure equities and listed infrastructure debt into a single portfolio.

- We verify that combining listed infrastructure equities and debt brings diversification benefits and improves the risk-adjusted returns. In general, the benefits of combining debt and equity to diversify portfolios are well known (see [2] and literature references) and have led to the rapid growth in multi-asset investing [3]. Infrastructure has been a less obvious investment due to the bond-like performance characteristics of listed infrastructure equity, as explained in our earlier publication [1].
- In this paper, we demonstrate that from a pure infrastructure bond portfolio point of view, the diversification effect improves the yield of the portfolio as a result of the equity dividends, which increase the overall returns. Perhaps, more importantly, the equity component serves as a partial inflation hedge for fixed income investors.
- Pure infrastructure equity investors can reduce volatility and drawdowns by adding infrastructure bonds to their portfolios. The fixed income component can serve as a hedge for equity holders during a corporate restructuring, which can be particularly important given the high leverage of infrastructure companies.
- We also discuss some of the challenges of diversification in a multi-asset infrastructure portfolio and the advantages and disadvantages of investing in listed multi-asset portfolio compared with other unlisted infrastructure vehicle investments.
- Finally, we explain different approaches to selecting a ratio of debt to equity in the multi-asset listed infrastructure portfolio.

Possible benefits of multi-asset infrastructure investing?

We have classified the reasons investors may be interested to combine several asset classes in a single portfolio [3]. One of the most common is diversification, which improves a portfolio's expected risk-adjusted returns.

For infrastructure investments, adding infrastructure fixed income and equities into a single portfolio is a natural fit. The capital structure of most infrastructure assets has a significant debt component, and the combination of debt and equity in a portfolio can be viewed as an unleveraged investment in an infrastructure asset. In this paper, we consider the potential benefits of this combination, using the FTSE Russell Developed Core Infrastructure and the FTSE Fixed Income Core Infrastructure series.¹

Infrastructure diversification dilemma

First, we review the merits of portfolio diversification when infrastructure fixed income and equity are combined into a single portfolio.

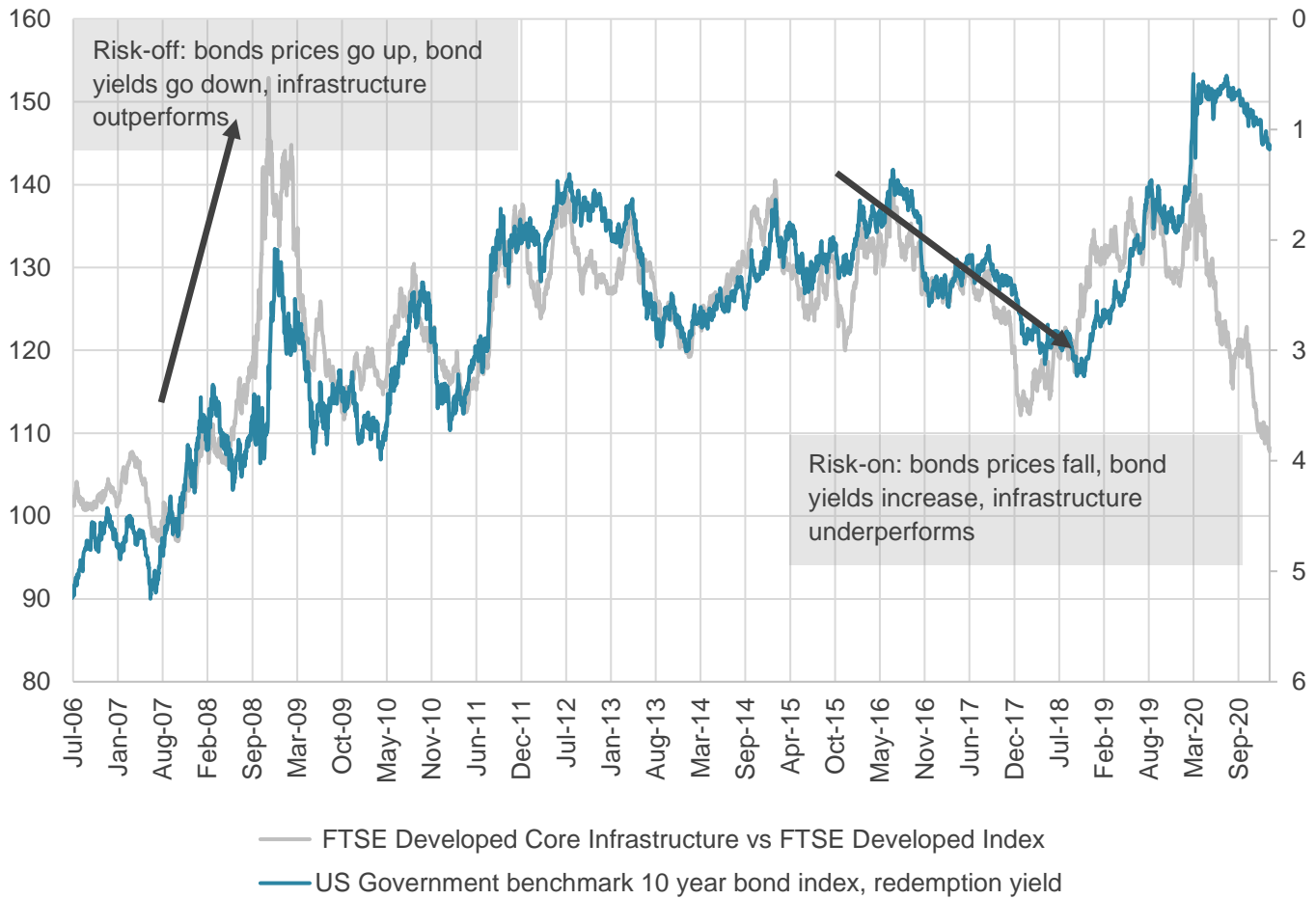
The diversification benefits of mixing bonds and equities in a portfolio has been widely researched [2] and generally accepted. However, the diversification benefits of combining infrastructure listed equity with fixed income may not be as obvious, as listed infrastructure equity exhibits some bond-like behavior [1].

Figure 1 looks at returns since 2006 and shows that infrastructure tend to outperform the wider stock index when bond yields fall, and vice versa.

¹ FTSE Russell. Ground rules of FTSE Infrastructure Index Series. September 2020.
https://research.ftserussell.com/products/downloads/FTSE_Infrastructure_Index_Series.pdf

FTSE Fixed Income Core Infrastructure index series are scheduled to launch in March 2021.

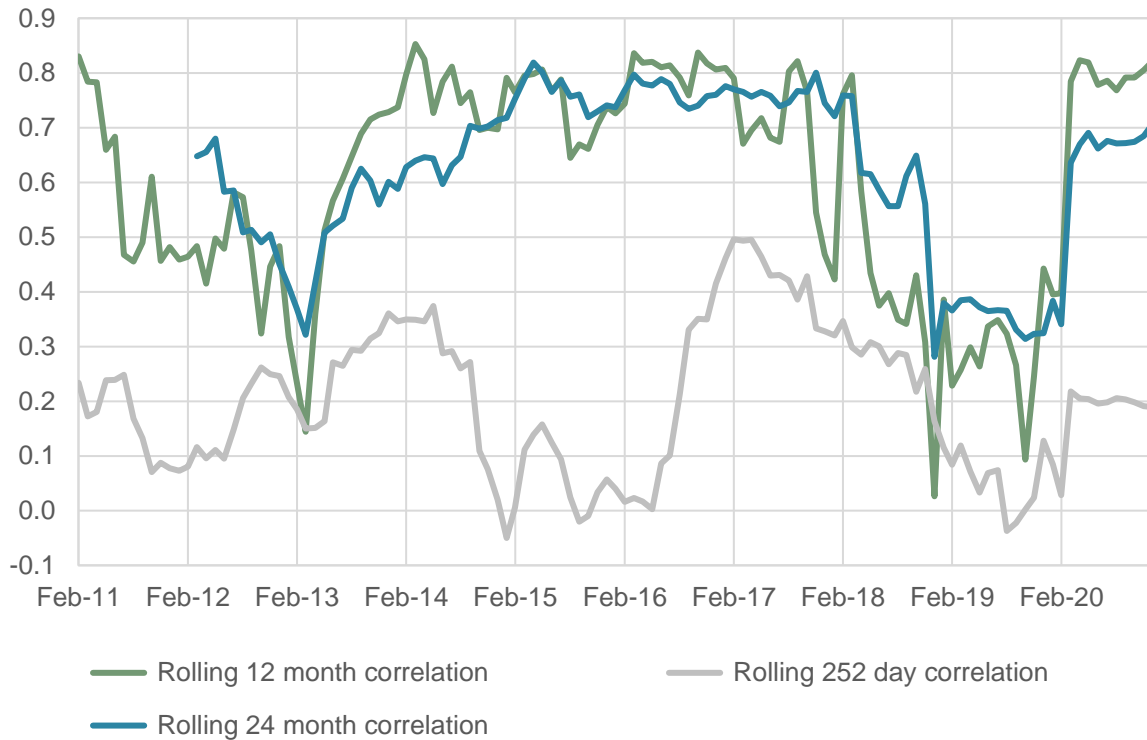
Figure 1. Performance of FTSE Developed Core Infrastructure Index relative to FTSE Developed Index versus 10-year US bond yield (inverted RH-scale)



Sources: FTSE Russell, for Infrastructure Index data, daily observations from February 26, 2010 to February 12, 2021. Refinitiv, for bond index data. 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.

To assess the merits of diversification, we calculate the historical correlation between the performance of the FTSE Russell Developed Core Infrastructure and the FTSE Fixed Income Core Infrastructure Index over different periods and frequencies. Figure 2 shows that the correlation in performance varies over time and fluctuates between -0.02 and 0.89.

Figure 2. Return correlation coefficient between FTSE Russell Developed Core Infrastructure and FTSE Russell Fixed Income Core Infrastructure indexes



Sources: FTSE Russell, for Infrastructure Indexes, daily observations from February 26, 2010 to December 31, 2020. 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.

As can be seen, the correlation in the daily returns have been low during the last 10 years, fluctuating between just below 0 and 0.5, while the last two years saw the correlation reach an even lower level of 0.2.

Monthly returns correlations, over rolling one and two years, have generally been higher, reaching or briefly exceeding 0.8. In the last two years, both 12 and 24-month rolling correlations have been low, at below 0.6, with the exception of the COVID-19 crisis period when the correlations increased again to above 0.6.

From the correlation levels, it is reasonable to expect that combining equity and debt listed infrastructure into a single portfolio can provide diversification benefits. Using different proportions of debt and equity mix, we also calculate the returns and volatility of the multi-asset portfolios with a monthly rebalance (in the case of fixed equity/fixed income ratio portfolios), and with no rebalancing for the market value portfolio in Table 1.

The various equity-debt combinations show an improvement in risk-adjusted returns in the multi-asset portfolio compared to single asset fixed income and equity indexes. Therefore, we can conclude that combining listed infrastructure fixed income and equities does offer some diversification benefits.

Table 1. Risk and return characteristics of listed infrastructure multi-asset portfolios

	100% Equity	80% equity, 20% fixed income	Market Value (70% equity, 30% fixed income)	60% equity, 40% fixed income	50% equity, 50% fixed income	30% equity, 70% fixed income	100% fixed income
Annualized return	7.00%	6.37%	6.14%	5.72%	5.38%	4.69%	3.61%
Annualized volatility	13.87%	11.27%	10.97%	8.89%	7.83%	6.14%	5.57%
Information ratio	0.50	0.57	0.56	0.64	0.69	0.76	0.65

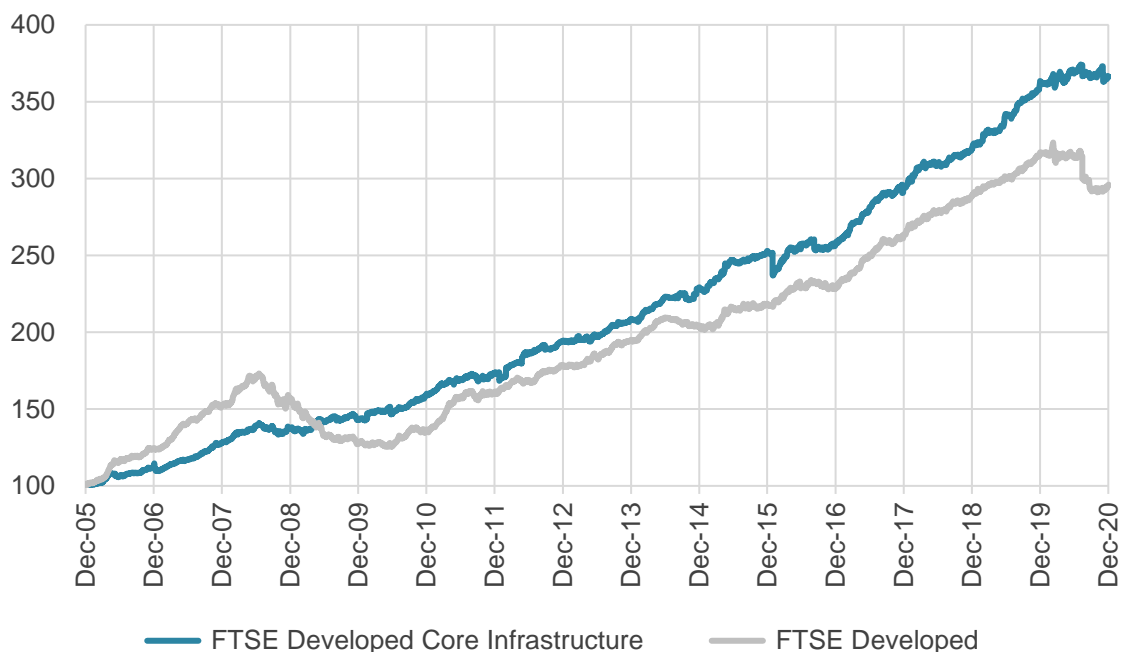
Sources: FTSE Russell, for Infrastructure Index data, daily observations from February 26, 2010 to December 31, 2020. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

Income component and defensive properties

As Table 1 illustrates, the return of the multi-asset infrastructure portfolios is equal to the weighted average of the fixed and equity components, while the combined volatility is lower than the weighted average of the respective volatilities.

The combination of the equity and fixed income infrastructure assets not only improves the risk-adjusted returns, but also the current yield profile for fixed income investors; it adds a stable dividend stream (see Figure 3) from the equity infrastructure in exchange for a disproportionately lower level of volatility in the portfolio.

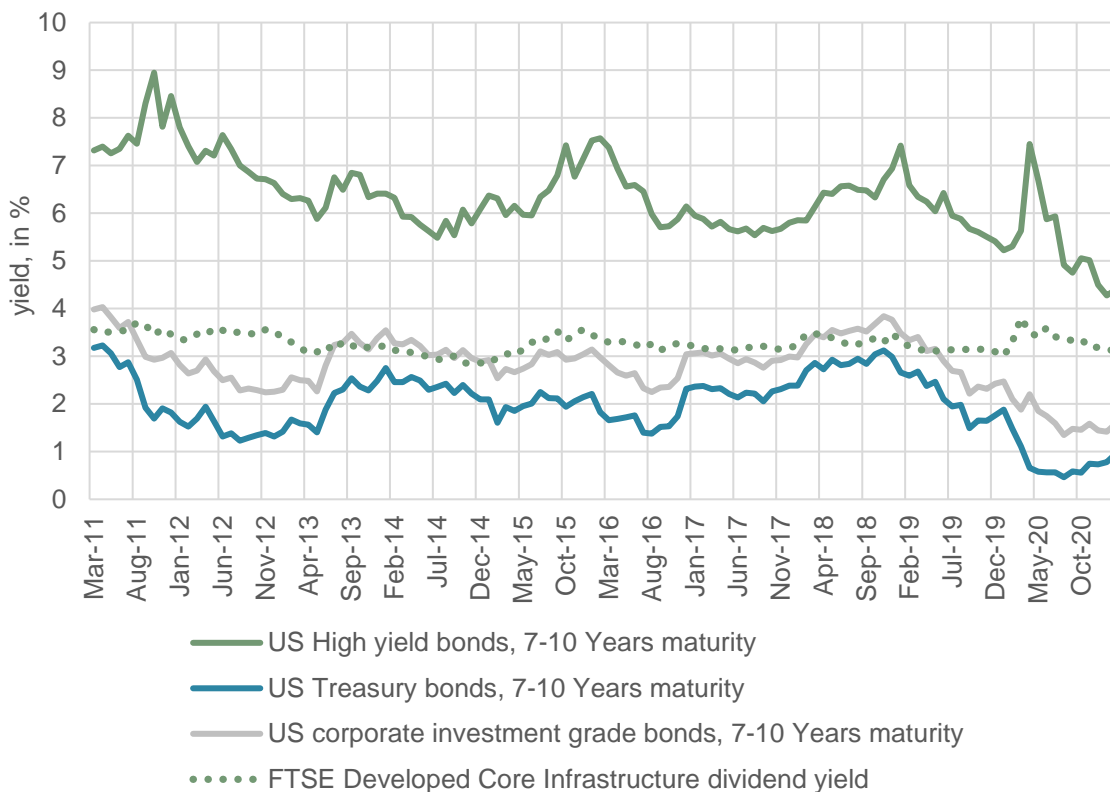
Figure 3. Rebased DPS of FTSE Developed Core Infrastructure Index and FTSE Developed Index



Source: FTSE Russell. FTSE Developed Core Infrastructure and FTSE Developed Indexes based on monthly data from December 2005 to December 2020. 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.

The additional yield is particularly attractive for fixed income investors, who are looking for extra yield in an environment of low bond yields as shown in Figure 4.

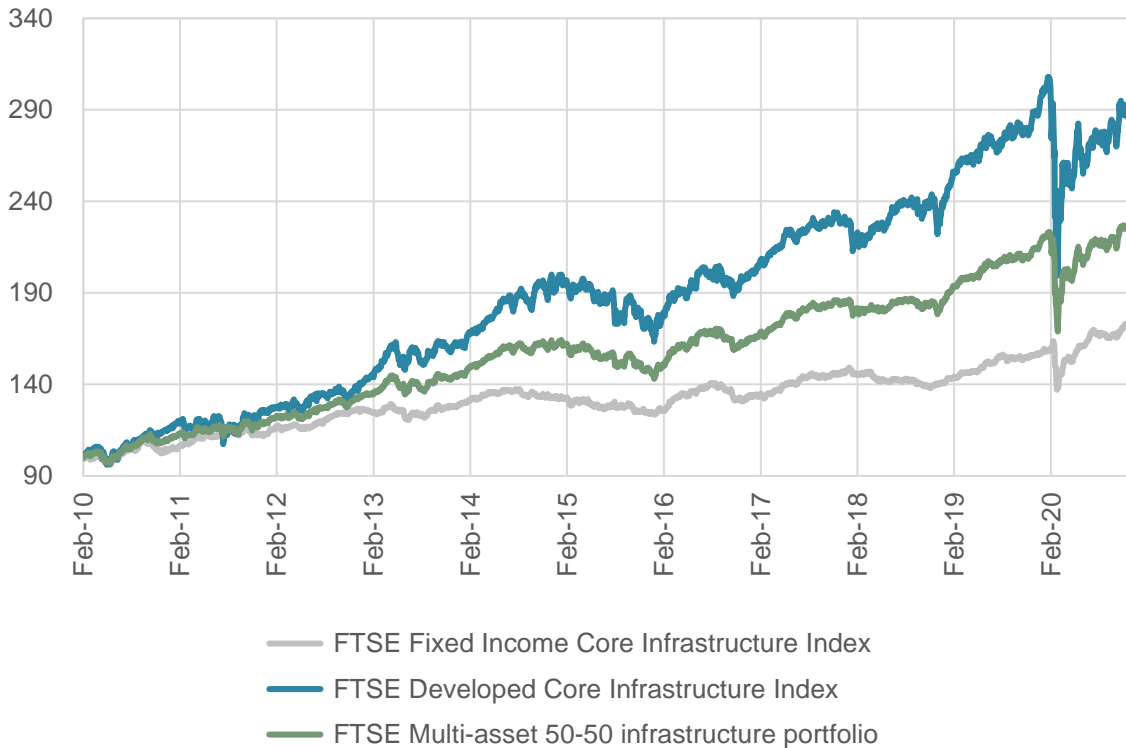
Figure 4. Selected fixed income benchmarks' yields and FTSE Developed Core Infrastructure dividend yield



Sources: FTSE Russell, for Infrastructure Index data, daily observations from March 2011 to February 2021. Refinitiv, for the bond index data. 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.

From an equity investor point of view, the addition of the debt component reduces the volatility and drawdowns of the portfolio, increasing the defensive properties of a listed infrastructure investment. Moreover, adding a fixed income component may also be viewed by equity holders as a hedge against corporate distress in the event the covenants of the bonds are triggered and the company has to restructure its capital.

Figure 5. Recent performance of FTSE Russell Developed Core Infrastructure, FTSE Fixed Income Core Infrastructure index and 50-50 FTSE Multi-asset infrastructure portfolio



Sources: FTSE Russell, for Infrastructure Index, daily observations from February 26, 2010 to December 31, 2020. 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.

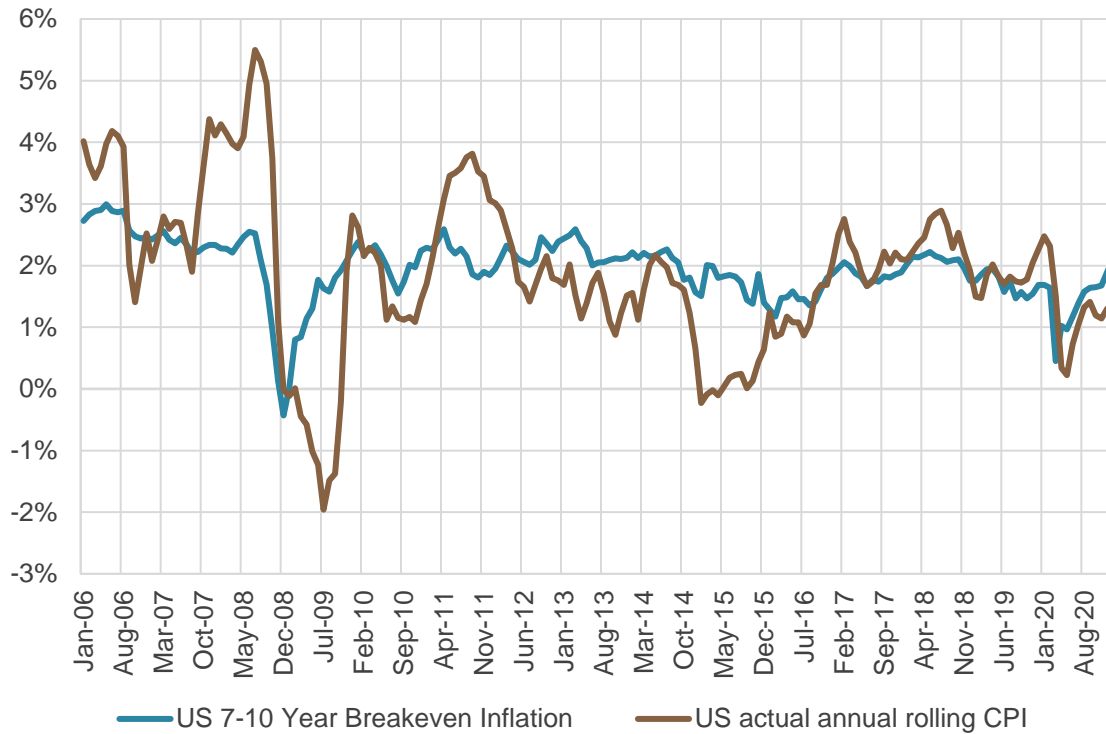
Different impact of inflation on fixed income and equities infrastructure

While infrastructure equity investors can hedge the risk of corporate distress via a multi-asset portfolio, fixed income investors may use the multi-asset approach for inflation protection.

Indeed, combining fixed income and equity components is a way of capturing the stable income stream from the infrastructure asset as a whole. As most of infrastructure asset pricing has a ratchet-up revenue mechanism, the upside from increased revenues and profits are captured by equity investors. Pure fixed income infrastructure investors, particularly of long-dated securities, do not participate in the upside from the profits of the company and the capital appreciation of the asset.

Inflation is also likely to lead to capital appreciation, which investors in a pure infrastructure fixed income portfolio would miss out on. However, this has not been an issue in the last decade as inflation has been largely tamed (Figure 6).

Figure 6. US inflation expectations and actual CPI



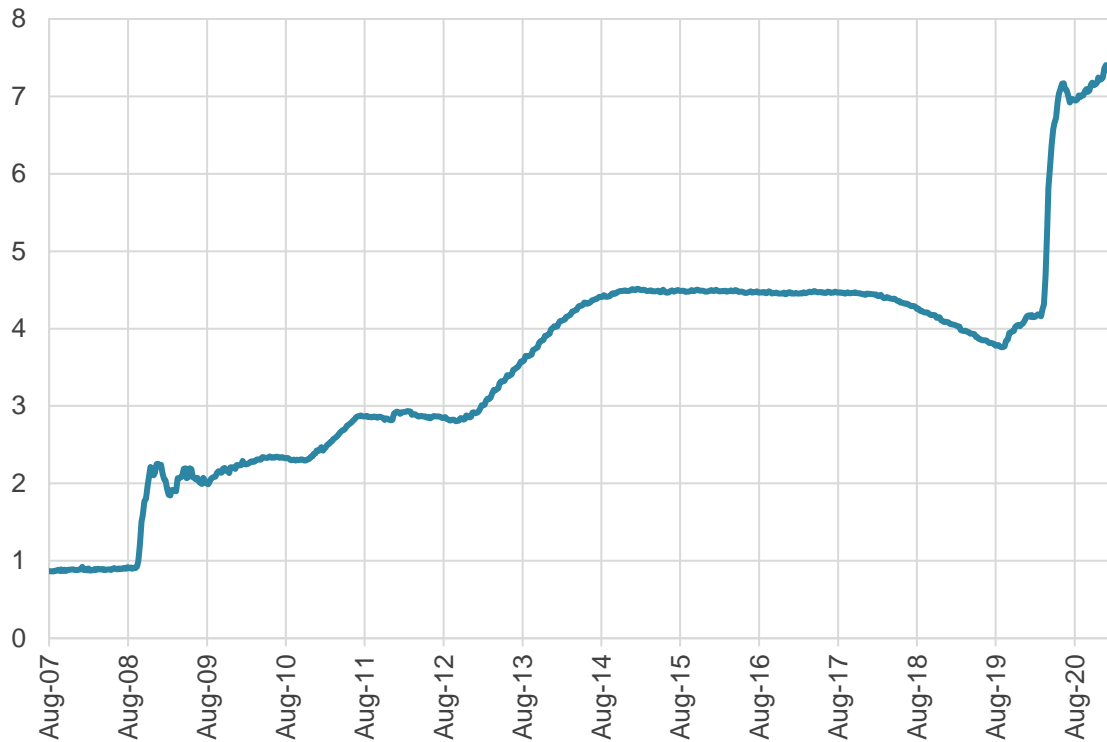
Sources: FTSE Russell, for Infrastructure Index, daily observations from January 15, 2005 to January 15, 2021. Refinitiv, for the bond index. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical, historical data. Please see the end for important legal disclosures.

However, the massive monetary easing which followed the COVID-19 crisis (Figure 7) has put inflation back on the agenda of investors. In our blogs², we have reflected on rising investor concerns over inflation. Therefore, adding equity infrastructure to a fixed income infrastructure holding can be topical in the current environment, as it can provide a hedge against inflation, in addition to the risk-adjusted return cash flow adjustment.

² Robin Marshall. FTSE Russell blog. July 8, 2020. Does Q2 inflation-linked and credit rally presage helicopter money. <https://www.ftserussell.com/blogs/does-q2-inflation-linked-and-credit-rally-presage-helicopter-money>

Philip Lawlor. FTSE Russell blog. August 24, 2020. Can inflation take root without money velocity increasing? <https://www.ftserussell.com/blogs/can-inflation-take-root-without-money-velocity-increasing>

Figure 7. Quantitative easing. Size of the US Federal Reserve balance sheet, in TrIn USD



Sources: FTSE Russell, for Infrastructure Index, daily observations from February 26, 2010 to February 3, 2021. 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.

Vehicles of investment in multi-asset infrastructure

We have mentioned several benefits which result from combining fixed income and equity infrastructure investments, using liquid infrastructure instruments as illustrations. But these are not limited to listed infrastructure vehicles, and are similarly applicable to unlisted, private and direct investments in infrastructure.

The benefits are also applicable to unlisted vehicles, but to a lesser extent. The recent market developments have demonstrated once again the benefits of diversification. Despite having a more robust earnings profile overall, some segments of infrastructure have suffered more, and have been slower to recover, than others during the COVID-19 crisis. Examples include airports, which have significantly underperformed, as well as toll-road operators. By contrast, communication infrastructure has performed well.

Constructing a well-diversified portfolio with direct infrastructure investment requires large financial resources, while listed infrastructure equity requires a much smaller portfolio size level.

Liquidity is another consideration that impacts the choice of infrastructure investment vehicle. The issue of liquidity is not just the ability, timing and cost of entering and exiting of investments. It is also about the ability to add value to the portfolio by changing the weights of the fixed income and equity components.

Comparing (Table 1) the market value weighted multi-asset portfolio with the fixed ratio multi-asset portfolios (which are rebalanced to the fixed ratio on a monthly basis) illustrates that the monthly rebalance marginally improves the risk-adjusted return compared to the portfolio where relative weights of equity and fixed income components drift according to the market performance. The proportion between fixed income and equities does not have to be fixed and we discuss the options in the next section.

The total value of listed infrastructure securities (fixed income and equities) is approximately US \$4 trillion, allowing investors to have a significant position, if desired. There could be some specific infrastructure assets, however, which are not accessible through listed vehicles and direct investment or unlisted vehicles could be the only options available. Unlisted infrastructure vehicles could also be a way to access new construction and other valued added activities in infrastructure, including turnaround of distressed assets.

Multi-asset construction methods

In the previous sections, we discussed the benefits of combining fixed income and equity infrastructure in a single portfolio.

We now consider different approaches to choosing the ratio between fixed income and equity components. One of the typical and traditional approaches is to have a fixed ratio.

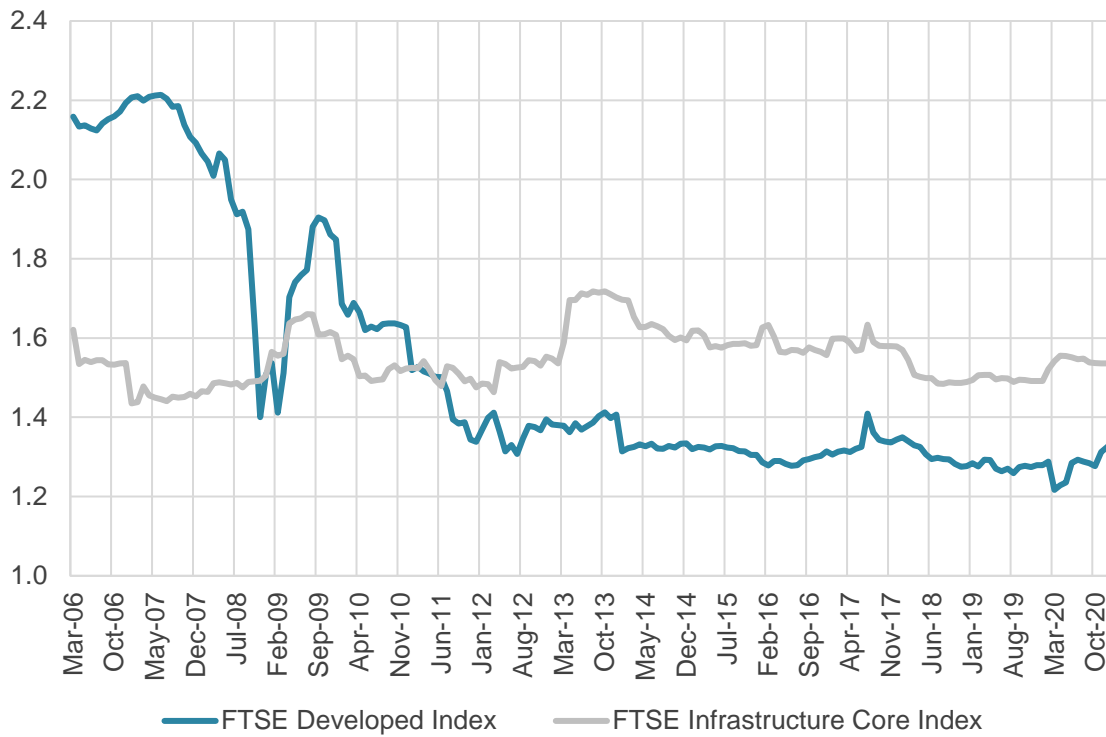
In the fixed ratio scenario, for example the classic fixed “60/40” approach, the multi-asset portfolio is reset to the 40% debt component and 60% equity component at the rebalance dates. Besides having the benefit of simplicity, it also generates additional return in volatile asset price environment, when assets returns are mean reverting in some sense, as the strategy buys underperforming asset class on the rebalance date and sells outperforming one. It is not always a value-added activity, however. In market conditions when one asset is consistently outperforming, the fixed rebalance strategy leads to consistent selling of outperforming asset at the rebalance date and accumulating underperforming asset.

The fixed ratio between the fixed income and equity components can be adapted to the risk tolerance of an investor. Typically, the fixed income component increases over time as risk tolerance decreases, the so called “glidepath” approach, usually used in pension fund holdings as beneficiaries approach the pension age.

Another approach is a variable ratio between fixed income and equities, where the ratio is not fixed at the rebalancing dates. We looked at popular fixed income equity switching models for setting variable ratios. The examples below illustrate the different approaches:

- 1. Leverage (debt-to-equity) ratio of infrastructure companies in the FTSE Developed Core Infrastructure index.** At each rebalancing date, the ratio of the fixed income and the equity portions are reset to be equal to the debt-to-equity ratio of the FTSE Developed Core Infrastructure Index. The leverage ratio has been relatively stable over the last 15 years, fluctuating between 1.6 and 1.8, which is equivalent to a respectively 38.5% and 35.7% proportion of equity in the capital structure (Figure 8). In the multi-asset portfolio model, at the end of each month, we set the ratio between the fixed income and equity portions to be equal to the latest available data for capital structure of the FTSE Developed Core Infrastructure Index.

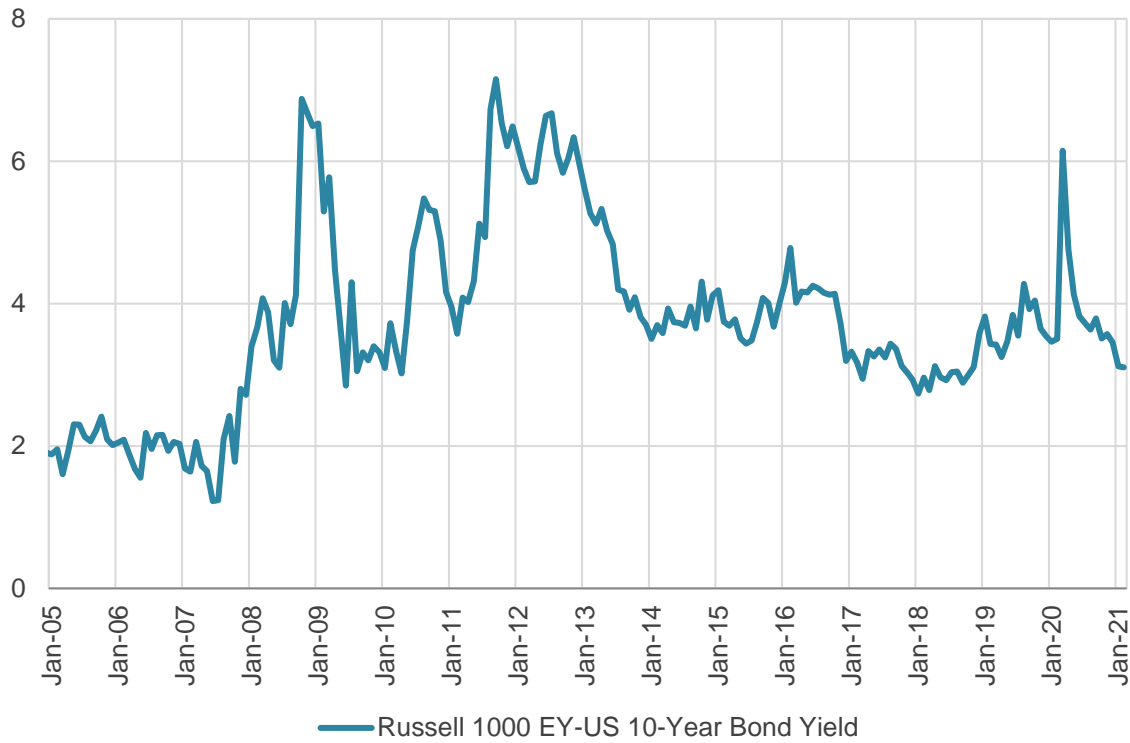
Figure 8. Debt to equity ratio of FTSE Russell Developed Core Infrastructure index



Sources: FTSE Russell, for Infrastructure Index, monthly observations from March 17, 2006 to January 15, 2021. 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.

2. US Federal Reserve model of yield differential. A popular model compares the earnings yield of the Russell 1000 index and 10-year treasury bond yields (Figure 9). In the last 15 years, the difference fluctuated between around 1.5% and 7%. At the rebalancing dates, we reset the fixed income and equity components, depending on where the latest yield differential is within 0% and 8%. The upper limit, 8% indicates a relatively high yield of equities compared to bonds and warrants higher allocation to equities. If the ratio is closer to the lower limit, it would indicate that the fixed income yield warrants a higher allocation to the asset class.

Figure 9. Yield differential between Russell 1000 earnings yield and US 10-year treasury bond yield



Sources: FTSE Russell, for Infrastructure Index, monthly observations from January 7, 2005 to February 12, 2021. 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.

- 3. Normalized relative return.** A simple, yet popular, model that looks at the relative three-month rolling performance of fixed income and equity indexes, normalized by correlation. It is based on the presumption of the mean reversion of relative performance and adjusts for trending behavior via correlation normalization. Historically, it fluctuated between -1 and 1. In our simulation, we linearly mapped the normalized relative return to the proportion of infrastructure equity portion on the rebalance date where -1 would correspond to 100% equity and 1 would correspond to 0% equity.

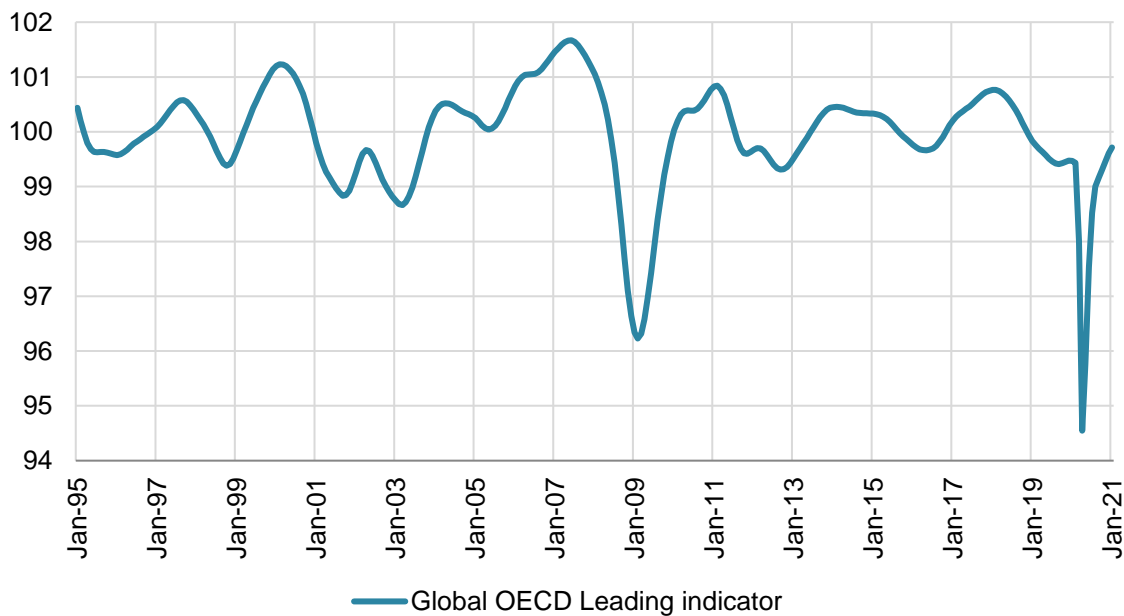
Figure 10. Normalized relative performance of Russell 1000 relative to US 10-year government bonds



Sources: FTSE Russell, for Infrastructure Index, weekly observations from July 3, 1990 to February 12, 2021. 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.

- OECD leading indicator.** Similarly to the normalized relative return approach, we mapped the range of values from around 94 to 102 for the leading indicator to the range of proportion of equities in a simulated portfolio from 100% to 0% respectively.

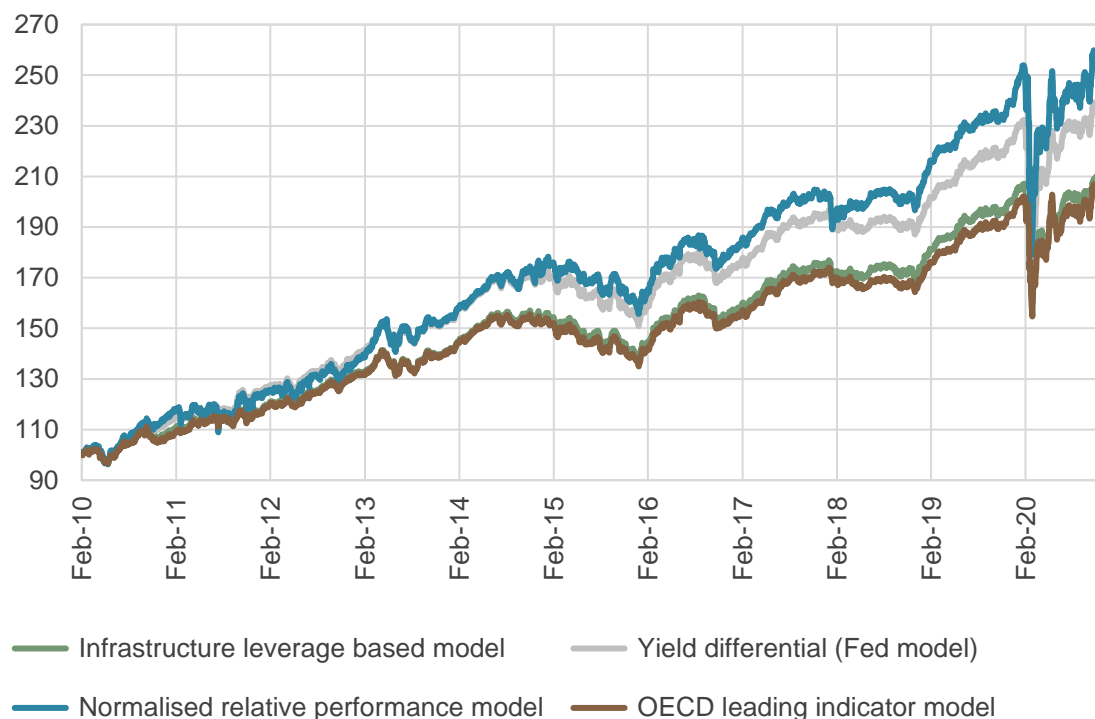
Figure 11. Global OECD leading indicator



Sources: Refinitiv data, monthly observations from August 7, 1996 to January 12, 2021. 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.

In all cases, the rebalances are performed at the end of each month. We have compared the performance of the portfolios constructed in different ways – Figure 12 and Table 2.

Figure 12. Performance of differently constructed multi-asset infrastructure portfolios



Sources: FTSE Russell, for Infrastructure Index, daily observations from February 26, 2010 to December 31, 2020. 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.

Table 2. Risk and return characteristics of differently constructed infrastructure multi-asset portfolios

	80% equity, 20% fixed income	30% equity, 70% fixed income	Leverage ratio	US Federal Reserve model	Normalized relative performance	OECD leading indicator
Annualized return	6.37%	4.69%	4.88%	5.75%	6.17%	4.72%
Annualized volatility	11.27%	6.14%	6.98%	8.25%	10.80%	7.75%
Information ratio	0.57	0.76	0.70	0.70	0.57	0.61

Sources: FTSE Russell, for Infrastructure Index, daily observations from February 26, 2010 to December 31, 2020. 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.

The normalized relative return model produced the best absolute return but the lowest information ratio. In all the models, we used a simple rule of mapping between the range of model signal values to the ratio of fixed income and equity in the multi-asset portfolio. We have not aimed to optimize the models to achieve the highest returns and best information ratio.

From a performance and information standpoint, all four models, however, are within the range of fixed ratio multi-asset rebalance portfolio, which suggests that a significantly more complex fixed income-equity allocation models would be required to outperform the simple fixed ratio portfolios, with a glidepath overlay for appropriate risk management.

Summary

In this paper, we demonstrated the diversification benefit of a multi-asset portfolio for infrastructure investors by testing several combinations of fixed income and equity listed infrastructure mix, which led to an improvement in the risk-adjusted returns.

We also looked at several popular fixed income-equity rebalancing models. We have not set to optimize the rebalancing models in any way but showed that there are various asset allocation strategies, which we applied to the infrastructure fixed income and equity components. It appears that in terms of returns and information ratios, these models perform within the range set by a fixed ratio approach, which may suggest that more sophisticated rules-based, multi-asset allocation models would be required to outperform simple fixed-weight, rebalanced portfolios.

Besides the historical statistical improvement of the risk-adjusted return, the equity-debt mix can provide other benefits such as inflation protection, and a yield improvement for fixed income investors.

Finally, we pointed out that listed multi-asset infrastructure portfolios allow a significantly lower entry point for investors compared to direct multi-asset infrastructure portfolios.

References

1. FTSE Russell. Practical consideration for listed Infrastructure. June 2019.
2. Wainscott, C.B. The stock-bond correlation and its implications for asset allocation. Financial Analysts Journal (1990), pp. 55-60.
3. FTSE Russell. The growth of the multi-asset investing (Part 1).

For more information about our Infrastructure Indexes, please visit our [FTSE Infrastructure Index Series](#) page.

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.

To learn more, visit ftserussell.com; email info@ftserussell.com; or call your regional Client Service Team office

EMEA

+44 (0) 20 7866 1810

North America

+1 877 503 6437

Asia-Pacific

Hong Kong +852 2164 3333

Tokyo +81 3 4563 6346

Sydney +61 (0) 2 8823 3521

© 2021 London Stock Exchange Group plc and its applicable group undertakings (the "LSE Group"). The LSE Group includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE Global Debt Capital Markets Inc. and FTSE Global Debt Capital Markets Limited (together, "FTSE Canada"), (4) MTSNext Limited ("MTSNext"), (5) Mergent, Inc. ("Mergent"), (6) FTSE Fixed Income LLC ("FTSE FI"), (7) The Yield Book Inc ("YB") and (8) Beyond Ratings S.A.S. ("BR"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB and BR. "FTSE®", "Russell®", "FTSE Russell®", "MTS®", "FTSE4Good®", "ICB®", "Mergent®", "The Yield Book®", "Beyond Ratings®" and all other trademarks and service marks used herein (whether registered or unregistered) are trademarks and/or service marks owned or licensed by the applicable member of the LSE Group or their respective licensors and are owned, or used under licence, by FTSE, Russell, MTSNext, FTSE Canada, Mergent, FTSE FI, YB or BR. FTSE International Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator.

All information is provided for information purposes only. All information and data contained in this publication is obtained by the LSE Group, from sources believed by it to be accurate and reliable. Because of the possibility of human and mechanical error as well as other factors, however, such information and data is provided "as is" without warranty of any kind. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly or impliedly, either as to the accuracy, timeliness, completeness, merchantability of any information or of results to be obtained from the use of the FTSE Russell products, including but not limited to indexes, data and analytics or the fitness or suitability of the FTSE Russell products for any particular purpose to which they might be put. Any representation of historical data accessible through FTSE Russell products is provided for information purposes only and is not a reliable indicator of future performance.

No responsibility or liability can be accepted by any member of the LSE Group nor their respective directors, officers, employees, partners or licensors for (a) any loss or damage in whole or in part caused by, resulting from, or relating to any error (negligent or otherwise) or other circumstance involved in procuring, collecting, compiling, interpreting, analysing, editing, transcribing, transmitting, communicating or delivering any such information or data or from use of this document or links to this document or (b) any direct, indirect, special, consequential or incidental damages whatsoever, even if any member of the LSE Group is advised in advance of the possibility of such damages, resulting from the use of, or inability to use, such information.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing contained herein or accessible through FTSE Russell products, including statistical data and industry reports, should be taken as constituting financial or investment advice or a financial promotion.

The information contained in this report should not be considered "research" as defined in recital 28 of the Commission Delegated Directive (EU) 2017/593 of 7 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council ("MiFID II") and is provided for no fee

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index inception date is back-tested performance. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. However, back-tested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic data used in the calculation of the index.

This document may contain forward-looking assessments. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking assessments are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially. No member of the LSE Group nor their licensors assume any duty to and do not undertake to update forward-looking assessments.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of the LSE Group. Use and distribution of the LSE Group data requires a licence from FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB, BR and/or their respective licensors.