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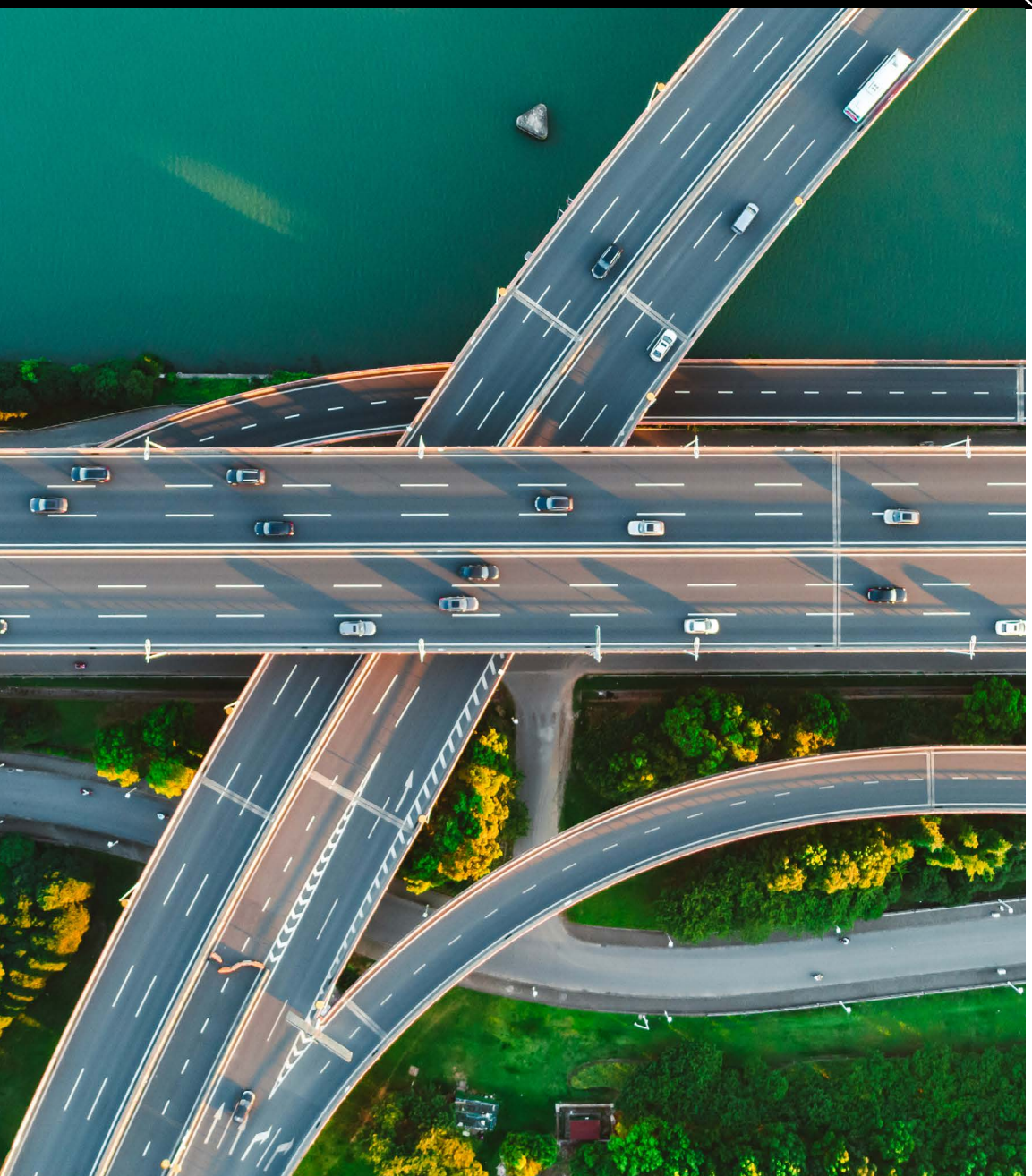
Pathways

Private infrastructure performance: Uncovering the source of returns

September 2025



Executive summary

The database: Using a proprietary dataset of more than 200 private infrastructure assets, we develop time series for key financial statement line items such as revenue and earnings before interest, taxes, depreciation, and amortisation (EBITDA) and analyse their contribution to long-run returns and sensitivity to the economic cycle.

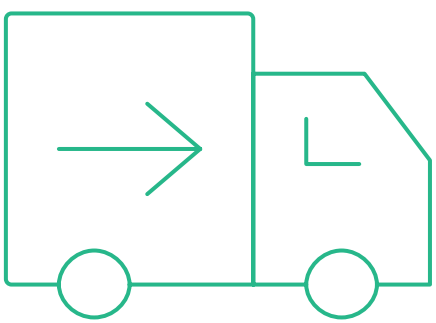
Return drivers: Infrastructure's strong risk-adjusted return over the past decade was primarily driven by robust EBITDA growth, which was in turn driven by (surprisingly) strong revenue growth. We examine in detail the key drivers and discuss why this revenue delivery is likely to largely remain in place going forward.

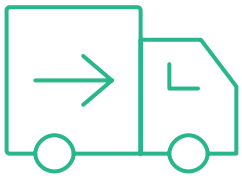
Outlook for returns: Looking ahead, we believe private infrastructure (brownfield operating assets across traditional infrastructure sectors) annualised returns (net of fees) could be in the range of 8.3% to 11.0% over the next 10-year period, depending on the macroeconomic backdrop, with 9.4% being the median expectation.

Other findings about the specific financial statement line items include:

- **Revenue growth:** Private infrastructure revenue experienced an annualised growth rate of 5.0% between 2008 and 2024. Revenue line analysis shows a statistically significant linkage to inflation and strong resilience during downturns.
- **EBITDA growth:** Private infrastructure EBITDA growth averaged 5.8% over the same period. Inflation and GDP growth also drive EBITDA growth, with the sensitivities to these drivers varying across sectors.
- **EBITDA margin:** Private infrastructure had a higher EBITDA margin, at 44%, than listed equities, at 17%, over the past decade, with infrastructure achieving a stronger margin improvement over time.

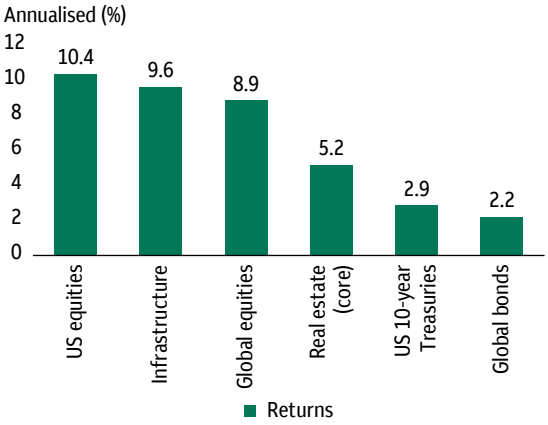
Introduction: Fundamental questions about return delivery





Since 2004, private infrastructure has delivered an annualised return of 9.6%, which is slightly below the 10.4% for US equities (S&P 500® Index) and above the 8.9% for global equities (MSCI World Index).[1] At the same time, the volatility of private infrastructure (9.5%)[2] has been significantly lower than that of US equities (16.6%) and global equities (17.2%). Put simply, private infrastructure's risk-adjusted return delivery has been exceptional over the past two decades.

Figure 1:
Private infrastructure has historically delivered attractive returns



Sources: Macquarie Asset Management (MAM), Bloomberg, European Association for Investors in Non-Listed Real Estate (INREV), Cambridge Associates (June 2025). US equities: S&P 500 Index; private infrastructure: Cambridge Associates Infrastructure Index, returns are net of fees, expenses and carried interest; global equities: MSCI World Index; global bonds: Bloomberg Global Aggregate Total Return Index; real estate (core): INREV Global Real Estate Fund Index (GREFI) refers to core property performance gained via fund structure with low levels of leverage, and excludes land, developments and alternative property sectors. Analysis conducted between 1Q 2004 and 4Q 2024. Past performance is not indicative of future returns.

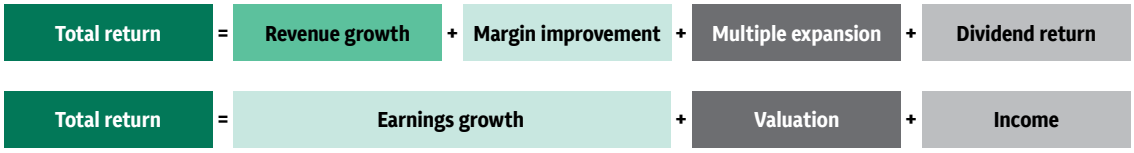
1. US equities: S&P 500 Index; private infrastructure: Cambridge Associates Infrastructure Index, returns are net of fees, expenses and carried interest; global equities: MSCI World Index. Analysis conducted between 1Q 2004 and 4Q 2024. Past performance is not indicative of future returns.
2. For volatility on an unsmoothed basis, refer to our Perspectives paper "Infrastructure portfolio allocation: What could optimal look like?" (April 2025).

In this paper, we use a new proprietary dataset to analyse time series of financial statement line items and to answer several fundamental questions that are critical for investors in private infrastructure. In particular, we aim to understand if private infrastructure can continue this outstanding return performance over the coming decade. Strict adherence to efficient capital market ideas might suggest that after two decades of superior performance, an extended period of weaker performance is due. Our findings suggest over the coming decade private infrastructure is likely to continue to deliver a stronger risk-adjusted return relative to other asset classes. That said, the composition of return drivers may change, depending on the macroeconomic backdrop. As part of this analysis, we explore a range of other, more specific, questions about infrastructure's performance. These questions include:

- How much of the historical total return can be attributed to multiple expansion?
- What are the fundamental drivers behind private infrastructure EBITDA growth?
- How sensitive are infrastructure revenues to the economic cycle?
- Which sectors exhibit stronger linkages to inflation?
- Which infrastructure sectors historically offered the strongest downside protection?

To answer these questions, a total return attribution analysis is required, which can be viewed as follows (Figure 2):

Figure 2:
Total return attribution framework (illustrative only)



Source: Macquarie Asset Management (May 2025).

Our proprietary dataset: Data sources and underlying assumptions

The data available to private infrastructure investors are more limited compared to other asset classes such as listed equities, fixed income, real estate and private equity. While several total return indices exist for infrastructure, time series of financial statement line items that can provide valuable insight into underlying return drivers are often unavailable. This paper aims to fill this gap in investors' data tool kit. Given the data constraints, we rely on a variety of sources to construct each time series.

- **Earnings:** Drawing on MAM's comprehensive proprietary data and a range of publicly available data sources, we have compiled a detailed and extensive financial statement database of 211 private infrastructure assets. The dataset covers the period 2008 to 2024 (inclusive). Aggregate time series for revenue and EBITDA are calculated by weighting sectors according to their share of total deal volumes. The five sectors are transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure (e.g. waste). The dataset primarily includes brownfield operating assets and excludes greenfield or development projects. The outlier data points were detected and removed using the interquartile range (IQR) method.[3]
- **Valuations:** In our Pathways paper, "Private infrastructure valuations: Relative value macroeconomic drivers and implications for investors" (June 2023), we developed a dataset and methodology to track valuation multiples for private infrastructure. Our database is based on 1,222 enterprise value (EV)/EBITDA transaction multiples for private infrastructure deals that reached financial close between 2008 and 2024 (inclusive).
- **Total return:** We rely on the Cambridge Associates Infrastructure Index. The index is a horizon calculation based on data compiled from 232 infrastructure funds. All returns are net of fees, expenses and carried interest.[4]
- **Income:** Derived as a residual component by subtracting the earnings and valuations pillars from total return.

Due to the number of sources used in this analysis, the results are inherently approximations. Nonetheless, we believe this dataset provides valuable insights into the underlying drivers of infrastructure returns as well as a framework for assessing the outlook of same.

3. The IQR method is based on calculating the range between the first quartile and the third quartile and then defining upper and lower bounds based on this range. In this analysis, we used 3 IQR to define upper and lower bounds. Data points falling outside these bounds are considered outliers.
4. Cambridge Associates (as at December 2024).

Revenue growth: Inflation linkage and sensitivity to economic cycle

Between 2008 and 2024, private infrastructure revenue experienced an annualised growth rate of 5.0%, with the highest growth rates observed in digital infrastructure and the lowest in the utilities and power sector.

A regression analysis of the main macroeconomic drivers of infrastructure revenues is shown in Figure 3. Our analysis focuses on inflation, GDP growth and interest rates. The results reveal a positive and statistically significant relationship between infrastructure revenues and both inflation and GDP growth. This indicates that infrastructure revenues tend to grow more rapidly in periods when inflation is high and economic growth is robust.

Figure 3:
GDP growth and inflation are the main macroeconomic drivers of infrastructure revenue growth

Macroeconomic variable	Coefficient	Standard error	T-stat	P-value	Statistical significance
Inflation	0.289	0.112	2.583	0.012	***
GDP growth	0.394	0.107	3.662	0.001	***
Interest rates	-0.195	0.105	-1.861	0.067	not significant

Source: Macquarie Asset Management (June 2025). Analysis conducted between 1Q 2008 and 4Q 2024. All variables are standardised by subtracting the mean and dividing by the standard deviation. Interest rates refer to 10-year government bond yields. Inflation refers to changes in the Consumer Price Index (CPI). All macroeconomic variables are weighted by nominal GDP across the US, the eurozone and the UK. The regression contains an intercept term that is not included in the table above.
*** Statistically significant result when p-value is less than the significance level of 5%.

Private infrastructure revenues and their sensitivity to inflation

Figure 4 illustrates that during periods of elevated (i.e. above average) inflation, private infrastructure revenue growth averaged 7.4%, compared with 3.7% during periods of low (i.e. below average) inflation. Figure 5 shows that revenue growth tends to rise as the inflation threshold increases, further providing evidence for the positive relationship between infrastructure revenues and inflation.

Figure 4:
Revenue growth is stronger when inflation is above average

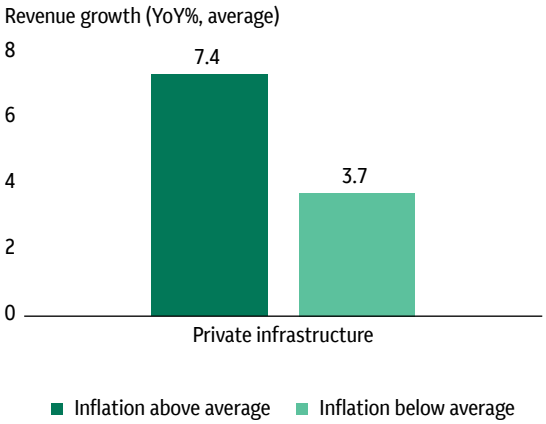
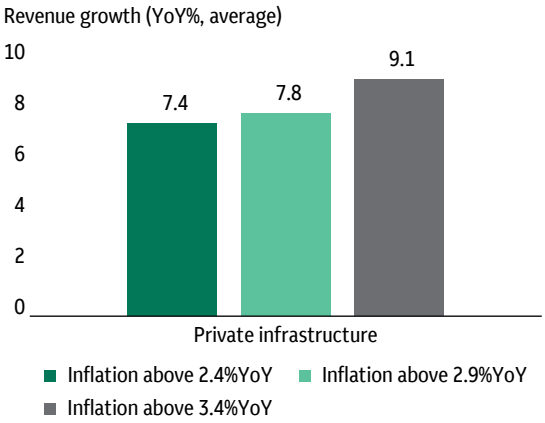


Figure 5:
Higher inflation is associated with stronger revenue growth



Sources: Bloomberg, Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Analysis conducted between 1Q 2008 and 4Q 2024. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Average annual inflation over the period was 2.4%. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

Overall, the historical data show a clear, positive relationship between infrastructure revenues and inflation. Dropping down a level, it is important to understand the underlying mechanisms driving this linkage, as they can differ by location and sector and whether the assets are regulated, contracted or merchant. Many infrastructure projects, such as utilities and transportation assets, operate under long-term agreements that include provisions for inflation adjustment. These provisions enable operators to increase prices and fees in line with inflation, ensuring that revenues maintain their real value over time. Figure 6 highlights some of the common inflation-linkage mechanisms across different infrastructure subsectors.

Figure 6:
The underlying mechanisms of how infrastructure revenues are linked to inflation

Sector	Inflation linkage mechanism
Toll road	Concession agreements often include provisions for periodic toll rate adjustments linked to inflation indices.
Airports	Aeronautical charges (often regulated) have price increases linked to CPI. Non-aeronautical revenues (unregulated) often depend on contracts in place that may include inflation-linked adjustments.
Ports	Some (but not all) port tariffs are explicitly linked to CPI.
Regulated networks[5]	Regulation typically provides high inflation protection, as the regulated asset base (RAB) and revenues allowances are indexed to inflation.
Contracted renewables	Some power purchase agreements (PPAs) are linked to inflation via CPI-based price adjustments.
Fibre networks	Revenues tend to be partially linked to inflation if contracts with service providers or customers include inflationary clauses.
Data centres	Long-term contracts often include annual escalators that increase lease payments by inflation.
Telecom towers	Tower companies, especially independent ones (TowerCos), rely on long-term contracts with CPI escalators.

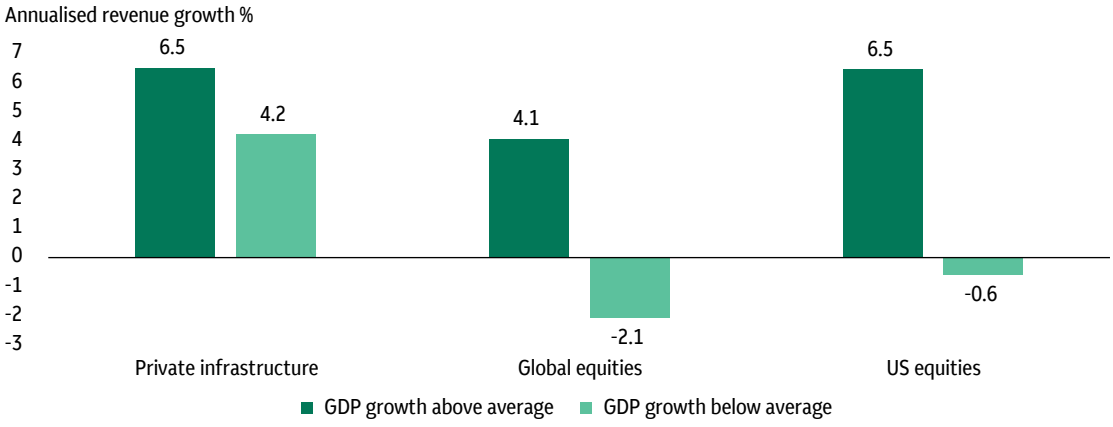
Source: Macquarie Asset Management (June 2025). Does not constitute investment advice or recommendation.

5. Regulated assets may involve regulatory risk. Regulatory risk refers to the potential for changes in regulations that could negatively impact the value or profitability of these assets.

Private infrastructure revenues and their sensitivity to GDP

Like other equity asset classes, infrastructure revenues are positively correlated with economic growth. Figure 7 highlights that higher GDP growth acts as a tailwind for infrastructure revenues. Infrastructure revenues are also less sensitive to GDP fluctuations than listed equities revenues. Particularly noteworthy is that during periods of below-average GDP growth, revenue growth for private infrastructure remained resilient at 4.2% per annum, performing significantly better than listed equities, in which revenues contracted by 0.6% and 2.1% for US and global equities, respectively, in such periods.[6]

Figure 7:
Infrastructure revenues grow strongly when GDP growth is healthy but are also relatively resilient during periods of weak growth



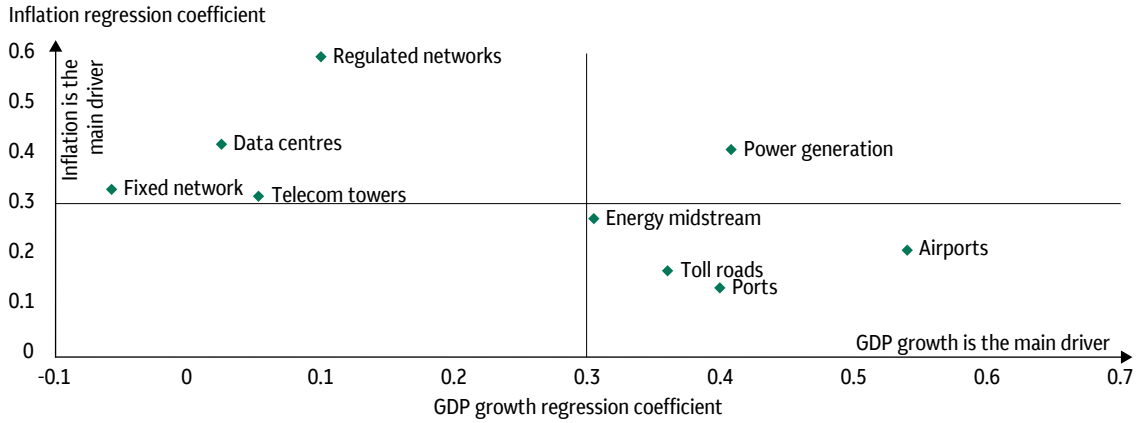
Sources: Bloomberg, Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Analysis conducted between 1Q 2008 and 4Q 2024. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Average year-over-year GDP growth over the period was 1.6%. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

6. Bloomberg (June 2025). Analysis conducted between 2008 and 2024. Does not constitute investment advice or recommendation. Revenue growth for listed equities refers to revenues per share. Past performance is not indicative of future returns. For illustrative purposes only.

Variation by subsector

While infrastructure is a defensive asset class with a built-in inflation-hedge potential, not all infrastructure assets exhibit these qualities to the same degree. The level of defensiveness and inflation-linkage can vary substantially across asset types. Figure 8 plots the inflation and GDP coefficients for different infrastructure subsectors on one chart, thereby providing a snapshot of the main driver of returns for each. For instance, regulated networks demonstrate the strongest linkage to inflation but show a weak relationship with GDP growth. Airports, on the other hand, have a strong linkage to GDP growth but weaker relationship with inflation. The sector differences highlight that, when structured appropriately, an infrastructure portfolio can deliver benefits across various economic environments by balancing the sector exposures across the portfolio.

Figure 8:
Infrastructure revenue growth drivers by sector



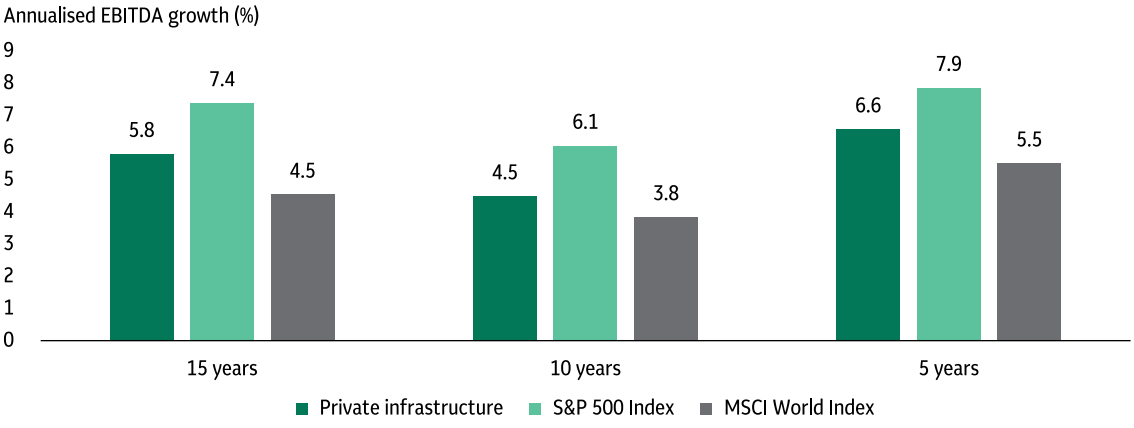
Source: Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Analysis conducted between 2008 and 2024. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

EBITDA growth: How has infrastructure performed over the long run?

EBITDA growth is a crucial metric in private infrastructure as it measures a company's operational profitability, which is a key indicator of value creation and returns. Given the diverse universe of sectors within the asset class, EBITDA growth allows for easier comparisons of companies across different sectors as it normalises for differences in capital structure and tax environments. This helps investors assess investment opportunities more effectively.

Global private infrastructure EBITDA growth averaged 5.8% over the past 15 years, 4.5% over the past 10 years and 6.6% over the past five years[7] (Figure 9). This represents higher growth than global listed equities (MSCI World Index) although lower growth than what US listed equities delivered over the same period (S&P 500 Index).

Figure 9:
EBITDA growth for private infrastructure and general equities over 15, 10 and 5 years



Source: Bloomberg, Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

7. Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns.

There are, of course, differences by region, and our data show that the EBITDA growth of US private infrastructure assets was historically higher than the global average. This better performance can be partially attributed to the region's stronger economic growth over the past 15 years.

EBITDA growth and its sensitivity to the economic environment

Figure 10 shows the regression results for EBITDA growth against our three main macroeconomic variables. Like for revenue, there is a positive and a statistically significant relationship with both inflation and GDP growth. However, there is no statistically significant relationship between EBITDA growth and interest rates.

Figure 10:
Inflation and GDP growth also drive EBITDA growth

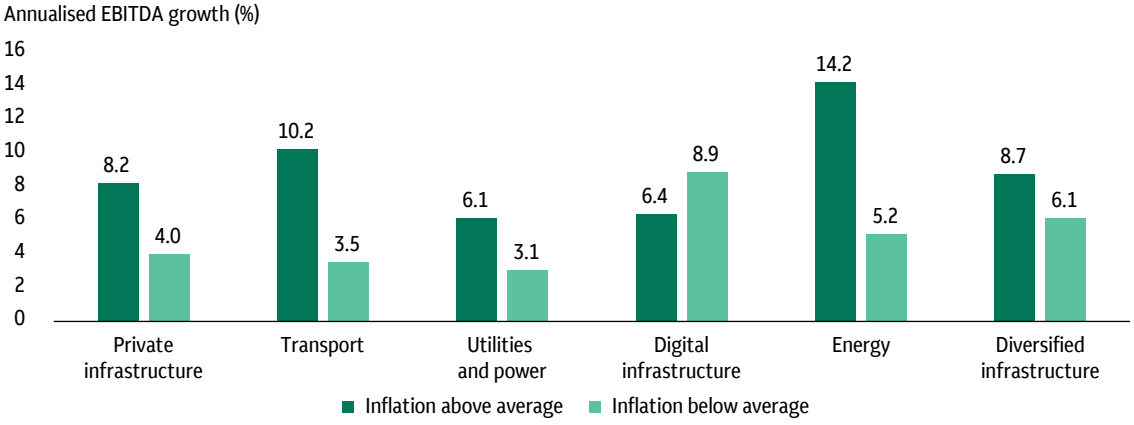
Macroeconomic variable	Coefficient	Standard error	T-stat	P-value	Statistical significance
Inflation	0.251	0.112	2.244	0.028	***
Real GDP growth	0.428	0.107	3.994	0.000	***
Interest rates	-0.169	0.105	-1.612	0.112	not significant

Source: Macquarie Asset Management (June 2025). Analysis conducted between 1Q 2008 and 1Q 2024. All variables are standardised by subtracting the mean and dividing by the standard deviation. Interest rates refer to 10-year government bond yields. Inflation refers to changes in CPI. All macroeconomic variables are weighted by nominal GDP across the US, the eurozone and the UK. The regression contains an intercept term that is not included in the table above.
*** Statistically significant result when p-value is less than the significance level of 5%.

Figure 11 shows that private infrastructure EBITDA growth has been significantly stronger during periods of above-average inflation, averaging 8.2% per annum, compared with 4.0% per annum during periods of below-average inflation. It also shows that most infrastructure sectors tend to perform better in high-inflation environments. Interestingly, the digital infrastructure sector has demonstrated robust EBITDA growth regardless of the inflationary environment. We attribute this resilience to the structural growth drivers underpinning the sector, which continue to act as the primary engine of growth. These drivers appear to outweigh the influence of broader macroeconomic forces.

Figure 11:

EBITDA growth's positive relationship with inflation is consistent across infrastructure sectors

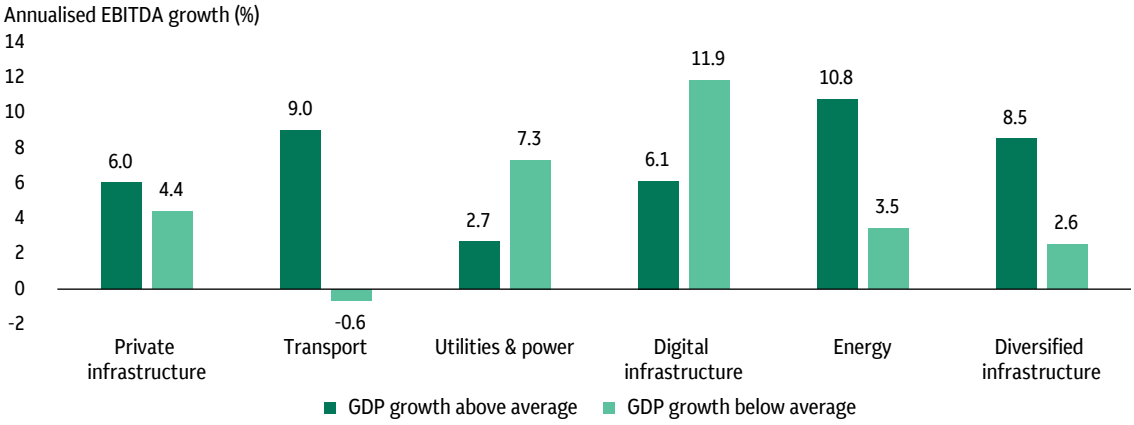


Source: Bloomberg, Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Analysis conducted between 1Q 2008 and 4Q 2024. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Average annual inflation over the period was 2.4%. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

Similarly, as Figure 12 shows, EBITDA growth performs more strongly when GDP growth is above average (6.0% per annum) than when it is below average (4.4% per annum). Transport and energy assets tend to have the strongest linkages with GDP growth (Figure 12). Toll road traffic is sensitive to GDP growth because economic activity directly influences travel demand – when GDP expands, it typically reflects higher income and employment levels, and greater consumer spending, all of which contribute to higher vehicle usage.

It is important to note that the utilities & power and digital infrastructure sectors show counter-cyclical behaviour. In other words, their EBITDA growth performance has historically been stronger during periods of below-average GDP growth. Utilities, such as electricity transmission networks, tend to operate in regulated environments that ensure stable revenues and predictable earnings. For digital infrastructure, structural drivers such as rising power demand from data centres and electrification of transport act as the primary drivers of growth in the sector.

Figure 12:
Well-structured infrastructure portfolios can deliver resilient EBITDA growth performance despite sectoral variations



Sources: Bloomberg, Macquarie Asset Management (June 2025). Private infrastructure performance data based on a proprietary database of 211 private infrastructure assets. Analysis conducted between 1Q 2008 and 4Q 2024. Revenue growth for infrastructure assets refers to the average across transport, utilities and power, digital infrastructure, energy midstream and diversified infrastructure weighted by sector shares in total infrastructure deal volume. Average year-over-year GDP growth over the period was 1.6%. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

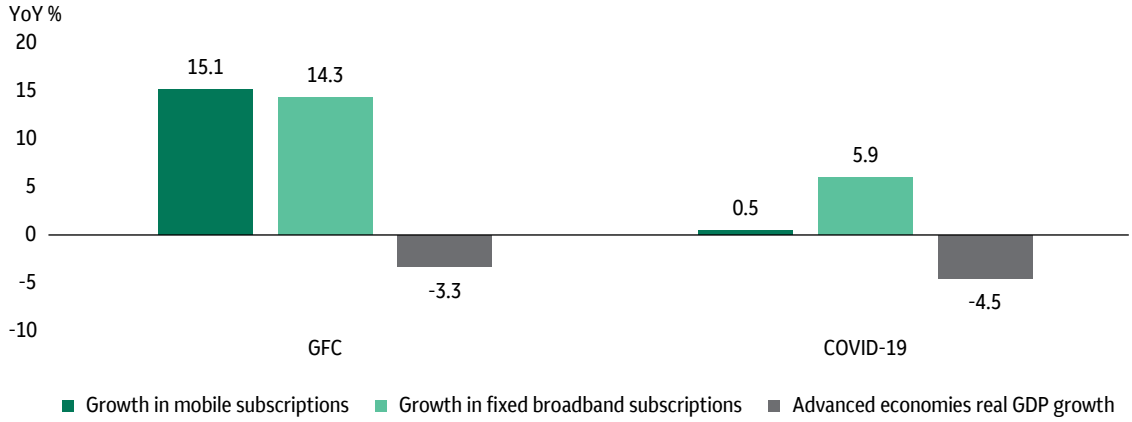
Digital infrastructure: Standing out from the crowd

Throughout this report, we have highlighted that digital infrastructure exhibits unique traits. As shown in Figure 12, digital infrastructure has historically demonstrated defensive characteristics, particularly during economic downturns. This resilience is partly due to its performance during the global financial crisis (GFC) and the COVID-19 pandemic.

During the GFC, when advanced economies contracted by 3.3%, mobile and fixed broadband subscriptions grew by 15.1% and 14.3%, respectively (Figure 13). Similarly, in 2020, as advanced economies shrank due to the COVID-19 pandemic, mobile and fixed subscriptions continued to grow to support connectivity during lockdowns.

Looking ahead, these strong structural drivers are likely to continue to underpin the growth of digital infrastructure. However, as the sector matures over the coming decades, we anticipate that some of these structural trends will gradually subside, and macroeconomic drivers may begin to play a more prominent role in shaping the sector's performance.

Figure 13:
Digitalisation has proven resilient to economic downturns



Sources: Statista, The Organisation for Economic Co-operation and Development (OECD), International Monetary Fund (IMF) (May 2022). GFC refers to the calendar year of 2009. COVID-19 refers to the calendar year of 2020.

EBITDA margin improvement as a value creation driver

EBITDA margin is used to assess operational efficiency and the core profitability of private infrastructure assets. Private infrastructure assets have historically generated higher EBITDA margins (44%) than general listed equities (17%) over the period 2014 to 2024 (Figure 14). A higher EBITDA margin does not necessarily imply higher returns, but it may result in more stable returns. High margins can reduce the swings in EBITDA for a given revenue swing, contributing to less volatility.

For value creation, it is the change in EBITDA margin over time that matters rather than the level of EBITDA margin at any point in time. Over the past decade, private infrastructure assets have, on average, achieved a 28-basis-point improvement in EBITDA margins per annum (Figure 15). In other words, EBITDA margin for an average private infrastructure asset would be 2.8% higher over a decade. This is greater than the 2.1% for listed equities over the same period.

Figure 14:
Private infrastructure has significantly higher EBITDA margins...

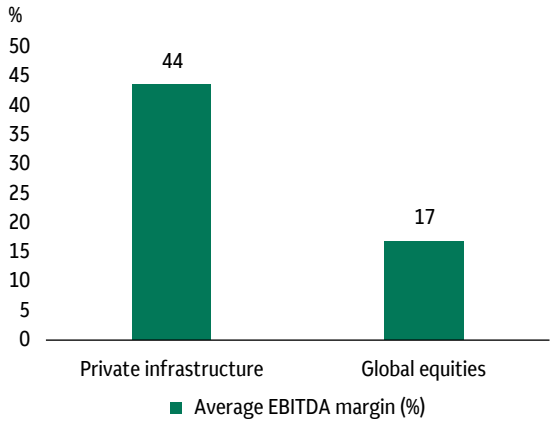
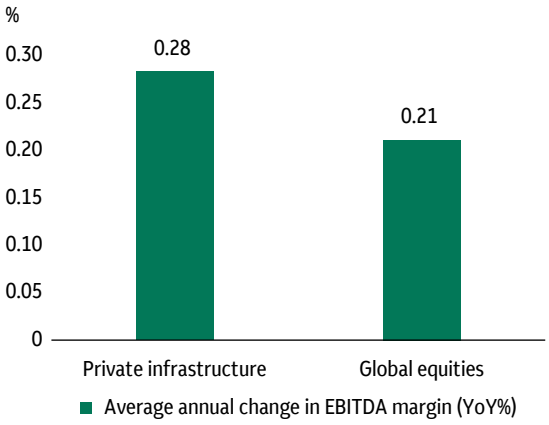


Figure 15:
...and a stronger EBITDA margin improvement per year than general equities



Sources: Bloomberg, Macquarie Asset Management (June 2025). Global equities: MSCI World Index. Analysis conducted between 2014 and 2024. Does not constitute investment advice or recommendation. Past performance is not indicative of future returns. For illustrative purposes only.

What are the drivers of private infrastructure's attractive EBITDA growth?

One interesting finding from the prior section is that infrastructure, which is a steady, defensive asset class, has achieved EBITDA growth that is superior to that of global equities. How has it achieved this remarkable EBITDA performance?

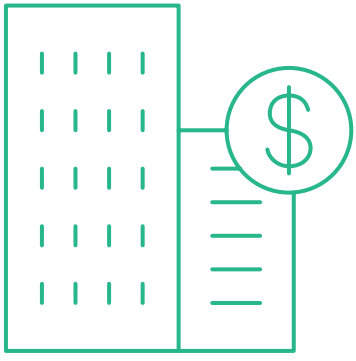
Our data indicate that the robust EBITDA growth was predominantly driven by revenue growth (since 2008, revenue growth accounted for 86% of EBITDA growth), with cost optimisation playing a relatively minor role. Given that infrastructure assets typically operate with a long-term investment horizon and provide essential services to society, cost optimisation tends to be significantly less aggressive compared with private equity strategies. For private infrastructure assets, cost optimisation typically focuses on enhancing operational efficiency over the long run through measures such as deploying automation, improving energy efficiency and leveraging digitalisation. Short-term, aggressive cost and headcount cuts are generally not part of the business plan.

In our view, there are a number of factors behind infrastructure's revenue delivery:

1. **Operational improvements:** Direct ownership of infrastructure assets provides companies with greater control and flexibility to implement operational improvements. This hands-on approach enables efficiency gains and enhanced profitability. This opportunity could be particularly pronounced for infrastructure assets owned by governments or part of a large corporation but not related to that corporation's core operations. Looking ahead, while privatisation opportunities may be thinner on the ground in some infrastructure markets (such as Australia), in others they remain significant.
2. **Buy-and-build strategies:** Buy-and-build strategies, where platforms are expanded through bolt-on acquisitions, allow investors to access economies of scale or scope and benefit from synergies between the acquirer and the target company. These strategies often result in accelerated growth and value creation.
3. **Structural drivers:** Infrastructure has benefited from strong structural tailwinds due to its relatively high exposure to powerful thematics such as digitalisation, demographics and decarbonisation. In our view, these trends are not going away anytime soon, and digitalisation is potentially accelerating.

Overall, we believe that the drivers of private infrastructure's strong revenue delivery – which is the main driver of its strong EBITDA and return performance over the past 15 years – largely remain in place and are likely to continue to provide support to the asset class going forward.

Valuations: The role of multiple expansion

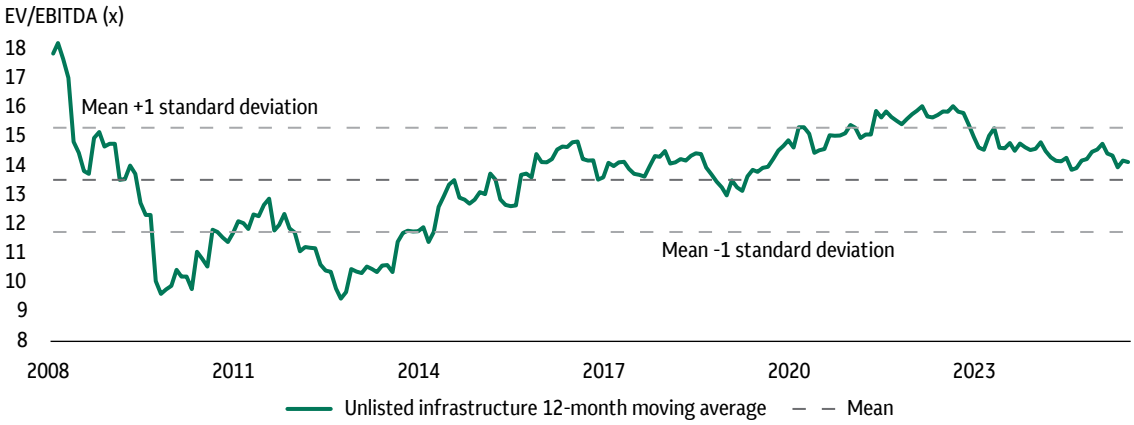


Multiple expansion refers to an increase in the valuation multiple applied to a company's earnings (or EBITDA) when it is sold, compared with the multiple used when it was initially acquired.

As highlighted in our Pathways paper "Private infrastructure valuations: Relative value macroeconomic drivers and implications for investors" published in June 2023, most equity asset classes have enjoyed a period of multiple expansion after the GFC. This trend was largely driven by falling interest rates, which boosted valuations. As our prior paper showed, infrastructure was a beneficiary of this trend but not more so than other equity asset classes. In other words, despite some investor perception to the contrary, private infrastructure did not benefit disproportionately from the period of low interest rates that prevailed from the GFC to 2022. In this section, we aim to revisit the macroeconomic factors influencing changes in transaction multiples, as well as the historical contribution of multiple expansion to value creation (measured as price return).

Using data from 1,222 private infrastructure transactions that reached financial close since 2008, we have constructed a time series that tracks private infrastructure valuations based on actual transaction prices (Figure 16).

Figure 16:
Private infrastructure's historical EV/EBITDA transaction multiples



Source: Macquarie Asset Management database (June 2025). Analysis is based on 1,222 transaction multiples for deals that reached financial close between January 2008 and June 2025. Past performance is not indicative of future results. For illustrative purpose only.

Macroeconomic drivers: Interest rates and inflation

Similar to our earlier analysis, our first objective is to examine the relationship between valuations and key macroeconomic variables. As illustrated in Figure 17, private infrastructure valuations have a negative and statistically significant relationship with interest rates and a positive relationship with inflation. Interestingly, the coefficient for GDP growth is small and not statistically significant, suggesting that historical fluctuations in multiples have been mostly explained by movements in interest rates and inflation, and not by GDP growth.

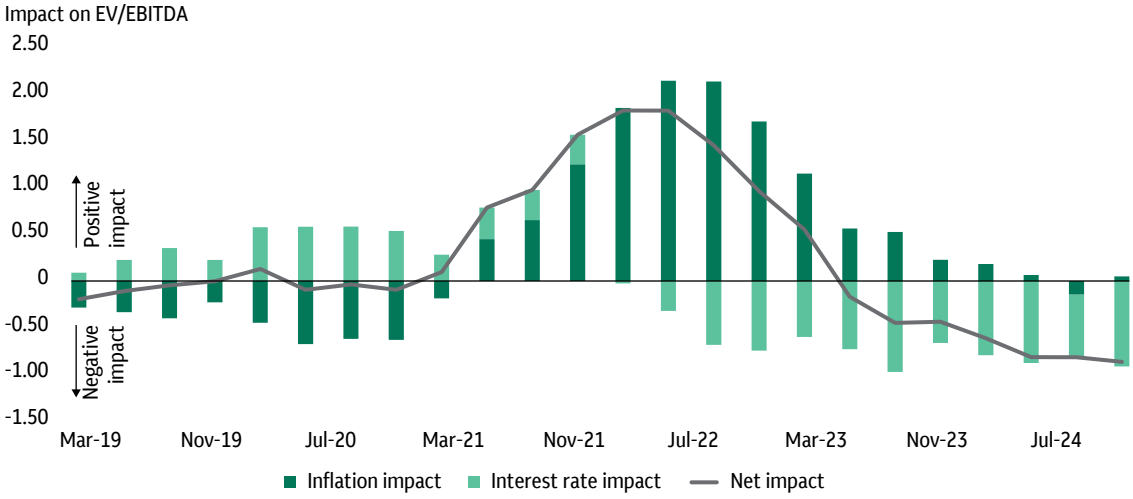
Figure 17:
Inflation positively impacts multiples, interest rates are a negative, while GDP growth is insignificant as a driver

Macroeconomic variable	Coefficient	Standard error	T-stat	P-value	Statistical significance
Inflation	0.368	0.127	2.911	0.005	***
Interest rates	-0.281	0.108	-2.596	0.012	***
Real GDP growth	0.088	0.125	0.705	0.483	Not significant

Sources: Macquarie Asset Management, Macrobond (June 2025). Analysis conducted between January 2008 and December 2024. All variables are standardised by subtracting the mean and dividing by the standard deviation. Interest rates refer to 10-year government bond yields. Inflation and GDP growth refer to year-over-year changes. All macroeconomic variables are weighted by nominal GDP across the US, the eurozone and the UK. The regression contains an intercept term that is not included in the table above.
*** Statistically significant result when p-value is less than the significance level of 5%.

When inflation rises, it can provide an uplift not only to current earnings but also to growth in future cash flows if it is expected to be sustained. Investor demand for assets that offer an inflation hedge may also increase in periods when inflation is high. Given that interest rates tend to rise with inflation, the net result is a more muted impact on infrastructure (relative to other asset classes), as the negative effects of higher rates can be partially offset by the benefits of higher inflation. Figure 18 aims to visualise the impact of inflation and interest rates and their net impact on private infrastructure valuations between 2019 and 2024.

Figure 18:
Visualising the impact of inflation and interest rates on valuation multiples



Sources: Macquarie Asset Management, Macrobond (June 2025). Analysis conducted between March 2019 and December 2024. Based on stepwise regression and derived by adding and removing potential explanatory variables in succession and testing for statistical significance after each iteration. Please note the analysis only captures the impact of macroeconomic variables and does not account for other factors that impact the asset class. Past performance is not indicative of future results. For illustrative purpose only.

Multiple expansion: Comparison with private equity

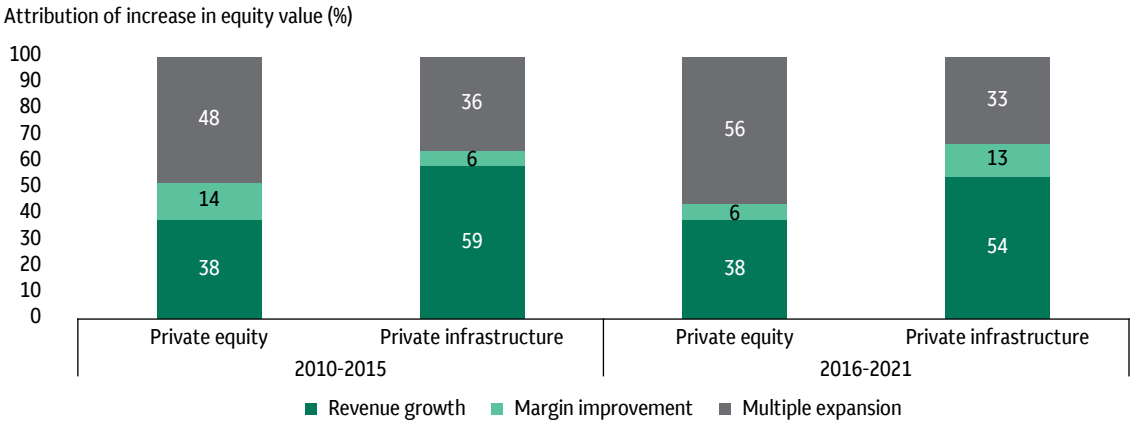
Private infrastructure and private equity share several similarities, as both are alternative investment classes that focus on investing in private, non-publicly traded assets. However, it is crucial to recognise that the underlying drivers of returns for these asset classes differ materially.

An analysis of value change decomposition for each asset class between 2010 and 2021 reveals distinct patterns in value creation. For private infrastructure, the majority of value creation (more than 50%) has come from earnings growth. In contrast, private equity has historically relied more heavily on multiple expansion as the primary driver of returns (Figure 19).[8] This indicates that private equity returns have been significantly influenced by exit valuations.

8. Bain & Company, "Global Private Equity Report 2022: Private Equity's Inflation Challenge".

In an average institutional portfolio optimisation exercise that we published earlier this year,[9] private equity would typically gain a larger share of the portfolio compared with private infrastructure based on historical performance. However, going forward, with the global economy expected to experience a "higher-for-longer" interest rate environment over the coming years, multiples are unlikely to expand very much and therefore unlikely to be the tailwind for returns they were over the post-GFC to COVID-19 period. Put differently, in the absence of strong multiple expansion, greater emphasis on earnings gains and operational improvements will be required to drive value creation.

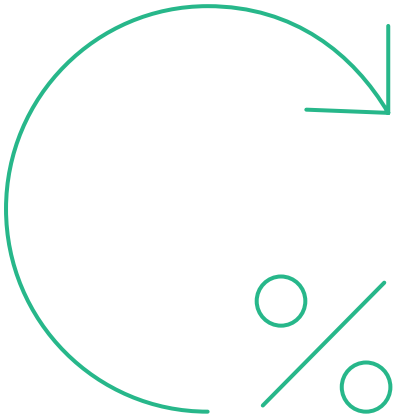
Figure 19:
Breakdown of the value creation: Infrastructure and private equity



Sources: Macquarie Asset Management (June 2025) calculations for private infrastructure and Bain & Company "Global Private Equity Report 2022: Private Equity's Inflation Challenge" for private equity. Private infrastructure calculations based on 1,222 private infrastructure EV/EBITDA transaction multiples and 211 private infrastructure assets for EBITDA growth database. Some columns may not equal 100% due to rounding.

9. Macquarie Asset Management, Perspectives paper "Infrastructure portfolio allocation: What could optimal look like?" (April 2025).

Total return: Putting the puzzle together



In the previous sections, we explored the key pillars underpinning private infrastructure's strong return performance – earnings and valuations – along with their macroeconomic drivers. In this section, we aim to estimate their contribution to total return over the past decade.

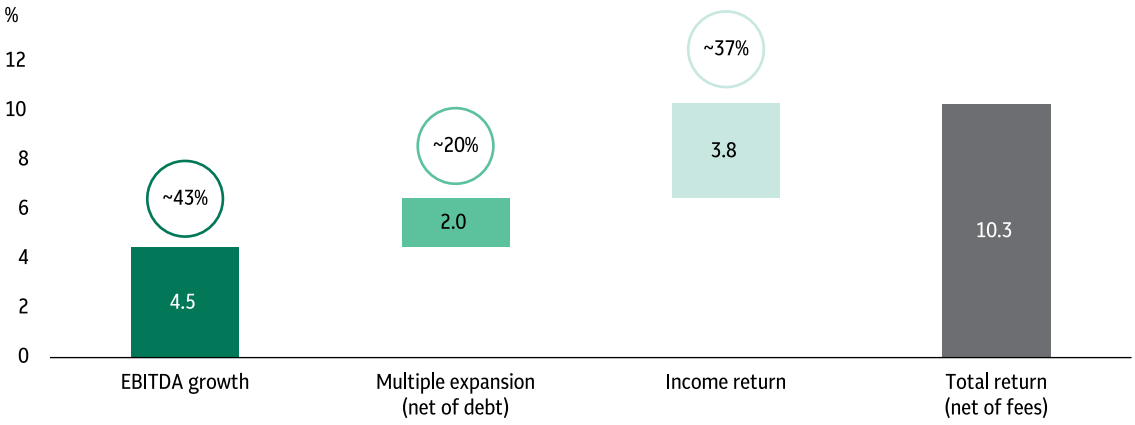
Figure 20 presents the estimated return attribution of private infrastructure total returns between 2014 and 2024:

1. **EBITDA growth.** Private infrastructure's EBITDA growth is estimated to have averaged 4.5% annually, based on data from 211 private infrastructure assets over this period.
2. **Valuation multiples.** EV/EBITDA transaction multiples have increased from 13.0x to 14.8x, as observed from 1,222 deals in private infrastructure.
3. **Total return.** The net total return is estimated at 10.3%, based on 232 private infrastructure funds.[10]

Over the past decade, EBITDA growth was the primary driver of private infrastructure returns, contributing 43% to total return. Income return followed with a 37% contribution, while multiple expansion accounted for 20%.[11] It is important to note that infrastructure's high margins and its ability to deliver attractive EBITDA growth supported a high (relative to other equities) and stable income return delivery.

10. Cambridge Associate Infrastructure Index (December 2024). Past performance is not indicative of future returns.
11. This analysis draws from various data sources rather than a single unified dataset, which means the conclusions are approximate rather than precise. However, given the large sample sizes underpinning this analysis, we believe it provides a representative and meaningful approximation. This analysis also offers an analytical framework for assessing the outlook for future returns.

Figure 20:
Private infrastructure return attribution analysis 2014 to 2024



Source: Macquarie Asset Management calculations (June 2025). EBITDA growth calculations based on 211 private infrastructure assets; multiple expansion calculations based on 1,222 transaction multiples; total return calculations based on Cambridge Associates Infrastructure Index. Past performance is not indicative of future returns. Approximations only.

Private infrastructure and US equities: Differences in return drivers

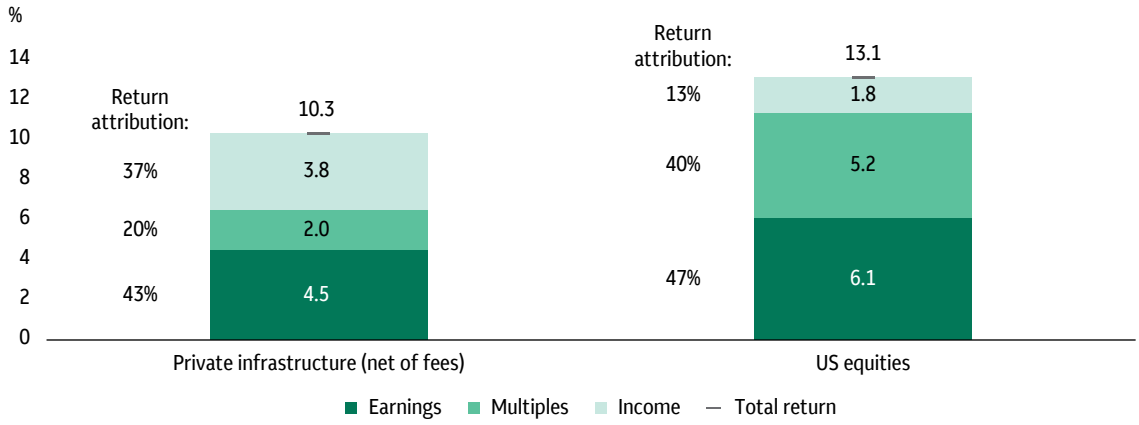
Figure 21 highlights key differences in the return drivers of private infrastructure and US equities during the post-GFC period:

1. **Earnings contribution.** Both asset classes have been primarily driven by earnings growth. US equities demonstrated higher earnings[12] contribution (47%) compared with private infrastructure (43%).
2. **Income component.** Private infrastructure has exhibited stronger income return, at 3.8%, than US listed equities, at 1.8%.
3. **Multiple expansion.** US equities experienced a larger return contribution (40%) from multiple expansion[13] compared with private infrastructure (20%).

Private infrastructure may appeal to investors seeking stable income and lower reliance on market-driven valuation changes.

12. Refer to EBITDA growth as a proxy for earnings growth.
13. Refer to equity/EBITDA multiple expansion, estimated as EV minus debt divided by EBITDA.

Figure 21:
Private infrastructure and US equities return decomposition between 2014 and 2024



Sources: Bloomberg, Macquarie Asset Management (June 2025). US equities: S&P 500 Index. Earnings refer to EBITDA growth; multiples refer to equity/EBITDA multiples; income refers to income return for private infrastructure and dividend yield for US equities. Analysis conducted between December 2014 and December 2024. Past performance is not indicative of future returns.

Long-term outlook: Can infrastructure deliver yet again?

Approximately 20% of private infrastructure's total return over the past decade was from multiple expansion. In other words, an investor purchasing an asset in 2014 and selling it in 2024 would have achieved 20% of the return from market timing alone – holding the asset during this period – without necessarily enhancing its operational performance.

However, going forward, interest rates may be structurally higher, potentially capping further multiple expansion. This raises a critical question: Can private infrastructure sustain the returns achieved over the past decade in the next decade and continue to deliver superior risk-adjusted return outcomes? The answer largely depends on whether, in the absence of multiple expansion, the asset class can continue to deliver healthy EBITDA growth.

Private infrastructure: Macroeconomic drivers in detail

To develop a view about future returns, we summarise the key sensitivities of the asset class to the economic variables examined in the previous sections (Figure 22). Inflation emerges as a significant overall driver, positively influencing revenue growth, EBITDA growth and valuations. GDP growth supports revenue and EBITDA growth, while historically it has not played a major role in explaining fluctuations in valuation multiples. Instead, changes in valuation multiples have been primarily shaped by interest rates and inflation.

Figure 22:
Summary table of key sensitivities to economic variables

	Inflation	GDP growth	Interest rates
Revenue growth	Positive	Positive	Not significant
EBITDA growth	Positive	Positive	Not significant
Valuations	Positive	Not significant	Negative
Total return	Positive	Positive	Negative

Source: Macquarie Asset Management (June 2025). Past performance is not indicative of future returns.

Long-term outlook for private infrastructure returns

Given the challenges in forming a single definitive view on the performance of the asset class, we present a scenario analysis for total returns (net of fees). Specifically, we consider three potential economic scenarios:

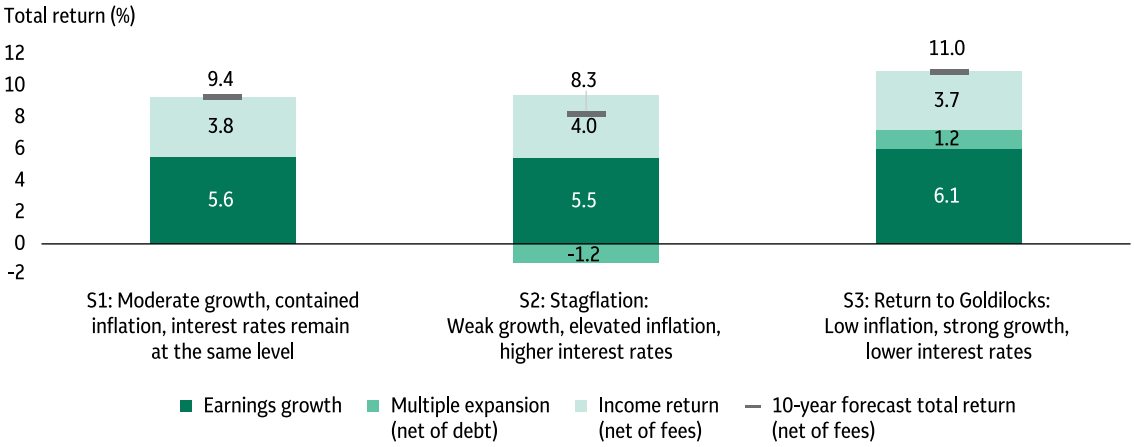
- **Scenario 1 (S1):** In this scenario, we anticipate moderate economic growth across developed economies, with GDP growth rates of 1.2% and 1.4% for the eurozone and the UK, respectively, and 2.0% for the US. Interest rates are structurally higher, keeping inflation relatively contained (i.e. not exceeding 2.3%).
- **Scenario 2 (S2):** This scenario assumes a stagflationary environment characterised by the simultaneous occurrence of low economic growth (at an average of 0.7% across the developed world economies), persistently high inflation (at an average of 3.8%) that proves difficult to control and elevated interest rates.
- **Scenario 3 (S3):** This scenario envisions a return to a "Goldilocks economy," characterised by healthy economic growth and low inflation, similar to the early 2000s. If artificial intelligence turns out to be a significant boost to productivity growth over the next decade, this type of macroeconomic backdrop could be likely.

While any single scenario may not persist throughout the entire decade, we assume that these economic conditions may dominate for substantial periods between 2025 and 2034. Overall, we project private infrastructure to deliver a total return in the range of 8.3-11.0% on a net-of-fees basis. Figure 23 summarises the long-term return assumptions for each of these scenarios.

Across all three scenarios, we expect income return to remain largely stable and consistent with historical levels. Our forward-looking analysis based on our historical regression shows that EBITDA growth could be in the range of 5.5-6.1%, depending on a scenario. In S2, the elevated level of inflation is expected to partially offset the impact of weaker growth. In S3, the contribution from lower inflation is likely to be compensated by stronger economic growth as a driver of EBITDA.

The key differentiator lies in the contribution of multiple expansion. In S1, we foresee no contribution from multiple expansion, implying that entry and exit multiples are likely to remain broadly unchanged. In S2, valuation multiples may be negatively impacted by higher interest rates needed to constrain elevated inflation, suggesting exit multiples could be lower than entry multiples. In S3, falling interest rates in response to low inflation levels could lead to a positive contribution from multiple expansion.

Figure 23:
Long-term (10-year) outlook for private infrastructure returns (net of fees)



Source: Macquarie Asset Management (June 2025). Past performance is not indicative of future returns. Does not constitute investment advice or recommendation. For illustrative purposes only.

Stagflation: Is it good or bad for private infrastructure?

In our scenario analysis, as illustrated in Figure 23, we conclude that stagflation is likely to result in a lower expected return for infrastructure compared with other economic scenarios. However, it is important to emphasise that, in a stagflationary environment, private infrastructure is still expected to perform better than listed equities and bonds. For instance, private infrastructure has delivered an absolute return of 8.5% during the mini stagflation periods observed between 2004 and 2024, which is well above the returns of listed equities and bonds (Figure 24).

That said, in the past 20 years, the developed world economies did not see a prolonged stagflationary environment such as the one observed in the 1970s. Since private infrastructure as an asset class only emerged in the 1990s, we used the S&P 500 Utilities Index[14] to see how utilities performed relative to general equities (S&P 500 Index)[15] in the 1970s. From 1973 to 1982 inclusive, utilities delivered an annualised return of 9.0%, higher than general listed equities at 6.7% over the same period (Figure 25).

14. New York State Department of Public Service public archive, Exhibit RAM-4 Utility Industry Historical Risk Premium, percentage annual change, December to December.
15. NYU Stern, "Historical Returns on Stocks, Bonds and Bills: 1928-2024" (updated January 2025). S&P 500 Index long-term annual return including dividends.

While Figure 24 may overstate the outperformance of infrastructure during an extended stagflationary environment, Figure 25 may understate it given it is limited to slow-growing utilities (with infrastructure today being significantly broader). In our view, given its inflation hedge and defensive traits, as well as high margins and structural growth drivers, private infrastructure is fundamentally very well positioned for a stagflationary-type environment and could perform 250-400 basis points better than listed equities in such an environment.

Figure 24:
Private infrastructure and other asset classes during mini stagflations between 2004 and 2024

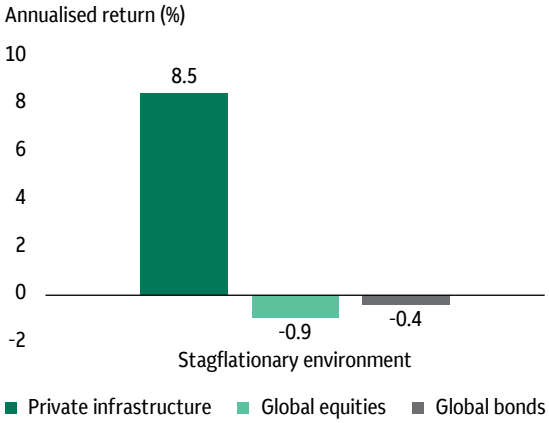
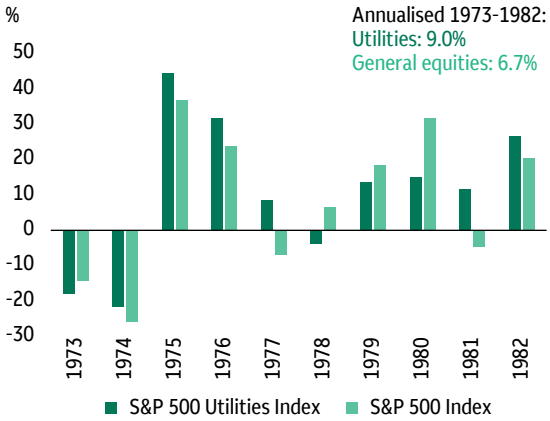


Figure 25:
S&P 500 Utilities Index and S&P 500 Index during the period of stagflation from 1973 to 1982



Sources: Macquarie Asset Management, Cambridge Associates, Bloomberg, NYU Stern "Historical Returns on Stocks, Bonds and Bills: 1928-2024", New York State Department of Public Service archive (June 2025). The lefthand chart refers to the 12 quarters of stagflation in the period between 1Q 2004 and 3Q 2024. Private infrastructure: Cambridge Associates Infrastructure Index; global equities: MSCI World Index; global bonds: Bloomberg Global Aggregate Total Return Index. Past performance is not indicative of future returns.

Relative long-term outlook and important implications

To summarise, our analysis indicates that the long-term (10-year) return outlook for private infrastructure is projected to range between 8.3% and 11.0% (Figure 26). This expectation is supported by robust EBITDA growth and stable yield generation.

Interestingly, an evaluation of long-term capital market assumptions for US equities across 13 forecasters suggests that, for the holding period of 2025–2034, US equities are expected to deliver annual returns in the range of 4.8% to 7.8%. This projection is significantly lower than the historical annual return of 10.4% achieved over the 2004–2024 period. One of the most frequently cited reasons for these subdued forecasts is "elevated valuations and market concentration."

Indeed, when examining relative valuations (Figure 27), the negative spread observed between US equities and private infrastructure in 2025 – compared with the historically substantial positive spread – underscores the potential attractiveness of private infrastructure as an entry point relative to US listed equities.

Figure 26:
Long-term outlook for private infrastructure returns relative to US equities

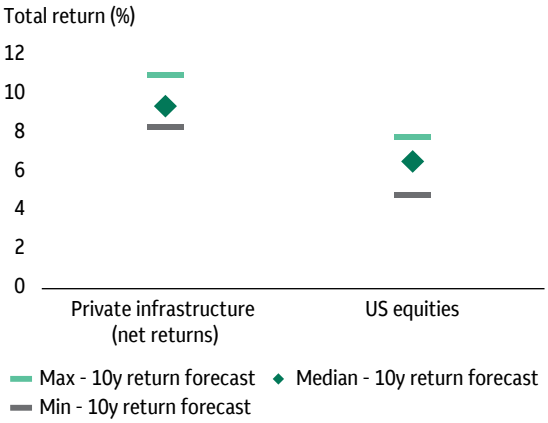
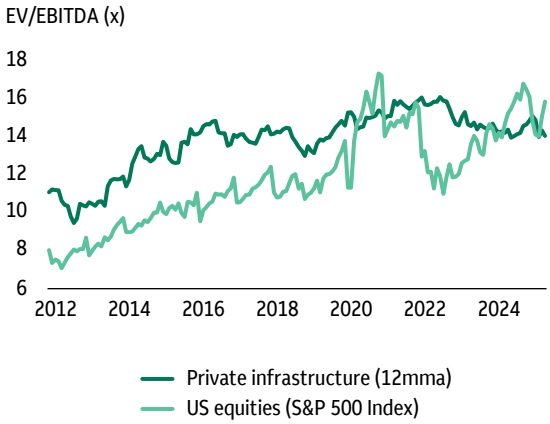


Figure 27:
Relative entry EV/EBITDA valuations for private infrastructure and US equities



Sources: Macquarie Asset Management, Bloomberg (July 2025). The 10-year capital market assumptions for US equities for 2025-2034 is based on 13 forecasters: BlackRock, Amundi, Vanguard, Fidelity Investments, Morgan Stanley Wealth Management, PGIM, DWS, Allianz, BNY Advisors, Nuveen, Northern Trust, Callan, Barclays. Past performance is not indicative of future returns. 12mma refers to 12-months moving average.

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Currency risk is the risk that fluctuations in exchange rates between the US dollar and foreign currencies and between various foreign currencies may cause the value of an investment to decline. The market for some (or all) currencies may from time to time have low trading volume and become illiquid, which may prevent an investment from effecting positions or from promptly liquidating unfavourable positions in such markets, thus subjecting the investment to substantial losses.

Infrastructure companies may be subject to a variety of factors that may adversely affect their business or operations, including high interest costs, high leverage, economic slowdowns, surplus capacity, increased competition, commodity prices, regulatory and political developments, difficulty raising capital, and terrorist acts or political actions, and general changes in market sentiment.

The global financial crisis (GFC) refers to the period of extreme stress in global financial markets and banking systems between mid-2007 and early 2009.

Inflation is the rate at which the general level of prices for goods and services is rising, and, subsequently, purchasing power is falling. Central banks attempt to stop severe inflation, along with severe deflation, in an attempt to keep the excessive growth of prices to a minimum.

Stagflation occurs when persistent high inflation is combined with high unemployment and stagnant demand in a country's economy.

The **Bloomberg Global Aggregate Total Return Index** measures the performance of global investment grade fixed income securities. This index is widely used as a benchmark for fixed income securities.

The **Cambridge Associates Infrastructure Index** represents a horizon calculation based on data compiled from 232 infrastructure funds, including fully liquidated partnerships, formed between 1994 and 2024. The Developed Markets sub-index comprises 199 funds; the Emerging Markets sub-index comprises 27 funds.

The **US Consumer Price Index (CPI)** is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services.

The **INREV Global Real Estate Fund Index (GREFI)** measures net asset value weighted performance of non-listed real estate funds on a quarterly basis.

The **MSCI World Index** represents large- and mid-cap stocks across 23 developed market countries worldwide. The index covers approximately 85% of the free float-adjusted market capitalization in each country.

The **S&P 500 Index** measures the performance of 500 mostly large-cap stocks weighted by market value and is often used to represent performance of the US stock market.

The **S&P 500 Utilities Index** measures the performance of companies within the S&P 500 Index that are categorized as members of the Global Industry Classification Standard (GICS) utilities sector.

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Pathways

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