December 2025

The performance of Infrastructure Debt

Accessing private infrastructure debt transparently with infraMetrics®

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Executive Summary

Private infrastructure debt is emerging as a distinct segment within institutional fixed income portfolios. It is more than a niche extension of corporate or real estate credit, offering a combination of resilience, stability, and favourable risk-adjusted returns. These characteristics are underpinned by the essential services provided by its underlying assets and the structural protections built into its contracts.

This white paper uses infraMetrics to examine how private infrastructure debt differs from standard corporate and real estate credit indices. It highlights key differences in credit stability, sector composition, performance behaviour, and benchmark alignment. The analysis compares infrastructure debt indices (both investment-grade and high-yield) with commonly used public benchmarks such as Bloomberg corporate (IG and HY), Markit iBoxx (IG and HY), Dow Jones Real Estate (IG and HY), and the Markit iBoxx “Infrastructure” HY index. We evaluate performance, credit behaviour, sector composition, drawdown characteristics, and benchmarking alignment over a full market cycle from 2014 to 2025.

Key findings from the analysis include:

- **Robust credit performance**: Infrastructure debt consistently exhibits lower default probabilities and higher recovery rates than public corporate bonds or real estate credit. infraMetrics data show that even non-investment-grade infrastructure loans exhibit strong capital preservation characteristics. Default risk is highest during early construction phases but drops significantly once projects become operational, reflecting the lifecycle de-risking unique to this asset class.
- **Distinct sector allocation and cash flow dynamics**: Infrastructure debt portfolios are heavily concentrated in essential service sectors (e.g. transport, energy, power, utilities), unlike corporate and real estate benchmarks that are dominated by cyclically sensitive sectors (financials, industrials, consumer, etc.). Infrastructure sectors generate regulated or long-term contracted revenues with low cyclicality, supporting more predictable cash flow profiles. This distinct sector mix results in materially different risk transmission and return behavior compared to traditional credit indices.
- **Superior risk-return profile:** infraMetrics indices have higher risk-adjusted returns over long-term horizons in both investment-grade and high-yield segments. For example, the infra100 Project NIG (non-investment grade) index shows the highest risk-return ratio among the indices evaluated, while maintaining a shorter duration and moderate yield. Overall, non-investment-grade infrastructure debt achieved lower volatility than traditional high-yield benchmarks, with comparable or better total returns over the analysis period.

- **Resilience during market stress**: During periods of economic dislocation—such as the 2015 and 2018 credit selloffs or the 2022 rate-driven bond market correction—corporate and real estate credit indices suffered sharp, prolonged drawdowns. In contrast, infraMetrics indices showed smaller, shorter-lived declines, reflecting their reduced sensitivity to macroeconomic shocks and policy tightening. This pattern of lower drawdown and quicker recovery supports the case for infrastructure debt as a reliable anchor in credit portfolios.
- **Benchmarking inadequacies of using listed indices**: Standard public benchmarks fail to reflect the underlying reality of private infrastructure debt. Sector misalignment, absence of project finance instruments, and divergence in performance behavior render indices like from corporate bond market or real estate bond unsuitable for LPs and GPs managing infrastructure credit strategies. infraMetrics indices provide a purpose-built benchmarking framework calibrated to the actual characteristics of the asset class, enabling better strategy design, performance attribution, and investment decision-making.

This white paper illustrates that private infrastructure debt is not merely a risk-reduced subset of high-yield or real estate credit but an asset class in its own right, defined by contractual resilience, lifecycle de-risking, and economic fundamentals offering investors access to stable long-term income, downside protection, and efficient portfolio diversification. These qualities position infrastructure debt as a foundational element of modern institutional fixed income strategy.

Given its distinct risk-return profile, sector composition, cash flow dynamics, and response to economic shocks, infrastructure debt cannot be appropriately measured or managed using traditional credit benchmarks. Generic corporate bond or real estate indices fail to reflect the underlying characteristics of this asset class omitting essential services, misrepresenting volatility, and excluding project-level instruments. As a result, they distort performance attribution, risk assessment, and strategic allocation. The infraMetrics indices provide a fit-for-purpose alternative: a dedicated benchmarking framework built from real-world, asset-level infrastructure transactions, offering both LPs and GPs the tools to align investment analysis with the true nature of infrastructure credit. This tailored benchmark approach is essential for unlocking the full strategic potential of infrastructure debt in institutional portfolios.

Introduction

In a period of heightened macroeconomic uncertainty, inflationary pressures, and structural shifts in capital markets, infrastructure debt has gained attention as a significant component of institutional fixed income portfolios. It combines capital preservation, stable income, and downside protection—attributes that are increasingly sought after as traditional fixed income strategies face challenges in delivering high yields with resilience. Despite these strengths, infrastructure debt remains underrepresented in mainstream benchmarks and asset allocation models, and it is often mischaracterized as a niche sub-segment of corporate or real estate credit.

Infrastructure debt is backed by essential, long-lived physical assets such as transportation, networks utilities, digital infrastructure, and clean energy projects. These assets produce steady, long-term revenues through regulated tariffs, offtake contracts, or other usage-based payments. Most infrastructure debt instruments are senior and secured (collateralized) loans governed by strict covenants, which contributes to robust credit performance across market cycles. Furthermore, because these instruments are private and relatively illiquid, they carry an illiquidity premium – an extra return earned not by taking on more credit risk, but by accepting lower liquidity and complexity.

Traditional public market benchmarks or proxy indices fail to capture these fundamental characteristics. Mainstream bond indices (e.g., Bloomberg corporate IG/HY, Markit iBoxx high-yield, and broad real estate bond composites) are dominated by cyclical, market-sensitive sectors and do not mirror the cash flow mechanics or credit behavior of infrastructure assets. Using such indices as proxies for infrastructure debt can distort relative value assessments, reduce benchmarking accuracy, mislead performance attribution, and complicate strategic allocation decisions.

infraMetrics was developed to address this gap by providing a dedicated dataset and benchmarking framework based on observed infrastructure debt transactions. The platform delivers metrics such as market-implied credit spreads, probability of default (PD), loss given default (LGD), expected loss (EL), and risk-adjusted return measures. These are calculated using a consistent valuation and credit risk methodology, grounded in a bottom-up, instrument-level data architecture.

infraMetrics indices also support compliance with regulatory frameworks such as Solvency II and PRIIPs, which allow or require the use of asset-specific internal models. By providing consistent, segment-specific reference values for credit spreads, default risk, and valuation parameters, infraMetrics enables investors, asset managers, and regulators to assess infrastructure debt portfolios using empirical, market-based evidence.

In This paper presents a descriptive analysis of private infrastructure debt based on infraMetrics data. The objectives are to:

- Describe how the credit and duration characteristics of infrastructure debt differ from public corporate and real estate credit benchmarks.
- Summarise performance patterns across investment-grade and non-investment-grade infrastructure debt indices and other fixed income indices.
- Evaluate Assess observed outcomes during selected market drawdown periods (2015, 2018, 2022).
- Discuss the limitations of traditional benchmark proxies for infrastructure debt and outline the use of dedicated indices as a measurement tool.

Overall, the findings indicate that infrastructure debt is not a niche sub-sector or merely a high-yield substitute, but a distinct pillar of the fixed income universe. For institutional investors such as pension funds, insurers, and sovereign wealth funds, infrastructure debt offers a scalable investment option that aligns with long-term capital deployment and regulatory requirements. It can enhance portfolio stability, assist with liability duration matching, and provide inflation-linked income with relatively lower drawdown risk.

As global infrastructure financing needs grow—driven by the energy transition, digitalisation, and public-private partnerships—the role of infrastructure debt in portfolio construction is expected to expand. The distinctive performance profile of this segment, documented through infraMetrics data and benchmarks, offers a factual basis for evaluating infrastructure debt within a diversified fixed-income allocation.

Recent private infrastructure credit trend

Private infrastructure credit has emerged as a significant segment in institutional credit portfolios. Its rapid growth reflects structural shifts in the global lending landscape, alongside a search for stable, long-term income amid increasing macroeconomic volatility.

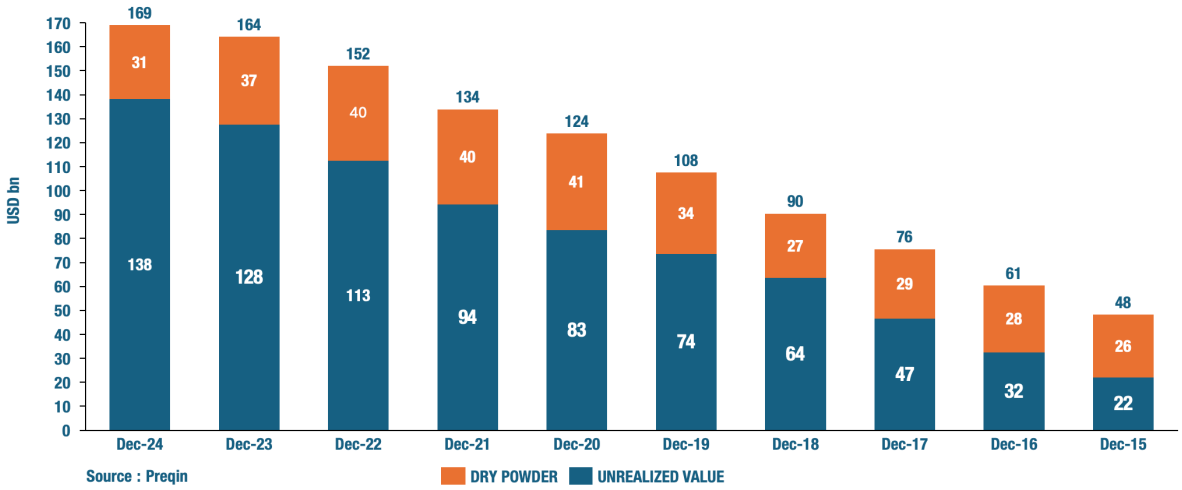
Between 2009 and 2023, the global private credit market expanded nearly tenfold, reaching close to $2 trillion in assets under management (McKinsey & Company, 2024). While direct lending continues to dominate this market, infrastructure debt is one of the fastest-growing segments within private credit. This expansion is driven in part by the retreat of traditional bank lenders due to Basel III/IV regulations and related balance sheet constraints, combined with persistent demand for long-duration, asset-backed financing solutions that offer inflation-linked cash flows. According to analysis by PGIM, asset-backed lending, real estate debt, and infrastructure debt together account for approximately 40% of the private credit market (PGIM, 2024).

Notably, the growth of infrastructure credit represents more than just an increase in volume it marks a realignment in institutional lending strategies. Insurers and pension funds have been allocating more to infrastructure debt as they seek to match long-term liabilities and manage exposure to market volatility. For example, UBS Asset Management (2024) reported that fundraising for infrastructure debt remained robust, accounting for roughly 20% of total infrastructure capital raised in recent periods. This suggests that even as overall infrastructure fundraising ebbs and flows, the credit component has maintained a substantial share.

Importantly, the rise of infrastructure credit has been accompanied by a broader diversification of investor participation. Alongside specialized private debt managers, participants now include insurance companies, sovereign wealth funds, and vehicles targeting retail investors. Regulatory changes have also broadened access. In Europe, the updated European Long-Term Investment Fund regulation (ELTIF 2.0), effective January 2024, removed minimum investment thresholds and allowed open-ended fund structures with periodic redemptions. These reforms make infrastructure debt more accessible to private wealth and retail investors. This influx of new capital and investor types is fostering innovation in deal origination and underwriting, with growing activity in sub-investment-grade, hybrid, and mezzanine debt structures—particularly across sectors such as energy transition, digital infrastructure, and transportation.

McKinsey & Company (2024) further projects that up to $6 trillion of infrastructure, asset-backed, and other nonbank-eligible credit could migrate off of bank balance sheets in the United States alone over the next decade. Infrastructure debt is expected to capture a significant portion of this reallocated capital, given its long-duration, capital-intensive profile, and alignment with insurers' asset-liability management needs. In addition, infrastructure debt often carries lower regulatory capital charges on certain insurance balance sheets, reflecting favourable treatment under solvency frameworks. This regulatory benefit provides an incentive for institutional investors like insurers to increase their exposure to the asset class.

FIGURE 1: Growth of Global Infrastructure Debt AUM (2015–2024): Dry Powder vs. Unrealized Value



Industry data also underscore the growing scale of infrastructure credit. According to Preqin, total assets in infrastructure debt funds—combining both deployed capital and undeployed "dry powder"—rose from roughly $48 billion in 2015 to about $169 billion by the end of 2024. This steady growth indicates that infrastructure debt has become an established component of private credit portfolios. The trend has been underpinned by the asset class's historically stable cash flows and predictable income streams, even during periods of broader market volatility.

The evolving role of infrastructure credit is further evident in new industry operating models. As outlined by McKinsey & Company (2024), a private credit "ecosystem" is taking shape that brings together asset managers, insurers, and banks to collaborate in the origination, syndication, and distribution of infrastructure loans at scale. Asset managers are creating vertically integrated platforms to secure proprietary deal flow and improve credit execution. A prominent example is Apollo Global Management's acquisition of Credit Suisse's securitized products group (now rebranded as Atlas SP), which established a dedicated platform for originating and intermediating asset-backed credit deals under one roof. Meanwhile, banks are adapting to an originate-to-distribute approach rather than holding infrastructure loans on their balance sheets, they increasingly partner with non-bank lenders to syndicate or sell these exposures. This shift, highlighted by the Financial Times, illustrates a structural redistribution of credit risk and a growing reliance on private credit channels beyond traditional banks. Taken together, these developments indicate that infrastructure debt is now an enduring part of the global private credit landscape, firmly embedded as a regular component of the financing ecosystem rather than a niche or transient opportunity.

Measuring the Market

Understanding the infrastructure debt market requires robust, comprehensive, and representative data—something that has historically been lacking due to the opaque nature of private markets. The infraMetrics platform addresses this gap by providing a transparent, model-driven, and empirically anchored framework for evaluating infrastructure debt. In doing so, it serves as a data-driven benchmarking and analytics tool, offering standardized metrics to measure and analyze the performance of private infrastructure debt. This section outlines the dataset construction, market coverage, modelling methodology, and segmentation schemes used in this analysis. The infraMetrics universe currently covers over 9,100 infrastructure companies across 25 countries, with an aggregate enterprise value (EV) exceeding USD 5 trillion. Within this broad universe, the constituent dataset includes more than 800 firms and 2,000 senior debt instruments, representing approximately USD 975 billion in enterprise value, of which around USD 565 billion is outstanding debt.

The infraMetrics debt database covers a wide array of infrastructure sectors, including transportation, data, utilities, and social infrastructure. These sectors are mapped using the TICCS classification standard, which accounts for each company's industrial activity, business model, corporate structure, and geo-economic exposure.

The data is updated monthly, and the dataset is free of survivorship bias. It captures defaults, exits, and terminations in addition to successful deals, providing a realistic view of market performance over time. Historical data coverage extends back to 2005 for most segments, offering a long-run perspective on credit risk and return dynamics.

infraMetrics Debt Universe

The Scientific Infra & Private Assets Data Team compiles information on a wide range of infrastructure companies from the investable universe, focusing on those relevant to private infrastructure debt markets. To qualify for inclusion, companies must meet minimum data requirements, which helps ensure that analyses are based on comprehensive and reliable inputs. Data sources include both company-specific and instrument-level information, such as:

- Audited financial statements of infrastructure companies that meet the TICCS taxonomy standards (providing consistent and reliable financial reporting).
- Investor-contributed data such as financial statements, debt forecasts, and transaction prices shared by infrastructure debt investors.
- Publicly available information including news reports, annual reports, press releases, and other publications relevant to infrastructure finance.

All prices and returns in infraMetrics debt indices and benchmarks are calculated using a dynamic credit spread model, which is recalibrated monthly with the latest transaction data. This process incorporates a growing sample of historical debt transactions (over 5,687 deals as of early 2024), helping to improve the model's accuracy as new data is added each month. Through this monthly calibration, the model provides "shadow pricing" estimates for a broader universe of infrastructure debt instruments, aiming to reflect each instrument's exposure to relevant risk factors.

infraMetrics debt indices and benchmarks are constructed from the bottom up. A broad sample of potential debt instruments from the market universe is considered, and a representative subset is selected by an index committee. The committee reviews index constituents regularly to maintain consistency and representation over time. Constituents are adjusted when companies exit the universe due to events like bankruptcy, mergers, or public listings, ensuring that the indices remain representative of the private infrastructure debt market.

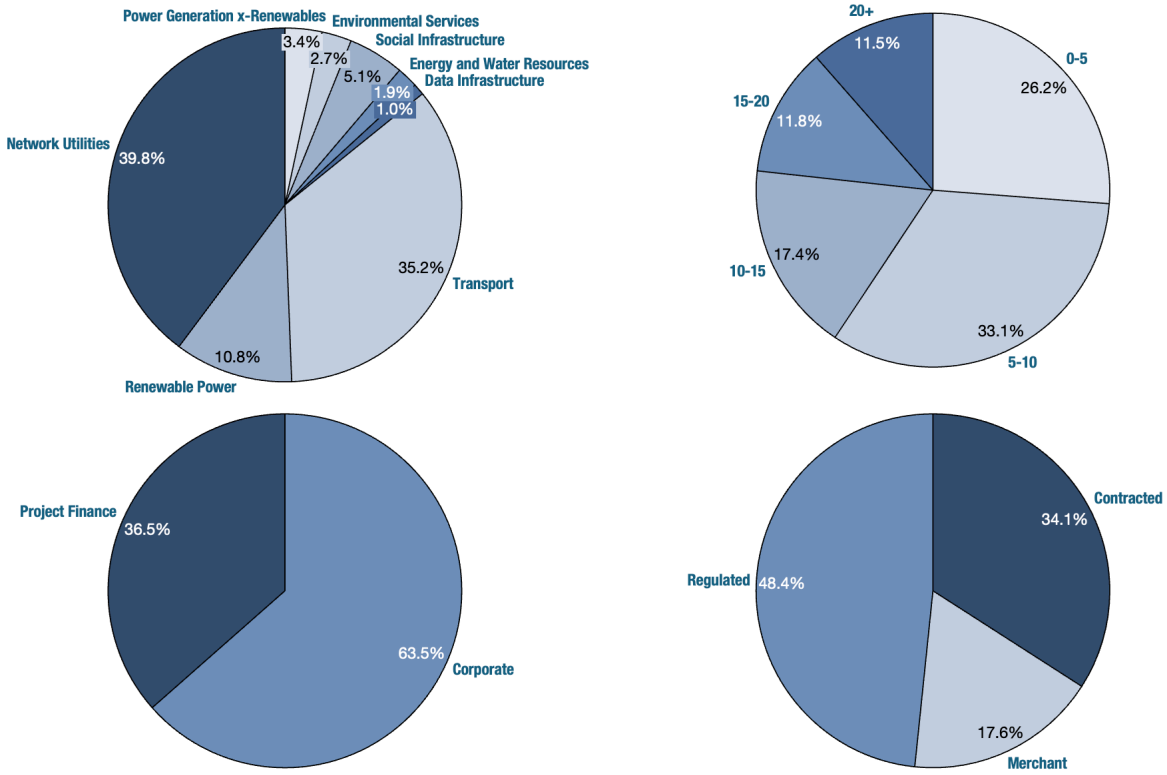
infraMetrics Debt Universe Landscape

The infraMetrics Debt Universe comprises a diverse and representative set of private infrastructure debt instruments, reflecting the breadth of the infrastructure financing market. As illustrated in Figure 1, this universe spans a wide array of TICCS categories (the taxonomy of infrastructure sectors and business models). Transportation (39.8%) and Network Utilities (31.8%) together account for over 70% of the portfolio by value. Renewable Power (9.9%), Social Infrastructure (5.6%), and Environmental Services (4.6%) also constitute significant portions, indicating that the dataset covers assets related to the energy transition and essential services.

From a maturity perspective, infrastructure debt in the infraMetrics universe tends to have extended tenors. Nearly 35% of the debt instruments have maturities between 5–10 years, and over 40% mature beyond 10 years. These figures illustrate the prevalence of long-dated exposure in this market, reflecting the long-term nature of many infrastructure projects.

In terms of financing structures, about 57% of the instruments are corporate debt and 43% are project finance. This mix indicates that the universe includes both corporate balance-sheet financing and asset-based project financing models. Revenue models are also predominantly stable: more than 75% of the instruments operate under either regulated (44.1%) or contracted (33.2%) revenue frameworks, while the remaining 22.7% are exposed to merchant revenue risk.

FIGURE 2: TICCS & Maturity Profile of the infraMetrics Private Infrastructure Debt Universe (Jun 2025)



Source: InfraMetrics

Valuing Infrastructure Debt

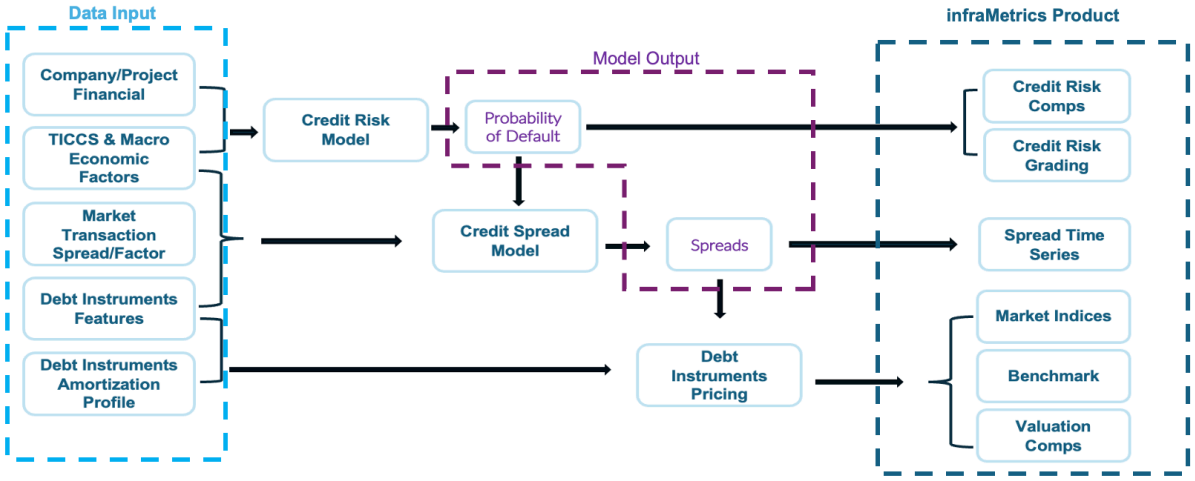
The infraMetrics valuation model offers a rigorous, market-based framework for assessing the fair value and credit risk of private infrastructure debt instruments. Built on actual deal-level pricing data, it leverages advanced quantitative methods to extract systematic credit signals, estimate spreads, and generate consistent valuations even in segments with limited market transparency. This model underpins infraMetrics indices and credit analytics, enabling investors to benchmark, monitor risk, and allocate capital with confidence across the infrastructure debt universe.

The infraMetrics valuation framework provides a structured and transparent methodology for assessing the credit risk and fair value of private infrastructure debt instruments. It is built on observed transaction-level data and incorporates firm-specific, sectoral, and macroeconomic information. The framework supports consistent credit risk measurement and pricing across a wide range of infrastructure debt instruments, even in markets with limited liquidity or pricing transparency.

The valuation process begins by collecting detailed input data at both the company/project level and the instrument level. The valuation process begins by collecting detailed input data at both the company/project level and the instrument level. These inputs include audited financial statements, debt amortization profiles, instrument-specific features (such as tenor, seniority, and currency), and sector

classification using TICCS. Macroeconomic indicators and observed market spread data are also included.

FIGURE 3: infraMetrics Private Debt Credit risk and Valuation Framework



Company or project-level financial statements, along with sector classifications (TICCS) and macroeconomic indicators, serve as core inputs to the infraMetrics credit risk model. This model is designed to estimate the Probability of Default (PD) for each debt instrument in the coverage universe. The PD represents the likelihood that the issuing entity will fail to meet its debt obligations over a defined time horizon typically the next 12 months. The model processes these inputs systematically to generate a forward-looking, point-in-time estimate of credit risk tailored to each issuer and instrument.

The estimated PD is subsequently used as an input to the credit spread model, which also incorporates observed transaction spreads, relevant macroeconomic variables, and instrument-specific characteristics such as face value and maturity. In addition, TICCS segment-level risk factors are included to capture systematic differences across infrastructure sectors and business models. The model produces a risk-adjusted credit spread, representing the market-implied compensation for the credit risk associated with the instrument. By relying on these underlying factor relationships, the framework is able to estimate spreads even for instruments without recent market pricing, providing a consistent basis for spread calculation across the full infrastructure debt universe.

The calculated credit spread is used to price each instrument through a discounted cash flow method, accounting for the debt's amortization profile and contractual features. This generates fair value estimates for individual instruments.

The credit risk, spread, and pricing outputs generated by the infraMetrics framework are used to produce a suite of quantitative analytics. These include time series for probability of default (PD), credit spreads, and yields, among other valuation and risk indicators. These metrics serve as the foundation for constructing infraMetrics indices, valuation comparable, and custom benchmarks. All outputs are segmented

across multiple dimensions—such as credit risk grade, sector, maturity bucket, and geographic region—enabling investors, asset owners, and other market participants to perform consistent benchmarking, monitor credit risk trends, and evaluate valuation metrics within a standardized infrastructure debt universe grounded in observed market behaviour.

infraMetrics Indices: A New Standard for Private Infrastructure Credit

Effective benchmarking is critical to assess the true performance of private infrastructure debt investments and align them with long-term financial goals. Traditional benchmarks such as listed bond indices or appraisal-based estimates fall short in this context, as they fail to capture the unique characteristics of private infrastructure debt, including its illiquidity, long durations, and project-specific risk features.

infraMetrics fills this gap by offering a purpose-built suite of indices specifically calibrated to reflect actual private debt market conditions. These indices are constructed using live market transactions and segment specific parameters such as credit spread, yield, default and recovery metrics, and duration. This enables asset owners and managers to build tailored benchmarks aligned with their portfolios' credit quality, maturity profile, and sectoral exposure.

Listed debt proxies and appraisal-based benchmarks often do not accurately reflect the performance characteristics of private infrastructure debt. Public market indices tend to misrepresent the risk–return profile of infrastructure assets, as they are typically dominated by liquid, cyclical sectors and do not account for the contractual or structural features unique to infrastructure finance. Appraisal-based benchmarks, on the other hand, often smooth out volatility due to infrequent revaluations, which can obscure the evolution of credit risk and delay the recognition of performance changes.

By contrast, infraMetrics indices are built using actual transaction data and market-calibrated credit risk and spread models, providing transparent, timely, and representative benchmarks. These indices serve as invaluable tools for investors seeking objective performance measurement, improved credit risk monitoring, and stronger alignment with regulatory and accounting standards.

infraMetrics indices are derived from a curated universe of over 2,500 private infrastructure debt instruments across sectors like renewable energy, transport, utilities, and social infrastructure. These indices are built using market consistent

valuation models that estimate credit spreads, yields, probability of default (PD), and expected loss updated monthly using actual transaction-level data.

The benchmark family includes flagship indices such as:

- **Infra300 debt:** a broad-market composite covering the full private infrastructure debt universe.
- **Infra 100 IG/NIG debt**: Focused on investment-grade and non-investment-grade debt across both corporate and project instruments.
- **Infra 100 Project IG/NIG:** Tracks credit-rated debt specific to infrastructure project financings.
- **Sector specific indices:** Covering Renewables, Transport, Utilities, and Data Infrastructure etc.
- **Maturity Based Indices:** Short-term (0–5 years), Medium-term (5–15 years), and Long-term (15+ years) debt composites.

Each index reflects real asset-backed private debt exposures and is updated monthly, enabling benchmarking of credit spreads, yield, expected loss, and credit transitions in a transparent and data-rich manner.

These benchmarks form the foundation for performance analysis, peer comparison, and strategic allocation in infrastructure private credit portfolios.

We will now compare these indices with listed proxies and other fixed income indices to assess their relative performance, risk-return characteristics.

Quantifying Credit Risk in Unrated Private Infrastructure Markets

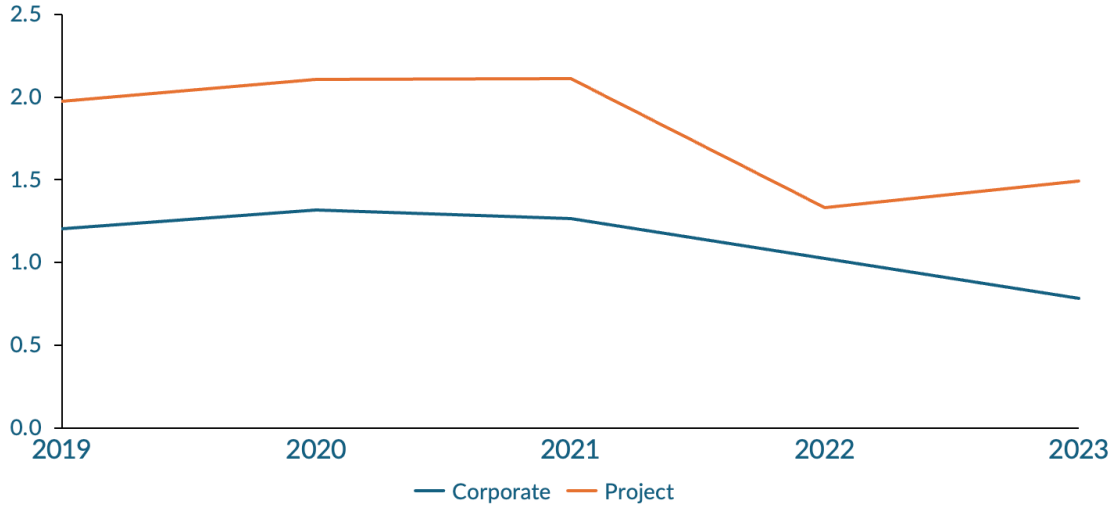
Infrastructure debt exhibits a distinct credit risk profile compared to traditional corporate or sovereign bonds. This distinction arises from the nature of the underlying assets: essential, capital-intensive projects in sectors like energy, transportation, digital connectivity, and social infrastructure. These assets operate under inelastic demand and often benefit from long-term concessions or regulatory frameworks that ensure predictable cash flows. Such characteristics have historically contributed to lower default frequencies and high recovery rates in the event of distress. By contrast, traditional corporate bonds—especially high-yield issues—lack these protections and tend to be more sensitive to macroeconomic cycles, business volatility, and refinancing pressures. As a result, corporate bond default rates can be more variable and generally higher over time.

infraMetrics provides data-driven credit risk measurement and benchmarking tools for the private infrastructure debt market. Empirical data from the infraMetrics

database indicate that from 2019 to 2023, infrastructure firms both infrastructure corporate debt and project-finance debt maintained very low one-year probabilities of default (PD). Project-financed infrastructure loans showed slightly higher PDs than infrastructure corporate debt, but both categories improved after 2021 to reach historically low default probability levels.

Figure 4 provides a visual comparison of the average one-year PD for infrastructure corporate versus project debt, highlighting the consistently low default probabilities observed in this asset class.

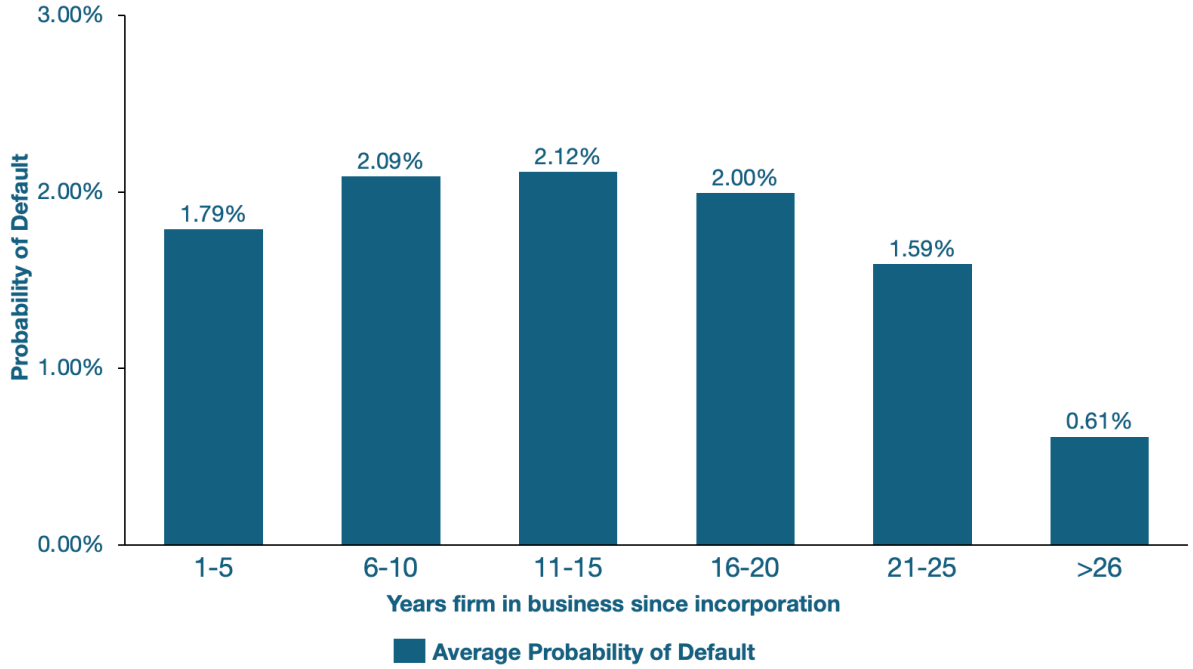
FIGURE 4: Average One-Year Probability of Default (PD): Corporate vs. Project Infrastructure Debt



Source: InfraMetrics

The Figure 5 illustrates the relationship between firm age and credit risk across both corporate and project-based infrastructure borrowers. Younger firms in the 1–5 year range exhibit an average probability of default (PD) of 1.79%, reflecting the heightened vulnerabilities of early-stage entities with shorter operating histories and less established financial resilience. Default risk rises modestly in the 6–10 year (2.09%) and 11–15 year (2.12%) brackets, where refinancing pressures and growth-related leverage can weigh on credit quality. After this mid-life phase, risk begins to decline steadily: firms aged 16–20 years record a PD of 2.00%, while those in the 21–25 year range drop further to 1.59%. The most seasoned firms, with over 26 years of operating history, show the lowest default risk at just 0.61%. This clear pattern highlights how operating maturity, established cash flows, and proven resilience significantly enhance credit stability over time, reducing long-term default likelihood.

FIGURE 5: Average Probability of Default Across firm age

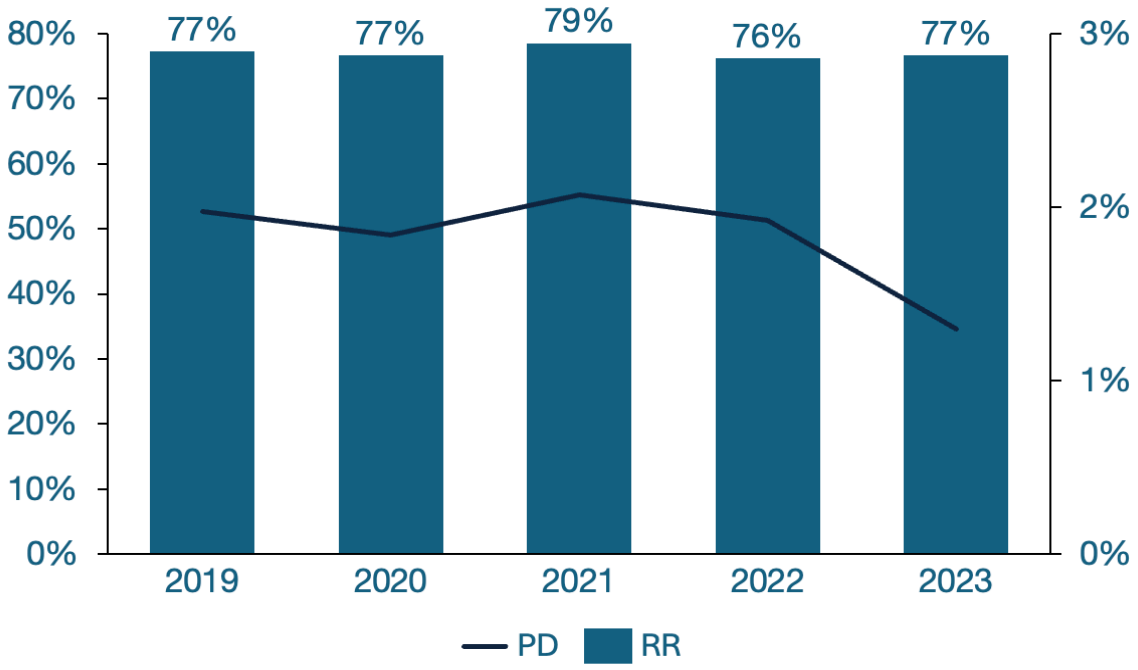


Source: InfraMetrics

The Figure 6 illustrates a compelling credit profile for global infrastructure debt, marked by high recovery rates (RR) consistently above 75% and a steadily declining probability of default (PD) between 2019 and 2023. Despite cyclical pressures and periods of macroeconomic stress, recovery rates remained stable peaking in 2021 and sustaining robust levels thereafter highlighting the asset class's ability to preserve capital even in distressed scenarios.

Meanwhile, the PD trend shows a clear downward trajectory, falling to nearly 1.3% by 2023, reflecting improving credit conditions and portfolio quality over time. This dual dynamic low and declining default risk paired with high recovery expectations is underpinned by the structural characteristics of infrastructure debt: essential service delivery, long-term contracted cash flows, regulatory oversight, and collateral backed lending frameworks. Together, these features enhance the asset class's defensive profile, making it a reliable fixed income allocation for institutional investors seeking stable income and resilience against downturns.

FIGURE 6: Probability of Default Across and Recovery Rate Global Infrastructure



Source: InfraMetrics

What Sets Infrastructure Debt Apart

Infrastructure debt exhibits characteristics that distinguish it from other fixed-income instruments such as investment-grade corporate bonds, high-yield debt, real estate credit, and government securities. These differences, reflected in infraMetrics data, include structural protections, long-term maturities, backing by tangible assets, and stable contractual cash flows. Because the underlying projects deliver essential services (for example, in energy, transportation, digital infrastructure, and social facilities), demand remains relatively steady even during economic downturns. This dynamic makes infrastructure debt's cash flows less sensitive to economic cycles, contributing to more stable performance during periods of financial stress.

Historical data from infraMetrics indicates that infrastructure debt has exhibited lower default rates and higher recovery values compared to several traditional credit sectors over recent periods. Yield comparisons also suggest that infrastructure debt instruments tend to offer a spread premium relative to corporate bonds with similar credit ratings. This differential is commonly interpreted as reflecting the illiquidity premium associated with privately held, long-dated instruments; however, it is important to note that this premium is not static and can vary depending on market conditions.

Additionally, infrastructure debt exposures can be disaggregated across multiple dimensions—including region, sector, credit rating, tenor, and financing structure—

enabling granular analysis of performance and credit risk, as each segment exhibits distinct behaviour across different market environments. These segment-level variations are observable using infraMetrics benchmarking and analytics tools.

For example, based on infraMetrics data as of September 2025, sector-level differences in credit spreads can be observed even among instruments with similar maturities (2–10 years) and investment-grade credit profiles. The average spread for global investment-grade infrastructure debt is approximately 90 basis points. In contrast, Social Infrastructure and Renewables within the same rating and tenor range exhibit higher average spreads around 109 basis points and 101 basis points respectively indicating a 10–20 basis point differential relative to the broader investment-grade segment. These differences reflect sector specific dynamics, structural features, and market pricing behaviour captured within the infraMetrics dataset.

Owners and operators of infrastructure assets face significant upfront capital requirements and must manage ongoing regulatory, operational, and maintenance complexities to sustain and enhance these essential services. Their borrowing needs span the full lifecycle covering initial capital expenditures, acquisition financing, periodic refinancing, and balance sheet recapitalizations.

I Infrastructure debt is underpinned by fundamental characteristics of the underlying assets, distinguishing it from other segments of fixed income and private credit. Key differentiating factors include:

Essential services: Infrastructure assets form the backbone of economic and social activity by providing critical services (e.g. electricity, transportation, and digital connectivity). Demand for these services tends to remain inelastic (steady) even during economic stress, supporting consistent cash flow generation.

Entry barriers: High upfront capital costs, regulatory and contractual protections, and strategic geographic positioning often create natural monopolies or oligopolies in infrastructure sectors. These barriers to entry limit competition and help stabilize cash flow generation.

Stability and predictability: Infrastructure projects typically have long-term, contractually backed revenue streams, coupled with efficient operations and relatively fixed cost structures. Concession agreements, regulatory frameworks, and multi-decade contracts (often over 30 years) help ensure predictable cash flows. In addition, lean operations and regular maintenance support reliable debt servicing over the life of the project.

Inflation protection: Many infrastructure debt revenue models include explicit or implicit inflation linkage. Contracts often contain indexed escalators or allow cost pass-through to end users, helping revenues keep pace with inflation and thereby providing a degree of resilience in real terms.

Infrastructure debt transactions are often structured with additional safeguards to mitigate risk for lenders. Loans are typically secured by liens on the underlying assets and include covenants that restrict additional borrowing, asset sales, new investments, or ownership changes. Protective covenants such as maximum leverage ratios, distribution limits, and early-warning triggers serve to identify signs of credit stress at an early stage. In some cases, lenders also obtain step-in rights, which allow them to assume control of a project if it encounters distress, with the aim of preserving asset value and improving recovery prospects.

Combined with the essential-service nature of the underlying assets, the structural features observed in infrastructure debt such as contractual protections, secured financing, and long-duration profiles contribute to distinct credit and valuation dynamics. These characteristics support the view that infrastructure debt warrants dedicated analysis, rather than treatment as a subset of broader private credit or corporate bond markets.

Beyond Bonds: A Comparative Analysis on Infrastructure Debt

Infrastructure debt is characterized by long maturities, asset-backed structures, and features that frequently incorporate inflation protection mechanisms. These traits are often consistent with the requirements of institutional investors seeking long-duration assets to match liabilities and generate stable income. Typically secured by physical infrastructure assets and governed by contractual covenants, these instruments exhibit credit performance patterns that differ from those of traditional corporate bonds. While other fixed income instruments generally provide higher liquidity and broader market exposure, their cash flow and credit dynamics tend to be more sensitive to macroeconomic fluctuations. In contrast, infrastructure debt has historically demonstrated more stable debt servicing characteristics across market conditions.

Real estate debt, although secured by tangible property, carries heightened cyclical risk and refinancing uncertainty. These factors often result in greater volatility in credit outcomes during economic downturns. Other forms of private credit (such as direct lending and mezzanine financing) tend to offer higher spreads to compensate for their illiquidity, idiosyncratic borrower risk, and shorter maturities.

This comparative framework outlines how infrastructure debt differs from other fixed income instruments across dimensions such as credit risk, maturity, spread, liquidity, duration, inflation linkage, diversification, structural features, and regulatory treatment. These distinctions, based on observed characteristics, help contextualize infrastructure debt within the broader fixed income landscape and support analysis alongside other asset classes.

Table 1: Infrastructure Debt vs Other Fixed Income Securities

Factor	Infrastructure Debt	Corporate Bonds	Real Estate Debt	Other Private Credit	Government Bonds
Credit Risk	Lowest default rates (<2%); robust collateral and covenants	Varies significantly; IG moderate, HY high defaults (up to 14%)	Dependent on property cycles; volatile in downturns	Higher defaults; idiosyncratic and cyclical risks	Very low for developed markets; considered risk-free in stable economies
Maturity	Long-term (10–30 years); matches asset and liability profiles	IG: 5–15 years; HY: 3–7 years	Intermediate (3–10 years)	Shorter (2–7 years), tailored risk structures	Wide range: short-term (<1 year) to long-term (10–30+ years)
Spread	Senior IG: 100–130bps; Non-IG: 250–400bps	IG: 90–150bps; HY: 300–600bps	Senior: 200–350bps; mezzanine: 500bps+	350–600bps+, opportunistic >700bps	Low spread: typically, lowest among major FI sectors, varies with country risk
Liquidity	Illiquid; bespoke terms; growing index transparency	Highly liquid IG/HY; narrow bid/ask spreads	Illiquid; negotiated transfers	Least liquid; restricted transferability	Highly liquid in developed markets; core government bond markets are deep but can be tested in crisis
Duration/Convexity	High duration (8–18 years); moderate convexity	Moderate duration and convexity	Low to intermediate; convexity affected by prepayments	Variable; prepayment and extension risks	Varies (short to very long duration and convexity options available)
Inflation Protection	Common inflation linkage; predictable cash flows	Limited linkage; mostly fixed or floating rates	Some inflation pass-through in leases	Rare inflation protection	Nominal bonds typically no inflation link; inflation-linked bonds exist (TIPS, gilts, linkers)
Diversification	Low/negative correlation to equities and credit	Higher correlation with equity and credit markets	Moderate correlation	Often correlated with economic cycles	Historically negative to low correlation with equities; diversification effectiveness can vary over cycles
Counterparty/ government Support	Frequent government or essential service backing	Private issuers; limited or no government backing	Tenant/borrower credit dependent	Primarily private counterparties	Government/sovereign backing; direct state support
Structural Characteristics	Strong covenants, asset-backed, cash flow ring-fencing	Mostly unsecured with lighter covenants	Secured by physical assets	Ranges from secured to unsecured; deal-dependent	Standardized, simple structures with transparent terms; less complex than private credit instruments
Regulatory Capital Treatment	Favorable under Solvency II	Standard treatment based on rating and sector	Risk-weighted; depends on asset quality	Generally less favorable	Most favorable for high-credit sovereigns (often 0% risk weighting for AAA/Aaa/sovereign bonds)

Purpose-Built vs. Proxy: infraMetrics Indices in Comparative Perspective

Infrastructure private debt represents a distinct credit and risk and return profile compared to traditional fixed income indices, such as corporate bonds, real estate debt, and other credit benchmarks. While listed corporate and real estate bond indices reflect public market activity, they do not capture key structural features of private infrastructure debt. Relying on such public indices as proxies for infrastructure credit may lead to inconsistencies in benchmarking, misestimation of credit risk, and less accurate evaluation of portfolio performance.

In this section, we compare infraMetrics investment-grade (IG) and non-investment-grade (NIG) indices with selected public market proxies such as broad corporate bond indices, real estate bond composites, and listed high-yield infrastructure-related issuers. The objective is to examine how infrastructure debt performance differs in terms of credit behaviour, spread movements, duration characteristics, and cyclicality under varying market conditions.

The analysis suggests that infrastructure debt indices, as constructed using infraMetrics methodologies and based on actual private debt instruments, exhibit comparatively stable spread dynamics and differentiated default patterns. For example, instruments included in the IG and NIG infraMetrics indices show lower spread volatility and more predictable performance during stressed periods than those observed in public market benchmarks. These differences are linked to infrastructure debt's long-duration, asset-backed nature and the contractual predictability of its revenue streams, which tend to respond differently to macroeconomic shocks and liquidity shifts compared to more market-sensitive corporate and real estate debt instruments.

By comparing index composition, credit profiles, and empirical behaviour across these benchmarks, the findings highlight where public credit indices usually fall short in reflecting the private infrastructure debt market. In this context, purpose-built indices such as those from infraMetrics provide a more tailored reference point for assessing credit trends, evaluating risk-adjusted spreads, and examining performance in a way that aligns with the structural features of the underlying instruments.

Sectoral and regional composition are key drivers of credit risk, duration exposure, and performance variation in fixed income markets. In the context of private infrastructure debt, these dimensions are particularly important given the diversity of underlying asset types and geographic jurisdictions.

Table 2: Comparative Overview of Infrastructure Debt, Real Estate, Corporate Bond indices

Category	Index	Focus	Region	Currency
Listed Infrastructure	iBoxx USD HY Infrastructure Index	USD HY corporate bonds in infrastructure sectors (e.g., utilities, telecoms)	Global	USD
Real Estate	DJ Real Estate IG	IG bonds from global REITs/property developers (A rated)	Global	Multi
	DJ Real Estate HY	HY bonds from global real estate issuers (BB rated)	Global	Multi
Corporate Bonds	Bloomberg Investment Grade Corporate Index	IG corporate bonds (multi-currency)	Global	Multi
	Bloomberg Global HY Corporate Index (USD hedged) Index	HY corporate bonds (multi-currency)	Global	Multi
	iBoxx USD Liquid IG Index	USD-denominated IG corporate bonds	Global	USD
	iBoxx USD Liquid HY Index	USD-denominated HY corporate bonds	Global	USD
Private Infrastructure Debt	infra100 IG Debt	100 largest IG infra senior debts (project & corporate)	Global	Multi
	infra100 NIG Debt	100 largest NIG infra senior debts (project & corporate)	Global	Multi
	infra100 Project IG Debt	IG senior debt from project finance SPVs	Global	Multi
	infra100 Project NIG Debt	NIG senior debt from project finance SPVs	Global	Multi

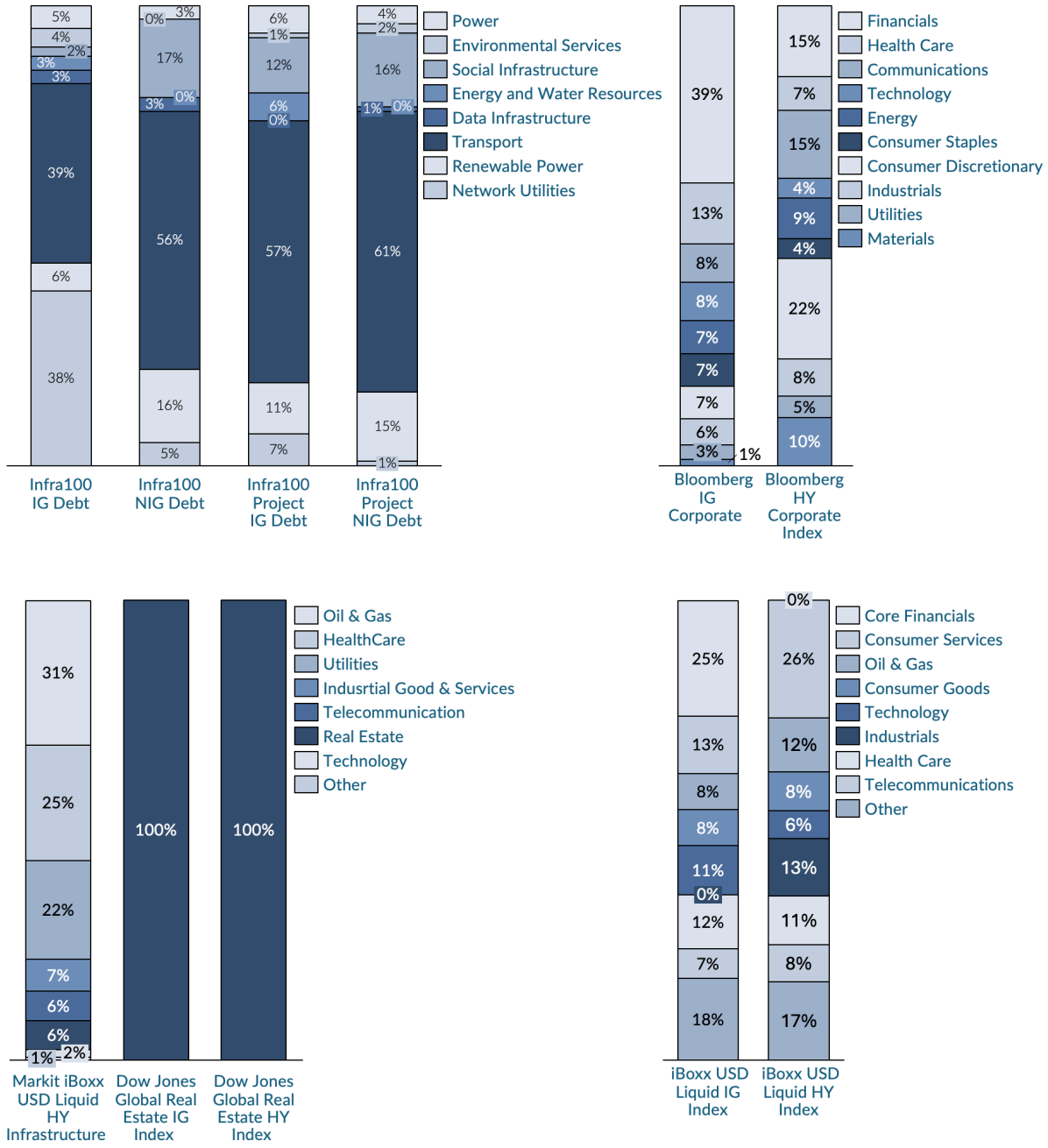
Source: InfraMetrics, Bloomberg

Compositional Contrast: Infrastructure Debt vs. Traditional Indices

infraMetrics indices are constructed to reflect these differences using asset-level, data drawn from the private infrastructure universe. Through the TICCS taxonomy, assets are segmented by sector such as transport, utilities, and renewables and by geographic region. Each segment contributes differently to observed patterns in credit performance, inflation linkage, and risk-adjusted return metrics, reinforcing the importance of compositional analysis in benchmarking and portfolio evaluation.

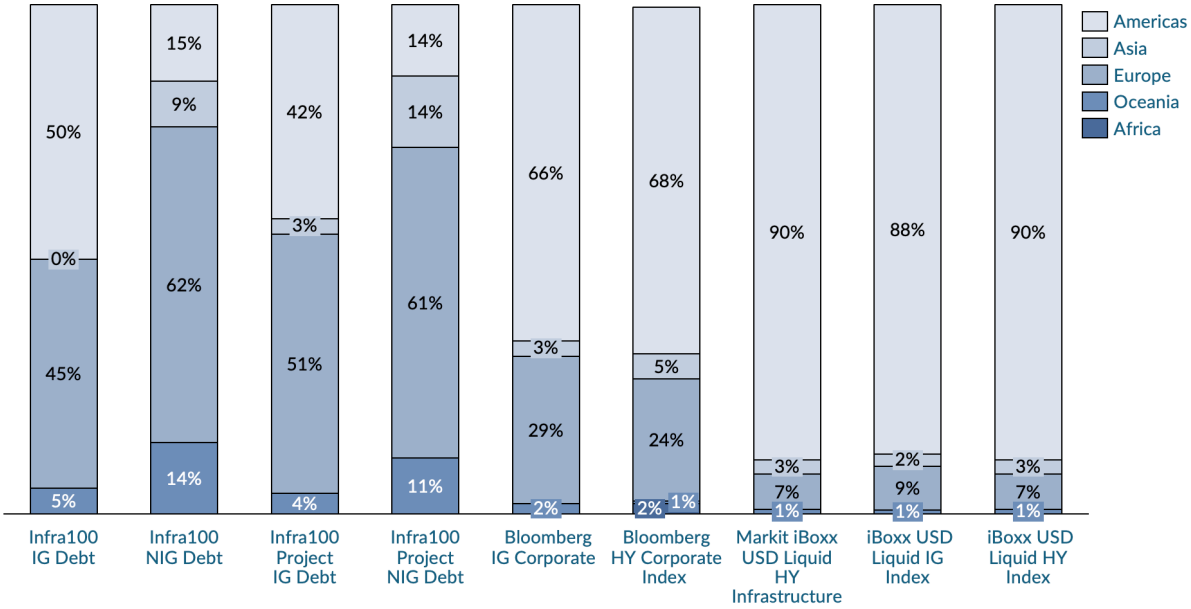
Understanding these compositional factors is essential when comparing infrastructure debt with traditional public market proxies, which often have markedly different sectoral and regional skews. The following chart illustrates these distinctions.

FIGURE 7: Index sector allocation as of 30th June 2025



Source: InfraMetrics, Bloomberg, S&P Global

FIGURE 8: Index region allocation as of 30th June 2025



Source: InfraMetrics, Bloomberg, S&P Global

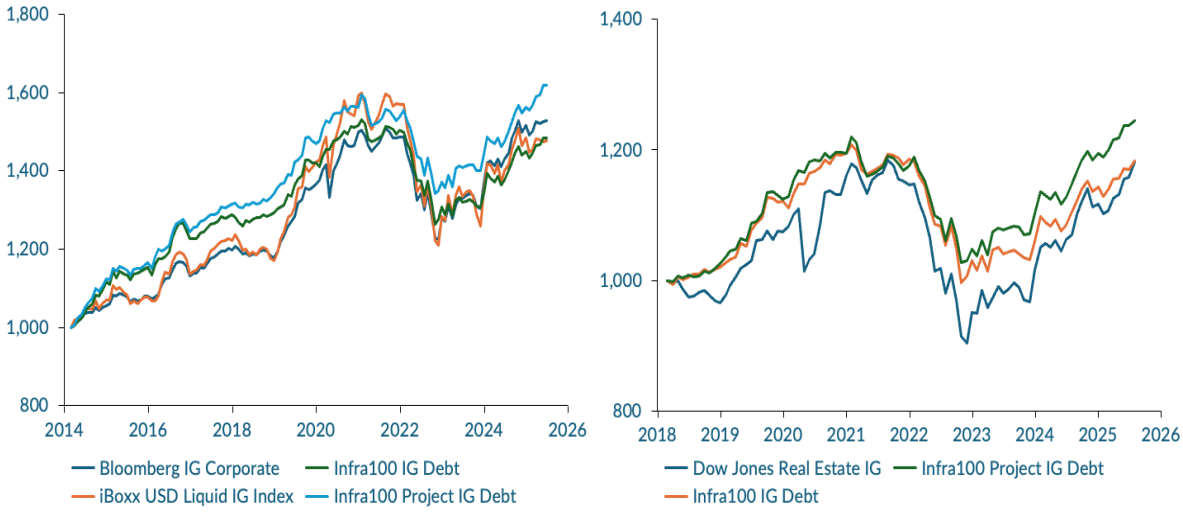
Why Infrastructure Debt Requires Its Own Benchmark: Comparative Insights into Performance and Risk

This section examines the performance dynamics across infrastructure debt, corporate bonds, and real estate credit indices, highlighting differences in returns, volatility, and drawdown behaviour. The analysis considers both investment-grade and high-yield (non-investment-grade) segments and observes distinct performance profiles among these credit asset classes. It finds that infrastructure debt has generally exhibited a more stable performance with lower volatility and smaller drawdowns, especially during periods of market stress.

This relative stability is attributed to infrastructure debt's asset-backed structure, longer duration, and often contracted cash flow profile. In contrast, corporate bond and real estate credit indices being more sensitive to broader market fluctuations tend to experience greater performance variability. These differences underscore the importance of using asset-class-specific benchmarks when evaluating credit performance and risk-adjusted returns, as infrastructure debt's unique characteristics can lead to different risk/return outcomes compared to more market sensitive credit sectors.

Investment Grade performance comparison

FIGURE 9: CUMULATIVE INVESTMENT GRADE INDEX PERFORMANCE – GROSS RETURNS (Jun 2025)



Source: InfraMetrics, Bloomberg

Table 3: ANNUAL PERFORMANCE INVESTMENT GRADE INDEX (Jun 2025)

Year	Bloomberg IG Corporate	iBoxx USD Liquid IG	Dow Jones Real Estate IG	Infra100 IG Debt	Infra100 Project IG Debt
2014	6.0%	7.0%	N/A	11.0%	12.1%
2015	1.2%	-0.2%	N/A	2.2%	2.7%
2016	6.2%	7.1%	N/A	8.2%	9.1%
2017	5.9%	8.3%	N/A	4.3%	4.8%
2018	-1.1%	-3.9%	-2.20%	1.7%	3.0%
2019	15.4%	19.9%	10.77%	8.2%	8.9%
2020	9.2%	12.0%	8.81%	8.6%	8.0%
2021	-1.1%	-1.8%	-2.59%	-2.2%	-2.5%
2022	-14.6%	-18.9%	-17.33%	-14.1%	-12.7%
2023	11.8%	11.3%	10.68%	8.2%	9.6%
2024	5.0%	2.1%	4.86%	2.8%	4.6%
2025	3.9%	4.2%	7.19%	4.8%	4.7%

Source: InfraMetrics, Bloomberg

Table 4: INDEX PERFORMANCE - GROSS RETURNS & FUNDAMENTALS (Jun 2025)

					Annualized Return					Fundamentals		
Index	1 Mo	3 Mo	1Yr	YTD	3Yr	5Yr	10Yr	Since Feb 2014	Since Feb 2018	Duration	Spread	Yield
Bloomberg IG Corporate	1.45%	1.92%	7.20%	3.92%	6.03%	1.46%	3.82%	3.88%	N/A	6.37	83 BPS	4.51%
iBoxx USD Liquid IG	2.17%	2.00%	6.49%	4.21%	4.81%	-0.22%	3.58%	3.63%	N/A	7.90	88 BPS	5.52%
Dow Jones Real Estate IG	2.04%	4.40%	10.36%	7.19%	6.40%	0.70%	N/A	N/A	2.17%	N/A	N/A	N/A
Infra100 IG Debt	1.14%	2.33%	7.02%	4.77%	3.92%	0.18%	2.96%	3.59%	2.27%	5.64	96 BPS	4.92%
Infra100 Project IG Debt	0.61%	2.20%	8.43%	4.70%	5.44%	1.01%	3.69%	4.33%	2.96%	5.84	104 BPS	5.05%

Source: InfraMetrics, Bloomberg, Refinitiv

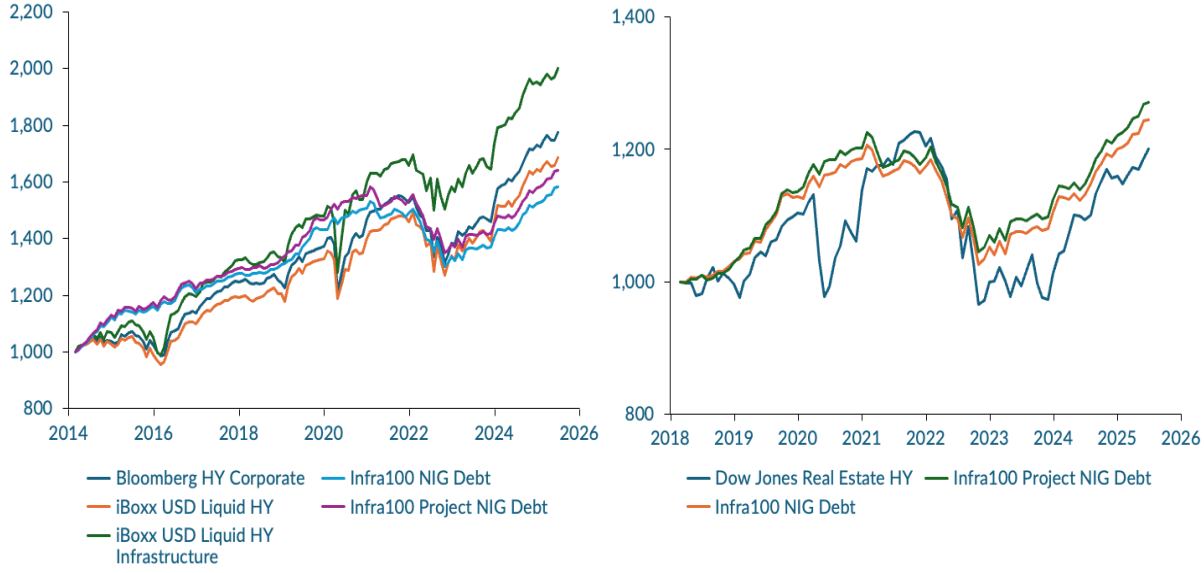
Table 5: INDEX RISK & RETURN CHARACTERISTICS (Jun 2025)

				Annualized Std Deviation					Risk Return Ratio			
Index	3Yr	5Yr	10Yr	Since Jan 2014	Since Feb 2018	3Yr	5Yr	10Yr	Since Feb 2014	Since Feb 2018
Bloomberg IG Corporate	7.53%	7.05%	6.03%	5.74%	N/A	0.80	0.21	0.63	0.68	N/A
iBoxx USD Liquid IG Index	10.61%	9.80%	8.31%	7.96%	N/A	0.45	-0.02	0.43	0.46	N/A
Dow Jones Real Estate IG	8.00%	7.80%	N/A	N/A	7.60%	0.80	0.09	N/A	N/A	0.29
Infra100 IG Debt	6.28%	5.70%	4.74%	4.68%	5.07%	0.62	0.03	0.62	0.77	0.45
Infra100 Project IG Debt	5.57%	5.39%	4.46%	4.41%	4.81%	0.98	0.19	0.83	0.98	0.62

Source: InfraMetrics, Bloomberg, Refinitiv

Non-Investment Grade performance comparison

FIGURE 10: CUMULATIVE NON-INVESTMENT GRADE INDEX PERFORMANCE – GROSS RETURNS (Jun 2025)



Source: InfraMetrics, Bloomberg

Table 6: ANNUAL PERFORMANCE NON-INVESTMENT GRADE INDEX (Jun 2025)

Year	Bloomberg HY Corporate	iBoxx USD Liquid HY Index	iBoxx USD Liquid HY Infrastructure	Dow Jones Real Estate HY	Infra100 NIG Debt	Infra100 Project NIG Debt
2014	2.9%	1.7%	5.3%	N/A	11.4%	12.4%
2015	-2.8%	-4.9%	-5.2%	N/A	2.9%	3.0%
2016	15.9%	15.8%	21.4%	N/A	6.8%	7.4%
2017	7.9%	6.6%	9.4%	N/A	4.4%	4.4%
2018	-2.0%	-1.3%	-0.7%	-2.4%	2.8%	3.2%
2019	14.2%	15.0%	15.0%	12.9%	8.9%	10.2%
2020	6.7%	5.1%	7.8%	6.3%	7.1%	7.2%
2021	3.7%	4.7%	4.0%	3.9%	-1.8%	-1.8%
2022	-10.9%	-11.1%	-7.8%	-17.8%	-12.1%	-11.9%
2023	14.2%	14.4%	14.5%	4.2%	8.4%	8.0%
2024	9.4%	7.9%	8.4%	10.0%	6.7%	7.1%
2025	4.4%	5.0%	4.8%	6.6%	3.8%	4.0%

Source: InfraMetrics, Bloomberg

Table 7: INDEX PERFORMANCE - GROSS RETURNS & FUNDAMENTALS (Jun 2025)

					Annualized Return					Fundamentals		
Index	1 Mo	3 Mo	1Yr	YTD	3Yr	5Yr	10Yr	Since Feb 2014	Since Feb 2018	Duration	Spread	Yield
Bloomberg HY Corporate	1.52%	3.09%	10.07%	4.42%	10.47%	5.92%	5.47%	5.25%	N/A	3.19	337 BPS	6.81%
iBoxx USD Liquid HY	1.85%	3.69%	10.58%	4.98%	10.15%	5.90%	5.19%	4.81%	N/A	2.86	305 BPS	7.17%
iBoxx USD Liquid HY Infrastructure	1.62%	3.57%	9.25%	4.79%	10.66%	6.46%	6.39%	6.37%	N/A	2.94	320BPS	7.01%
Dow Jones Real Estate HY	1.92%	4.54%	11.15%	6.63%	5.67%	2.99%	N/A	N/A	2.70%	N/A	N/A	N/A
Infra100 NIG Debt	0.36%	2.02%	8.88%	3.83%	5.42%	1.41%	3.43%	4.10%	3.02%	4.63	143 BPS	4.79%
Infra100 Project NIG Debt	0.33%	1.97%	9.33%	3.97%	5.63%	1.48%	3.70%	4.43%	3.29%	4.50	149 BPS	4.88%

Source: InfraMetrics, Bloomberg, Refinitiv

Table 8: INDEX RISK & RETURN CHARACTERISTICS (Jun 2025)

				Annualized Std Deviation					Risk Return Ratio				
Index	3Yr	5Yr	10Yr	Since Jan 2014	Since Feb 2018	3Yr	5Yr	10Yr	Since Feb 2014	Since Feb 2018
Bloomberg HY Corporate	6.11%	6.74%	7.39%	7.04%	N/A	1.71	0.88	0.74	0.75	N/A
iBoxx USD Liquid HY	7.52%	7.87%	7.66%	7.36%	N/A	1.35	0.75	0.68	0.65	N/A
iBoxx USD Liquid HY Infrastructure	7.48%	7.87%	8.88%	8.49%	N/A	1.42	0.82	0.72	0.75	N/A
Dow Jones Real Estate HY	8.42%	8.86%	N/A	N/A	8.77%	0.67	0.34	N/A	N/A	0.31
Infra100 NIG Debt	4.79%	4.73%	3.92%	3.87%	4.23%	1.13	0.30	0.88	1.06	0.71
Infra100 Project NIG Debt	4.66%	4.73%	3.96%	3.94%	4.24%	1.21	0.31	0.93	1.13	0.78

Source: InfraMetrics, Bloomberg, Refinitiv

The comparison between investment-grade and non-investment-grade private infrastructure debt and traditional fixed income indices shows clear structural differences in sector composition, maturity profiles, and the way each segment responds to economic and market conditions. These variations indicate that

conventional credit benchmarks may not fully reflect the characteristics or performance behaviour of private infrastructure credit, particularly given its distinct financing structures and underlying asset types.

Sector Composition: infraMetrics vs. Traditional Corporate Indices

- **infraMetrics Infrastructure Debt Indices:** The infraMetrics indices (e.g. infra100 IG/NIG and infra100 Project IG/NIG) are built on actual infrastructure sectors such as transport, power, renewables, and utilities. These sectors typically feature long term contracted or regulated revenues, lower economic cyclicality, and tangible asset backing, leading to more stable cash flow profiles.

- **Traditional Fixed Income Indices:** Broad market indices like the Bloomberg Investment Grade/High Yield Corporate indices and the Markit iBoxx USD Liquid IG/HY indices have large exposures to cyclical sectors (financials, industrials, technology, consumer discretionary, etc.) that are more sensitive to market volatility and economic shocks.

This structural difference in sector exposure means that a broad fixed income index can behave very differently from a pure infrastructure debt index. For example, the Bloomberg High Yield Corporate Index and iBoxx USD Liquid HY Index each allocate over 20% of their weight to consumer discretionary and services companies sectors that tend to be among the most vulnerable during economic downturns. In contrast, the infraMetrics infrastructure debt indices have only infrastructure sectors (utilities, energy & water resources, social infrastructure, etc.) that continue generating revenue even in recessions.

As a result, using a general corporate credit index as a benchmark may misrepresent the risk-return profile of private infrastructure debt. The corporate index could overstate volatility and drawdowns and understate the resilience of infrastructure-backed loans. In contrast, the purpose of the infraMetrics indices is to provide benchmarks derived from actual infrastructure debt instruments. They are built to align with the characteristics of the asset class, allowing performance evaluation, return target validation and portfolio construction that reflects the long-term, stable nature of infrastructure debt rather than the broader market's cyclicality.

Markit iBoxx USD Liquid HY Infrastructure Index and Its Composition

One notable example of the difference is the Markit iBoxx USD Liquid High Yield Infrastructure Index. Despite its name, this public index does not fully capture the characteristics of private infrastructure debt. It includes primarily corporate issuers that may engage in some infrastructure-related business, but it is dominated by general corporate high-yield bonds rather than project-specific debt. The index also carries significant exposure to sectors like real estate and technology, which are not core infrastructure sectors in a strict sense. These industries typically lack the long-

term contracted revenues, regulatory protections, or essential-service mandates that define true infrastructure investments. Moreover, the iBoxx "Infrastructure" HY index does not include project finance debt (e.g. ring-fenced senior loans issued by special-purpose vehicles with dedicated cash flow waterfalls and covenants).

Because of this composition, the performance of the iBoxx Liquid HY Infrastructure Index tends to mirror broad high-yield corporate credit behaviour. It has a higher correlation with macroeconomic cycles and greater sensitivity to credit market swings or refinancing risk, rather than exhibiting the stable, defensive characteristics associated with private infrastructure debt. Consequently, while this index provides a liquid, tradable gauge of high-yield debt in infrastructure related companies, it may not serve as a representative benchmark for private infrastructure credit strategies. Benchmarking a private infrastructure debt portfolio against this index could lead to mismatches in expected volatility, drawdown, simulating downside scenarios and Value at Risk given that the index's underlying exposures differ from pure infrastructure project debt.

A Benchmark That Reflects the True Nature of Infrastructure Debt

Historical data from periods of market stress highlight the different behavior of infrastructure debt indices compared to traditional corporate bond indices:

1. **2022 (Monetary Tightening and Inflation Shock):** The Bloomberg US Investment Grade Corporate Index and the iBoxx USD Liquid IG Index dropped by about –14.6% and –18.9%, respectively, during this volatile year. In comparison, the infra100 IG index declined by roughly –14.1%, and the infra100 Project IG index by –12.7%. Notably, these infrastructure debt indices experienced slightly smaller losses despite having similar duration profiles, suggesting that their long-term contracted cash flows helped cushion the impact of rising rates and credit spread widening.
2. **2018 (Equity Market Sell-off and Credit Volatility):** During a late-2018 market pullback driven by Federal Reserve tightening and global trade tensions, broad high-yield indices again slipped (e.g. –2.0% for Bloomberg HY, –1.3% for iBoxx USD HY). In the same period, the infra100 NIG index managed a gain of roughly +2.8%, and the infra100 Project NIG index rose about +3.2%. While risk assets generally saw declines, infrastructure debt indices continued to climb, indicating more resilience to short-term market turbulence.
3. **2015 (Global Growth Slowdown and Oil Price Collapse):** In a year marked by China's economic slowdown and a sharp drop in oil prices, high-yield corporate bonds struggled—the Bloomberg High Yield Corporate Index returned –2.8% and the iBoxx USD Liquid HY Index fell –4.9%. By contrast, the infra100 Non-Investment Grade (NIG) index delivered a modest gain of

about +2.9%, and the infra100 Project NIG index was up approximately +3.0% for the year. These positive returns amid broader high-yield market losses underscore the lower cyclicality of the infrastructure debt sector during that stress period.

Over the longer timeline from 2014 to 2025, the cumulative return patterns further reflect these differences. Traditional fixed income benchmarks (both investment-grade and high-yield) experienced several noticeable drawdowns and periods of heightened volatility particularly in years like 2015, 2018, and 2022 corresponding to economic or rate shocks. In contrast, the infraMetrics infrastructure debt indices followed a steadier upward trajectory with fewer and shallower drawdowns, and when drawdowns did occur, the recoveries were relatively swift. In other words, the private infrastructure debt indices show a more consistent compounding of returns over time, whereas the broad fixed income indices saw more frequent setbacks aligned with the business cycle and market sentiment changes.

It is also instructive to look at the performance of the iBoxx USD Liquid HY Infrastructure Index over this period. This index exhibited high sensitivity to risk-on/risk-off cycles. For instance, it delivered strong gains in certain "risk-on" years (+21.4% in 2016, +15.0% in 2019, and +14.5% in 2023), but also suffered notable declines in tougher years (e.g. –5.2% in 2015, –0.7% in 2018, and –7.8% in 2022). Such swings in performance reflect the index's exposure to more cyclical sub-sectors within the broad infrastructure theme (for example, companies linked to oil & gas prices or construction activity). While the iBoxx HY Infrastructure index captures short-term high-yield credit market rallies and sell-offs, it does not display the same level of stability or long-term compounding as the private infra100 NIG and Project NIG indices.

Risk-Adjusted Return Metrics and Yield Profile

Data on long-term risk and return metrics further illustrate how infrastructure debt indices compare with traditional bond indices:

- **Investment Grade Segment:** The infra100 IG Debt index has achieved an annualized return relative to risk (often measured as a return/volatility ratio) of about 0.62 over the past 10 years. This is higher than the roughly 0.43 ratio for the Markit iBoxx USD Liquid IG Corporate Index and in line with the 0.63 for the Bloomberg IG Corporate Index over a comparable period. Notably, the infra100 IG index's volatility since 2014 was around 4.7%, which is significantly lower than the approximately 8.0% volatility of the iBoxx IG index (and below the 5.7% volatility of the Bloomberg IG index). In terms of yield and duration, the infra100 IG provided a yield of about 4.92% with an effective duration of roughly 5.6 years, compared to a 4.51% yield and 6.37-year duration for the Bloomberg IG Corporate Index (and 5.52% yield, 7.9-year duration for the iBoxx IG index). This indicates that the infrastructure

debt index delivered a similar level of return with less interest-rate risk exposure and lower volatility. It also carried a relatively higher credit spread (infra100 Project IG index spread was around 104 basis points), as of June 2025.

- **High-Yield/Non-Investment Grade Segment:** The infra100 Project NIG (Non-Investment Grade) index showed a strong risk-adjusted performance, with a 10-year return/volatility ratio of approximately 1.13. This is substantially higher than the ratios for broad high-yield corporate/real estate indices (around 0.74 for Bloomberg US HY Corporate and 0.65 for iBoxx USD Liquid HY over the same period). The infra100 Project NIG's volatility has been recorded in the mid-single digits (around 4.5–5.0%), whereas typical high-yield corporate indices have seen higher volatility in the 7% to 8% range. The index's yield was roughly 4.88% (with a moderate duration near 4.5 years), which, combined with its volatility, results in a more favourable risk-return balance.
- **iBoxx HY Infrastructure Index:** For comparison, the Markit iBoxx USD Liquid High Yield Infrastructure index delivered a 10-year annualized return of about 6.39% with a yield around 7.01% (and an average credit spread of roughly 320 bps). Its effective duration has been quite short (approximately 2.94 years), which can limit interest rate risk but also indicates a focus on shorter-term debt. The annualized volatility of this index was relatively high, around 8.49%, leading to a return/volatility ratio of roughly 0.75 since 2014. In other words, much of the index's nominal return comes with elevated risk. The combination of a high yield spread, and low duration suggests the index is tilted toward higher-yield, shorter-maturity instruments a profile that differs from the long-duration, stable cash-flow investments typical of private infrastructure debt portfolios. Thus, the risk-adjusted returns are not as reflective as those observed for the infraMetrics non-investment grade infrastructure indices in this period.

Right Asset, Right Benchmark: Aligning Strategy with Reality

Private infrastructure debt is not simply "private corporate credit with a longer duration" it is an asset class built on different principles: essentiality, regulation, long-term stability, and contractual protection. Benchmarking such assets against generic corporate bond indices introduces distortions that undermine performance attribution, misrepresent volatility, and overstate liquidity risk. infraMetrics investment/non- investment grade indices, built from real-world, bottom-up transactions across global markets, offer an accurate and transparent reference point. They allow GPs to demonstrate skill in infrastructure debt selection, and LPs to backtest strategies against benchmarks that match their investment universe, not a public proxy.

- **Distinct Asset Class Characteristics:** Private infrastructure debt is fundamentally different from generic corporate credit. These debt investments are secured by assets that provide essential services and often operate under long-term concessions, regulatory frameworks, or contracts. As a result, infrastructure debt tends to have long-duration, stable cash flows and structural protections (collateral, covenants, step-in rights, etc.) that reduces the impact of economic cycles on credit performance. It is not simply "corporate credit with a longer tenor," but rather a separate segment with its own risk profile.
- **Benchmark Mismatch Risks:** Using broad public corporate bond indices as performance benchmarks for an infrastructure debt portfolio can lead to distortions. A generic corporate index includes many industries and risk factors that infrastructure debt does not share (and vice versa). Consequently, comparing infrastructure-focused portfolios to such indices may misstate volatility, drawdown risk, and liquidity assumptions for example, corporate indices might exhibit higher price volatility and drawdowns that are not reflective of the steadier valuation of private infrastructure loans. This mismatch can undermine accurate performance attribution and risk assessment.
- **Infrastructure Specific Benchmarks:** The infraMetrics indices (both investment-grade and high-yield infrastructure debt benchmarks) are created from real-world, bottom-up data on private infrastructure debt instruments globally. They provide a reference point tailored to the infrastructure debt asset class. By benchmarking against these indices, General Partners (GPs) managing infrastructure credit funds can more transparently demonstrate how their portfolio selection and performance compare to the broader private infrastructure debt market. Similarly, Limited Partners (LPs) and asset allocators can back-test and evaluate target returns, mangers performance or portfolio resilience using a benchmark that closely matches their investment universe, rather than a public-market proxy that might not truly reflect it. In essence, aligning the "right asset" with the "right benchmark" helps ensure that strategy and performance evaluation remain grounded in the reality of the underlying investments.

Not All Asset-Backed Credit Is Equal: Infra Debt vs. Real Estate Bonds

Private infrastructure debt and real estate bond indices represent structurally different Not all forms of asset-backed debt behave similarly. A clear contrast can be seen between infrastructure debt and real estate debt (as represented by real estate bond indices):

- **Real Estate Bond Indices:** These are typically composed of debt issued by real estate investment trusts (REITs), commercial property companies, and developers. The cash flows supporting real estate bonds are tied to property

values and rental incomes, which can be cyclical. They face risks from valuation swings in real estate markets, lease renewals or vacancies, tenant creditworthiness, and changes in demand across property types (office, retail, etc.). Such factors make real estate credit performance more sensitive to economic cycles, interest rate changes, and shifts in market sentiment. For instance, a downturn in property markets or a rise in financing costs can quickly erode the credit outlook for highly leveraged real estate borrowers, leading to wider credit spreads and price volatility in real estate bond indices.

- **Infrastructure Debt:** In contrast, infrastructure debt is backed by projects and companies delivering essential services often under long-term agreements or regulated revenue models. The financing structures (often project finance or secured loans) include covenants and collateral that protect investors. Because people continue to use electricity, water, transport, etc., even during economic slowdowns, the revenue streams for many infrastructure assets are more predictable and less correlated with short-term economic fluctuations. This means infrastructure debt has historically exhibited a different risk profile generally steadier cash flow coverage and more resilience in stress scenarios compared to real estate debt of comparable credit quality.

Performance Across Market Cycles: Infrastructure vs. Real Estate Debt

When examining performance over multiple market cycles, the differences between infrastructure debt indices and real estate bond indices become evident:

- **Drawdowns in Stress Periods:** Real estate credit indices (such as the Dow Jones Real Estate Investment Grade and High Yield indices) have experienced repeated deep drawdowns in recent years. Notably, during broader market stress events for example, the late 2019 to early 2020 period (with economic uncertainty and the onset of the COVID-19 pandemic) real estate bond benchmarks saw significant declines and spikes in volatility. A particularly pronounced example is 2022, when rapidly rising interest rates and inflationary pressures led to sharp corrections across fixed income markets. In 2022, the Dow Jones Real Estate IG index dropped approximately –17.3%, and its High Yield counterpart fell about –17.8%, making these among the worst-performing credit segments that year. By contrast, infrastructure debt indices had smaller drawdowns in the same environment: the infra100 IG index was down roughly –14.1%, and the infra100 Project IG was down –12.7% in 2022. Similarly, on the high-yield side, the infra100 NIG and infra100 Project NIG indices declined by about –12.1% and –11.9%, respectively. While still negative, these declines were a few percentage points more moderate than those of the real estate focused

indices, indicating less sensitivity to the rate shock and credit spread widening that occurred.

- **Recovery and Long-Term Trajectory:** Following periods of market dislocation, infrastructure debt indices have generally shown quicker recoveries and a return to their long-term growth trend, whereas real estate credit indices sometimes experienced a slower rebound. Over the full observed period (late 2010s through mid-2020s), the cumulative return of infrastructure debt indices outpaced that of real estate bond indices. The real estate benchmarks, aside from more volatile swings, often had their gains eroded by those large drawdowns (for example, the deep losses in 2020 and 2022). Infrastructure debt indices, with fewer large setbacks, were able to compound returns more steadily. This pattern suggests that the essential-service nature of infrastructure assets provided a degree of insulation from some of the severe downturns that hurt the real estate sector.

Risk-Return Metrics: Infrastructure vs. Real Estate Credit (Since 2018)

A comparison of risk-adjusted return metrics between infrastructure debt indices and real estate bond indices (using data available since 2018) further highlights their differences:

- **Investment Grade Comparison:** For the period since 2018, the infra100 Project IG Debt index shows an average return-to-risk (Sharpe-like) ratio of approximately 0.62, compared to only about 0.29 for the Dow Jones Real Estate IG Bond index. This indicates that per unit of volatility, the infrastructure project debt index achieved roughly twice the return of the real estate credit index. Consistently, the annualized volatility of infra100 Project IG has been lower (around 5.4–5.6%) versus roughly 7.6–8.0% for the real estate IG index. Even when looking at shorter horizons, the trend persists – over the last three years, infra100 Project IG's ratio was about 0.98 versus 0.80 for the real estate index. Over five years (a period including significant disruptions), the ratios were roughly 0.19 for infra100 Project IG against 0.09 for the real estate index, reflecting the impact of drawdowns in the latter. The broader infra100 IG (corporate-level infrastructure debt) index likewise delivered a solid risk-return profile (around 0.45 since 2018) with volatility near 5.7%, lower than that of the comparable real estate index.
- **High-Yield/Non-Investment Grade Comparison:** The gap is even more pronounced in non-investment-grade debt. The infra100 Project NIG index has a return/risk ratio of about 0.78 since 2018, whereas the Dow Jones Real Estate HY index's ratio is roughly 0.31 over the same period. In terms of volatility, infra100 Project NIG's annualized standard deviation was around 4.7% (measured over a five-year window), significantly below the real estate HY index's volatility (approximately 8.9%). The standard infra100 NIG

(broader infrastructure high-yield) index shows a similar pattern, with a post-2018 risk-return ratio near 0.71 and volatility around 4.7%, again far more stable than its real estate credit counterpart. In summary, infrastructure debt indices achieved higher returns per unit of risk and exhibited lower overall risk in this timeframe compared to real estate bond indices.

Real Estate Bonds Don't Reflect Infrastructure Credit Dynamics

In light of the above comparisons, it is apparent that real estate bond indices behave quite differently from infrastructure debt indices. Over the past decade, real estate credit benchmarks have been more prone to sharp boom-bust cycles – suffering steep declines in adverse markets and then recovering during strong periods, in line with the cyclicality of the property sector. This volatility and pattern of drawdowns do not mirror the more stable, income-oriented performance observed in private infrastructure debt indices. Even though both asset classes are forms of asset-backed credit, the underlying drivers (property market conditions vs. essential service demand and regulation) result in divergent outcomes. Therefore, using a real estate bond index as a performance proxy for infrastructure debt could be misleading. Such indices are not well-aligned with the cash flow stability, lower volatility, and longer investment horizon that characterize infrastructure debt. Investors and analysts focusing on infrastructure credit typically require benchmarks (like the infraMetrics series) that specifically capture the dynamics of infrastructure financing, rather than relying on real estate or broad corporate credit indices which don't reflect the true behaviour of infrastructure debt assets.

Strategic Allocation Implications

Private infrastructure debt offers a fundamentally distinct profile within fixed income allocations, blending long-duration, contract-backed cash flows with low credit cyclicality and strong downside protection. Analysis of infraMetrics indices indicates that across market cycles, this asset class has delivered higher cumulative returns than comparable public benchmarks, along with stronger volatility-adjusted performance, faster recovery times, and greater resilience during periods of market stress. These characteristics are relevant for diversification, yield enhancement, and capital stability in fixed income portfolios.

Importantly, private infrastructure debt carries an embedded illiquidity premium—a dynamic feature rather than a static spread—that compensates investors for limited secondary market tradability and longer holding periods. This premium is not merely a cost; it can also serve as an additional source of return, particularly for institutional investors with long-term liabilities. During market stress, public credit markets often experience sharp dislocations and forced selling; by contrast, private infrastructure

debt instruments tend to be largely insulated from mark-to-market volatility thanks to their contractual cash flows and stable fundamentals. infraMetrics index data further illustrate that this illiquidity premium has been associated with long-term performance that is comparable to or better than that of liquid investment-grade or high-yield credit, while exhibiting materially lower risk.

Examining correlations further highlights the differentiated role of private infrastructure debt in institutional portfolios. The correlation matrix reveals that infrastructure debt, both investment-grade (IG) and non-investment-grade (NIG), has a credit behavior profile that is materially distinct from traditional public fixed income instruments such as corporate and real estate bonds. This distinction carries implications for portfolio diversification, risk management, and benchmark selection.

FIGURE 11: Investment grade index return corelation

Source: InfraMetrics, Bloomberg

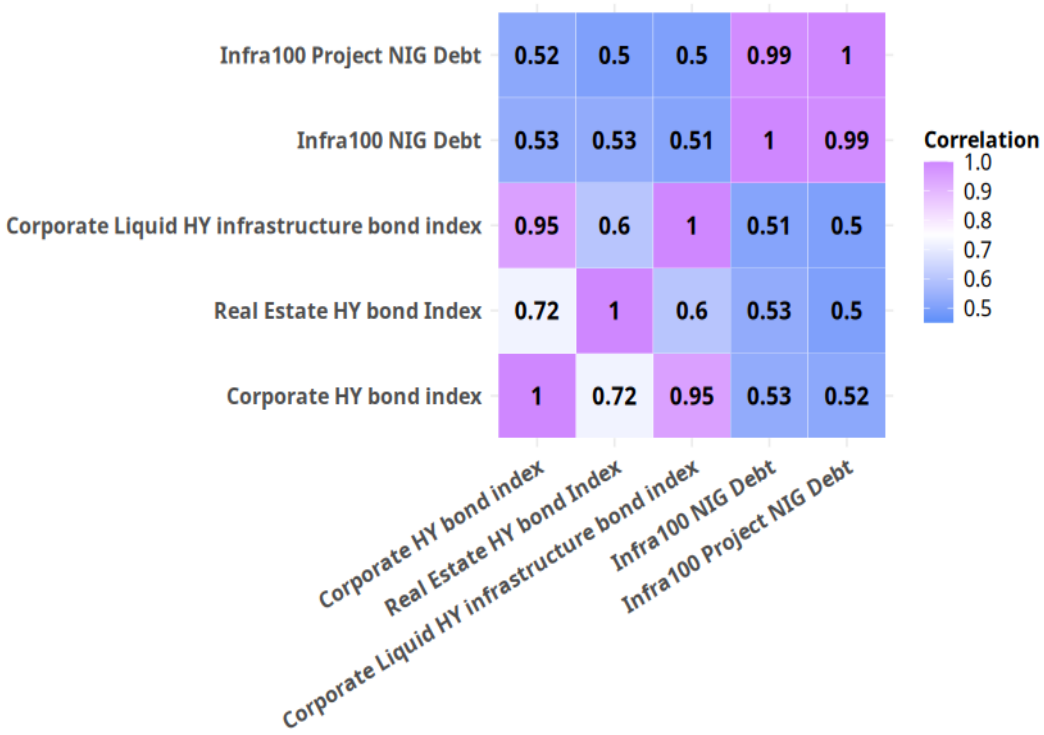
Building Smarter Investment Grade Fixed Income Allocations

Investment-grade infrastructure debt exhibits a distinct risk-return profile that sets it apart from traditional IG credit instruments. While infra100 IG Debt shows a moderate correlation of 0.78 with the Corporate IG Bond Index and 0.73 with the Real Estate IG Bond Index, these figures indicate only partial overlap. infra100 Project IG Debt—focused on project-financed instruments—demonstrates even lower correlations: 0.76 with Corporate IG and 0.72 with Real Estate IG. In contrast, Corporate and Real Estate IG indices are closely linked, with a 0.91 correlation, suggesting they share similar sensitivities to economic and refinancing risks.

These correlation differentials underscore the strategic allocation case for treating infrastructure debt as a distinct pillar within fixed income portfolios. The relatively low correlation between infraMetrics investment-grade indices and traditional corporate or real estate IG benchmarks highlights the diversifying potential of

infrastructure debt grounded in its long-term, contracted or regulated cash flows, essential service orientation, and asset-backed structures. Unlike public IG indices, which are tightly interconnected and highly sensitive to economic and refinancing cycles, infrastructure debt offers greater downside protection and return stability. For allocators, this means that using corporate or real estate bond indices as benchmarks for infrastructure credit introduces distortions that undermine portfolio construction, risk calibration, and performance attribution. In contrast, infraMetrics IG indices provide a fit-for-purpose reference aligned with the actual behaviour of private infrastructure debt, enabling more effective strategy design and capital allocation.

FIGURE 12: High yield index return corelation



Source: InfraMetrics, Bloomberg

Building Smarter High-Yield Fixed Income Allocations

Non-investment-grade infrastructure debt (NIG) shows a markedly different correlation profile compared to traditional high-yield credit. The infra100 NIG Debt index has a relatively low correlation of about 0.53 with both a broad corporate high-yield bond index and a real estate high-yield bond index, indicating limited co-movement with those segments of the market. The infra100 Project NIG Debt index exhibits even weaker correlations—approximately 0.52 with the corporate HY index and 0.50 with the real estate HY index—highlighting its differentiated behavior despite sharing a non-investment-grade rating category. By comparison, the

corporate HY bond index and a liquid infrastructure HY bond index are very closely aligned (around 0.95 correlation), reflecting their shared exposure to general high-yield credit risk and macroeconomic cycles.

These correlation patterns suggest that private infrastructure NIG debt functions as a distinct component within high-yield portfolios, rather than moving in lockstep with traditional HY bonds. The consistently low correlations of infra100 NIG and Project NIG with public HY indices indicate a potential diversifying effect, offering high yield with materially different downside risk characteristics. Consequently, benchmarking private infrastructure NIG debt against standard high-yield corporate or real estate bond indices may not accurately capture its risk–return profile. infraMetrics NIG indices are specifically designed to mirror the structural features and dynamics of private infrastructure credit, providing a benchmark that allows for more precise portfolio construction, risk attribution, and strategic planning in this segment.

In sum, infrastructure debt is not just a niche credit segment it is a strategic asset class deserving of its own benchmark. The combination of stable income, moderate-to-low correlation with traditional indices confirms their independence as a return stream, justifying dedicated allocation and benchmarking.

Conclusion

Infrastructure debt has grown in institutional portfolios in response to structural market shifts, regulatory changes, and a global search for stable, long-duration assets. The retreat of some traditional lenders, tighter capital requirements, and heightened market volatility have created space for private infrastructure credit as a source of yield and long-term liability matching, particularly where conventional fixed income products may not fully meet these needs. As institutional investors increase allocations to private credit, infrastructure debt is characterized by features such as contractual cash flows, strong collateral backing, and historically low default rates.

The recent expansion of private infrastructure credit highlights its increasing role in investment portfolios. This growth has been supported by the asset class's ability to provide stable, long-dated returns even amid inflationary pressures, rising interest rates, and macroeconomic volatility. Data from infraMetrics indicate that infrastructure credit's return consistency and downside protection are on par with – and in some cases exceed – those of traditional fixed income assets.

From a credit perspective, infrastructure debt exhibits distinctive risk characteristics due to its asset-backed structures, regulatory frameworks, and contractual cash flows. Default rates for infrastructure debt have historically been significantly lower than those observed in corporate or real estate debt. In addition, infraMetrics data

shows that over 75% of the infrastructure debt universe is classified as investment-grade, reflecting the predominance of higher credit quality in this segment. Credit losses have been mitigated by strong recovery rates and predictable cash flow profiles. Many infrastructure debt agreements also include embedded protections, such as covenants and step-in rights, which provide structural defenses for lenders.

The analysis also notes that public credit benchmarks (such as corporate, real estate, or listed infrastructure bond indices) are not fully representative proxies for private infrastructure debt. Comparisons based on public market indices can overlook certain strengths of private infrastructure debt and may not capture its risk-return profile accurately. For example, listed credit indices tend to experience larger drawdowns and more cyclical volatility, and they typically do not account for the longer duration and illiquidity characteristics inherent in private infrastructure loans. infraMetrics indices, on the other hand, are purpose-built for private infrastructure debt, using actual transaction data and real asset exposures. These specialized benchmarks provide a basis for performance attribution, strategy backtesting, and aligning capital deployment with the characteristics of the private infrastructure debt market.

Beyond yield, infrastructure debt exhibits characteristics that can be relevant in portfolio construction. It can contribute to portfolio stability, offer income streams aligned with inflation, and assist in matching long-term liabilities. As global investment flows increasingly target sectors such as clean energy, transportation, and digital infrastructure, the use of infrastructure debt is expected to grow – potentially becoming a larger component of fixed-income strategies in the years ahead.

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Appendix

Credit Risk Model:

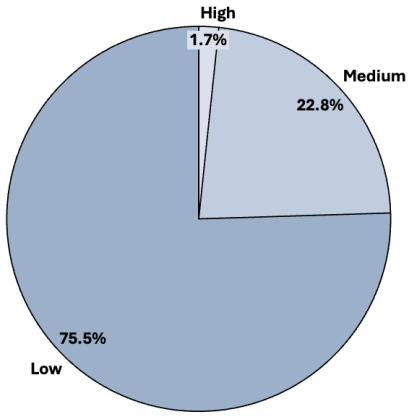
In credit risk analysis for infrastructure projects and corporate debt, survival analysis is pivotal for modelling the time until specific financial events, such as defaults, occur. The Cox proportional hazards model is used in this context to examine the relationship between various covariates and the hazard rate—the immediate probability of an event happening at a particular moment. This model is valuable for estimating borrower default risk by leveraging multiple risk factors.

Our approach incorporates time-varying covariates to capture changes in risk factors over time. Data is organized by company identifiers and a time variable (Age), creating intervals that reflect periods when covariates were recorded. For each observation, start- and end-times are defined chronologically to enable dynamic modeling of the data. The dataset includes financial ratios, economic indicators, and TICCS factors, allowing the model to adapt to the evolving nature of risk factors and improve predictive accuracy.

Our time-dependent Cox model utilizes over 8,000 annual observations from Scientific Infra & Private Asset's internal database, spanning 1988 to 2023. This extensive dataset enables a comprehensive view of default and survival events, with time-varying covariates providing nuanced insights into the factors that influence credit risk over time, supporting a more accurate assessment of borrower default probabilities. Full Credit Risk Model methodology is available here.

Figure 2 shows the credit risk composition of our debt universe as of Dec 2024. Credit risk grading system with Low, Medium, and High-risk categories, based on the probability of default. The default probability distribution is defined as Low: (0-1)%, Medium: (1-10)%, and High: (>10%), aligning with market standards where Low ≈ Investment Grade, Medium and High ≈ High yield

FIGURE 13: Credit risk distribution of the infraMetrics Private Infrastructure Debt Universe



The infraMetrics credit classification aligns The infraMetrics credit classification closely aligns with external benchmarks like S&P Global. As of Dec 2024, around 75% of the infraMetrics infrastructure debt universe is classified as investment-grade, and 25% as high-yield—mirroring S&P's finding that 75–80% of rated infra debt is investment-grade (source: S&P Global Ratings – Infrastructure Default and Rating Transition Study, 2023). This alignment reinforces the credibility of infraMetrics for market-aligned credit analytics.

Credit Spread Model:

The infraMetrics platform employs a robust, transaction-based valuation methodology to estimate credit risk premia for private infrastructure debt. Each month, the model is recalibrated using 5000+ historical and new infrastructure debt transactions, capturing market movements and pricing trends. This calibration enables the shadow pricing of hundreds of infrastructure instruments for which risk factor exposures are known.

At the core of the model is a multi-factor credit spread framework, driven by systematically observed market pricing behavior. The model decomposes credit spreads into key systematic risk factors, grounded in economic rationale, statistical relevance, and data availability.

Table 9: RATIONALE FOR INFRAMETRICS SYSTEMATIC RISK FACTORS.

Factor	Factor Definition	Economic Rationale	References
Size	Outstanding Face Value	Larger instruments tend to have lower spreads	(Strahan, 1999)
Maturity	Maturity of the debt instruments	Longer tenors tend to attract a higher risk premium for corporates but not always for projects.	Blanc-Brude & Yim (2019)
Credit Risk	Probability of Default	A higher risk of default attracts a higher expected return.	Blanc-Brude & Yim (2019)
Short Term Rates	3-Month interest rate	Higher funding costs for lenders is also characterized by a positive risk premia.	Blanc-Brude & Yim (2019)
TICCS Business Risk	Merchant, Regulated or Contracted control variables	Controlling for business risk families as defined in TICCS shows that merchant companies systematically attract higher risk premia.	Blanc-Brude & Yim (2019)
TICCS Sector	Industrial activity superclass or class control variables	A few sectors are found to have systematically higher or lower expected returns even after controlling for the effect of the factors described above.	Blanc-Brude & Yim (2019)

Every month, the credit spread model is recalibrated with the latest market transactions, allowing the factor model to reflect the latest shadow prices for assets

in our universe. Table 6 summarises the number of shadow prices available in infraMetrics by TICCS Activity Class.

Table 10: Shadow Prices For TICCS Sectors For The Period 2000 to 2024.

TICCS Code	TICCS Name	Number of Shadow Prices
IC10	Power	24,107
IC20	Env. Services	9,716
IC30	Social	20,996
IC40	Nat. resources	9,881
IC50	Data	4,944
IC60	Transport	117,289
IC70	Renewables	40,775
IC80	Net. Utilities	99,718
Total	All infrastructure	327,426

The infraMetrics credit spread model demonstrates strong accuracy, with a mean error of just -0.12% for project debt and -0.79% for corporate debt, and a median absolute percentage error (MedAPE) of 1.27% and 2.42%, respectively. These low error margins confirm the model's reliability in closely matching actual transaction prices and capturing market risk dynamics.

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