



**Scientific Infra
& Private Assets**

METHODOLOGY · INFRASTRUCTURE EQUITY

infraMetrics® Asset Valuation Methodology

Estimating the fair market value of unlisted infrastructure equity

The infraMetrics® asset pricing model estimates the fair market value of unlisted infrastructure equity in a robust and dynamic way. Calibrated monthly to private-market transactions, it replaces backward-looking, 'stale' net asset values with discount rates that reflect current market conditions — fully aligned with IFRS 13. This paper sets out the model, tests its robustness, and shows how it anchors granular valuation comparables.

Scientific Infra & Private Assets (SIPA) is a private-market index and benchmark provider, part of the PEI Group and a registered benchmark administrator with ESMA. This methodology paper was prepared using SIPA's *infraMetrics®* data. Contact sales@sipametrics.com for more information.

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Executive Summary

The *infraMetrics®* asset pricing model enables the fair market value of unlisted infrastructure equity investments to be estimated in a robust and dynamic manner. It greatly improves on traditional approaches, which tend to generate backward-looking or 'stale' net asset values that are not aligned with market prices at the time of reporting. Backward-looking NAVs also fail to reflect risk — the variance of prices — because they are smoothed using valuation methods that do not incorporate the latest market inputs.

Because a discount rate has a disproportionate impact on the value of a long-dated asset, getting the price of risk right is the single most important determinant of a credible infrastructure NAV.

This white paper sets out how *infraMetrics* addresses these issues. In particular, it discusses:

- Traditional approaches to unlisted infrastructure asset pricing produce stale values that do not reflect the true risk or the latest market price of these investments;
- The *infraMetrics* asset pricing model as an alternative that calibrates the price of equity risk to private-market transaction prices, genuinely aligned with the IFRS 13 standard and industry guidelines;
- The robustness of this approach and its superiority to a traditional CAPM-based discounted cash flow model; and
- An application of the model to build robust valuation 'Anchors' for private infrastructure equity investments.

Introduction

Unlisted infrastructure companies very seldom trade, leading to a dearth of market price data for any given asset and too few data points to build robust comparables from raw data. As a result, the ongoing valuation of unlisted infrastructure equity investments must rely on an asset pricing model until the asset is next sold.

Given the long-term, cash-flow-driven nature of these investments, infrastructure is typically valued using a discounted cash flow methodology — that is, it requires a model of the investment discount rate.

Following the IFRS 13 standard, the fair value of a financial asset is unequivocally defined as the exit price on the valuation date — the price as if the asset were sold in the market on that date, whether or not it can actually be liquidated then. The model of the discount rate used to value private infrastructure equity must therefore reflect the latest market conditions given the information available: it is a model of the expected return required by investors to own the equity of unlisted, illiquid private infrastructure companies.

Unfortunately, traditional appraisals typically fail to meet this standard for two reasons:

- First, they use the wrong model to represent the infrastructure equity discount rate; and
- Second, they do not use the most relevant or the latest market data to estimate its value.

Infrastructure appraisals use discount rates that are smoothed over time, such as a moving average of long-term bond yields, and risk premia that do not fully reflect the latest market conditions. The risk premium is often derived using a Capital Asset Pricing Model (CAPM). Because the CAPM requires a single asset beta, and because listed proxies are absent for most unlisted infrastructure investments, the beta is set at an arbitrary level and considered fixed over time. The equity risk premium is averaged over long periods from major stock indices, and the risk-free rate is a moving average of short-term interest rates. An illiquidity premium is then added to 'plug' the discount rate and arrive at a Net Asset Value (NAV) corresponding to the acquisition price at the time of investing. We call this the CAPM+ approach.

CAPM+ discount rates do not capture the evolution of the term structure of interest rates, nor the latest price of risk required by market participants to invest in illiquid infrastructure companies. Moreover, without a theoretical basis to adjust the illiquidity premium initially set, that value is typically left unchanged over time — whereas the actual market price of illiquidity does change. As a result, reported NAVs are backward-looking, or 'stale', and do not correspond to the market prices of individual assets.

The infraMetrics asset pricing model was developed to address these issues and to enable the best possible estimation of the equity risk premia and discount rates required to calculate the fair value of private, unlisted infrastructure equity investments. It is designed to reflect the principles of IFRS 13, echoed in the IPEV valuation guidelines: to derive a market risk premium and discount rate for individual infrastructure assets that genuinely reflect current market conditions and the risk exposure of each investment.

The infraMetrics asset pricing model is used to estimate prices for hundreds of assets across the private infrastructure universe. On average, at the market-segment level, these predictions are very close to average exit prices. It follows that infraMetrics can be used to produce market-level metrics of value, risk and performance, because in aggregate it predicts accurate market exit prices. This is why the model underpins SIPA's market indices, custom benchmarks and valuation comparables. The remainder of this document describes the model, its robustness, and how it is applied to build robust yet granular market-price 'Anchors'.

The infraMetrics® Valuation Model

Ideally, investors would have access to a large dataset of market transactions in each TICCS class on every valuation date, and could compute a robust average price from that data. In practice there are not enough transactions — in effect, there are not enough private infrastructure companies in the world — to obtain a robust value from observable transactions alone.

When observing historical transactions only, the raw data is too noisy: any estimate of the average market price is almost always wrong, because a robust mean cannot be obtained from 10 or even 20 data points, let alone while controlling for sector or geography. Since robust average prices cannot be read directly from raw transaction data, infraMetrics uses an econometric model to remove the noise of each transaction — its idiosyncratic part — and produce a continuously updated, unbiased estimate of the average level of private infrastructure asset prices at each point in time.

The model estimates expected excess returns — the equity risk premia — at the end of each month, using the latest observable infrastructure market transaction prices. The intuition is that market prices, and therefore risk premia, are driven in part by supply and demand, as investors express their preference for infrastructure risk. The risk premium of an infrastructure equity investment represents the market price of risk of the company's future dividends: the riskier the dividends, the higher the premium for a given level of demand; the higher the demand, the lower the premium for a given level of risk. The infraMetrics model is designed to capture these dynamics.

Common risk factors

If investors buy and sell infrastructure equity from one another and agree on transaction prices, there must be common factors that partly explain the level of those prices. Companies with higher profits, for example, are more likely to pay future dividends, all else equal, so their dividends are less risky and should correlate with higher equity prices. Conversely, higher leverage and debt service per dollar of free cash flow suggests more uncertain future dividends and, all else equal, lower transaction prices and higher risk premia.

Several such factors have been identified in the data, and a multi-factor model built and estimated. infraMetrics breaks down the risk premium of observed transactions into risk factors that, taken together, define the systematic risk profile of a project within its TICCS segment. The model uses five key risk factors, proxied by firm-level financials and a country-risk factor:

- **Size (total assets).** Larger assets are more complex, carry higher transaction costs and are more illiquid relative to other private infrastructure companies, so a larger size tends to attract a higher risk premium (a lower value).
- **Leverage (senior debt / total assets).** Companies with more leverage have less predictable future dividends, all else equal, and attract a positive premium.
- **Profits (return on assets before tax).** More profitable companies have more predictable, less risky dividends and attract a negative risk premium; conversely, a greenfield or distressed project with negative profits attracts a higher premium.
- **Investment (capex / total assets).** Higher levels of capital investment, usually found in a project's development phase, signal more uncertain future dividends — cost overruns and delays are not uncommon — and attract a positive premium.
- **Country risk (the term spread: 30-year T-bonds minus the three-month rate).** A wider spread indicates that markets require a higher premium to take long-term risk in a given country. It proxies both government-policy and macroeconomic risk; more specific country risk is captured in the idiosyncratic part of the premium.

Table 1 summarises the rationale and expected sign of each factor and references the existing research supporting these systematic effects.

■ **TABLE 1 · RATIONALE FOR INFRAMETRICS SYSTEMATIC FACTORS**

FACTOR	DEFINITION	EFFECT ON PRICE	ECONOMIC RATIONALE	REFERENCES
Size	Total assets	Negative	Larger assets are more illiquid and involve more complex transactions.	Fama & French (1992)
Leverage	Total debt / total assets	Negative	Higher leverage increases the risk of the cash flows accruing to shareholders.	Blanc-Brude & Tan (2019)
Profits	Return on assets before tax	Positive	Higher profits make future dividend payouts less uncertain.	Blanc-Brude & Tan (2019)
Capex	Capex / total assets	Negative	Higher capex raises the risk of construction cost overruns and delays, making dividends more uncertain.	Blanc-Brude & Tan (2019)
Country risk	Term spread	Negative	A steeper yield curve signals more uncertain long-term macro prospects and greater risk for infrastructure investors.	Chen & Tsang (2013)

Segment-level effects are then added to these systematic factors: an infrastructure investment commands a higher price (a lower risk premium) if, for example, it has contracted revenues (TICCS Pillar I) or belongs to the renewable-energy segment (TICCS Pillar II).

Empirical evidence supporting the common risk factors

Table 2 reports the correlation between the risk factors and price multiples: private infrastructure transaction multiples exhibit statistically significant correlations with the systematic factors. As Tables 3 to 6 illustrate, the average price of a private infrastructure company varies with the level of each factor present in the transaction and with the market segment. Because these factors are inherent in every infrastructure company bought or sold, they systematically explain the variance in prices between transactions at a given point in time. Companies in the lowest size and leverage brackets show the highest valuations, while for profitability the higher brackets command higher multiples.

■ **TABLE 2 · CORRELATION BETWEEN PRIVATE INFRASTRUCTURE TRANSACTION PRICE MULTIPLES AND SYSTEMATIC FACTORS**

RISK FACTOR	CORRELATION	LOWER BOUND	UPPER BOUND	SIGNIFICANCE
Size	-0.33	-0.39	-0.28	***
Profitability	+0.09	+0.02	+0.15	***
Leverage	+0.07	+0.003	+0.14	**
Country risk	-0.02	-0.08	-0.01	***

Source: PitchBook and Capital IQ, based on 1,000+ transactions, 2000–2024. *** significant at the 1% level; ** significant at the 5% level.

Performing a t-test on the difference in mean price multiples across TICCS industry sectors allows the null hypothesis of equal means to be rejected. Different industries exhibit distinct characteristics and significantly different mean multiples; the same holds across business-risk classes and corporate structures. These findings underline the importance of controlling for TICCS factors when pricing infrastructure investments.

TABLE 3 · MEDIAN PRICE / REVENUE ACROSS FACTOR BUCKETS

BUCKET	SIZE	LEVERAGE	PROFIT
Low	3.7x	4.1x	3.4x
Medium	3.6x	3.6x	3.5x
High	3.1x	3.0x	3.5x

TABLE 5 · TICCS CORPORATE STRUCTURE

CODE	CLASS	P / REV	EV/EBITDA	P-VALUE
CS2	Corporate	4.0x	8.4x	<1%
CS1	Project finance	2.5x	9.9x	<1%

TABLE 6 · TICCS BUSINESS-RISK CLASS

CODE	CLASS	P / REV	EV/EBITDA	P-VALUE
BR1	Contracted	2.4x	9.8x	<1%
BR2	Merchant	5.2x	10.0x	<1%
BR3	Regulated	3.1x	8.8x	<1%

■ TABLE 4 · MEDIAN PRICE / REVENUE AND EV/EBITDA ACROSS TICCS INDUSTRY CLASSES

CODE	TICCS INDUSTRY CLASS	MEDIAN PRICE / REVENUE	MEDIAN EV/EBITDA	P-VALUE
IC70	Renewables	4.3x	14.6x	<1%
IC60	Transport	3.9x	10.9x	<1%
IC80	Network utilities	3.2x	8.4x	<1%
IC40	Natural resources	3.1x	8.3x	<1%
IC20	Environmental services	2.6x	11.3x	<1%
IC50	Data	2.5x	6.5x	<1%
IC10	Power	2.3x	5.4x	<1%
IC30	Social	1.5x	9.1x	<1%

Source: Scientific Infra & Private Assets. Approximately 1,200 transactions, 2000–2024. EV/EBITDA is proxied by EVIC / revenue; the p-value is from a t-test for the difference in mean against the rest of the population.

Model set-up

The model uses the yield of observable transactions — the entry IRR — as an input. This yield is converted into a risk premium by removing the corresponding risk-free yield curve at the time and in the country of the deal, at the horizon of the investment. Observing a 25-year solar-farm investment in Spain in March 2017, for instance, the deal IRR (say c.8%) is composed of the 25-year Spanish yield curve on that date plus a risk premium (say c.6%). That risk premium then becomes an input to a multi-factor model that separates the effect of each risk factor on the market price of risk from the noise of each individual transaction.

Following standard asset-pricing notation, the factor exposure is a beta and the factor premium (or return) a lambda; market segments are defined using the TICCS taxonomy. Each new transaction is used to update the model and separate the market signal of the factor premium from the noise of the individual deal. This process is repeated as new transactions occur, using an econometric technique known as a Kalman filter — an algorithm widely used in physics and AI applications. Further detail is available in the [online documentation](#).

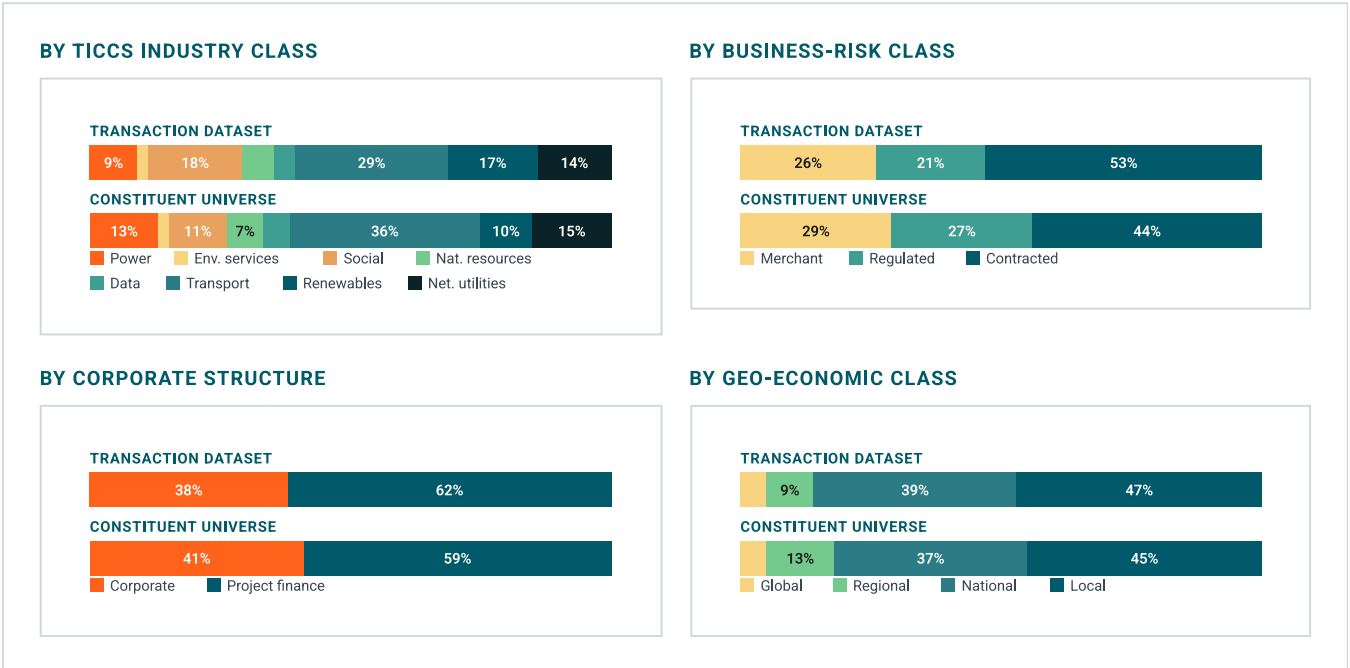
Model calibration

The model uses a carefully curated dataset of more than 1,200 unlisted infrastructure equity transactions going back two decades, and incorporates new observations monthly to update its estimate of the price of risk of each factor. The dataset covers all key segments of the market, as shown in Figure 1.

Model output

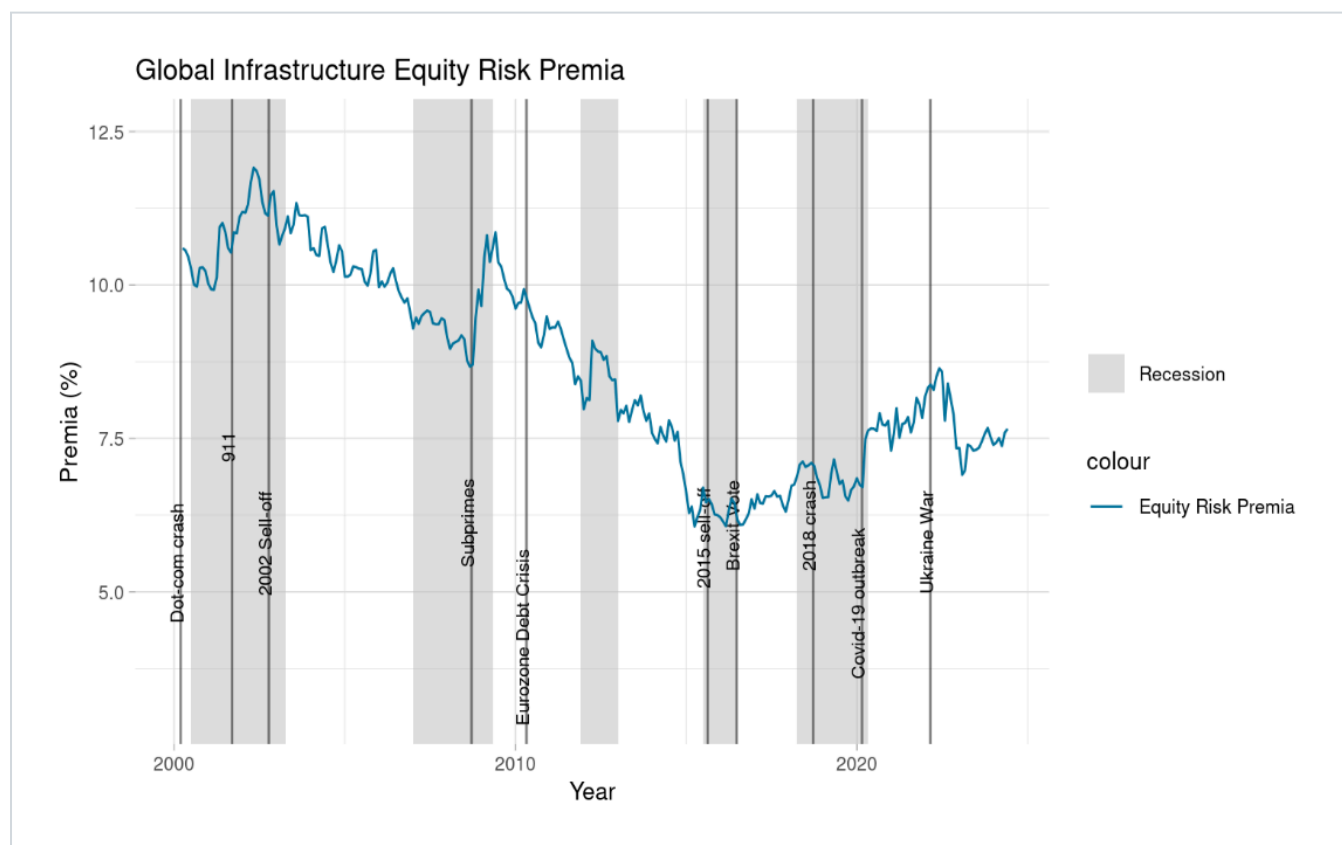
The output of the asset pricing model is the risk premium of each factor (the factor return). Factor returns are combined with each asset’s factor exposures (betas) to produce an asset-level risk premium, which is added to the relevant yield curve for that asset at that time to obtain a discount rate. In aggregate, the risk premia of the large, representative group of infrastructure assets in infraMetrics provide an estimate of the market risk premium for unlisted infrastructure equity. As Figure 2 shows, a new calibration is produced every month using the latest market transactions.

FIGURE 1 · INFRAMETRICS TRANSACTION DATASET VS. THE INFRASTRUCTURE UNIVERSE, BY TICCS PILLAR & SEGMENT



Source: Scientific Infra & Private Assets, infraMetrics®. Shares shown as a percentage of the transaction dataset and of the TICCS constituent universe.

■ FIGURE 2 · INFRAMETRICS UNLISTED INFRASTRUCTURE EQUITY MARKET RISK PREMIUM



Source: Scientific Infra & Private Assets, *infraMetrics®*. Monthly calibration of the market equity risk premium, 2000–2024.

Thus, despite the small number of observations available, it is possible to reduce the dimensionality of the price-estimation problem with a factor model. The latest market value of the unlisted infrastructure equity risk premium is estimated by decomposing available observations into a limited number of risk factors and re-estimating those factor premia regularly, using recent transaction values and their factor exposures. The Appendix shows how the *infraMetrics* indices follow the IFRS 13 standard.

Model Robustness

The robustness of the infraMetrics asset pricing model is tested in five complementary ways.

1 · Accuracy of the predicted prices

Table 7 shows that infraMetrics data accurately capture infrastructure market dynamics over time, without bias or smoothing. The shadow prices generated by the model represent the average (systematic) price of a company with similar characteristics at a point in time. On average, predicted and observed exit prices are very close within each TICCS segment: as Table 7 and Figure 3 show, the prediction error is typically within 5% of observed prices.

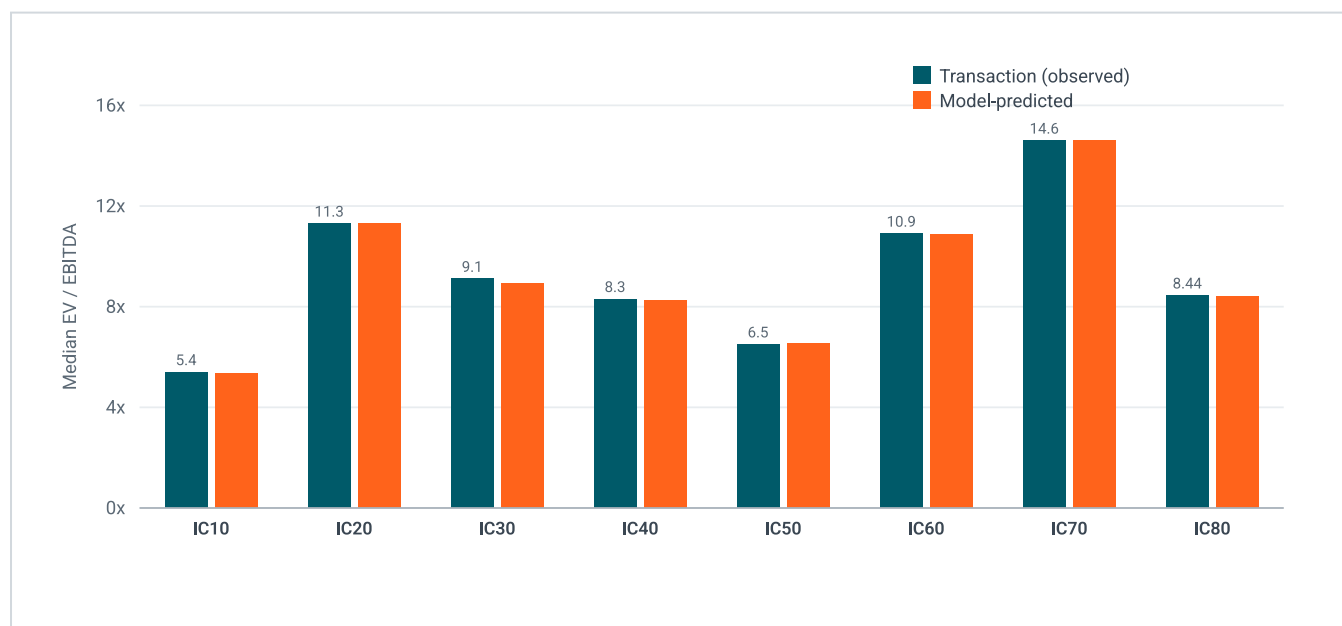
The market price of an infrastructure investment does not depend on the discount rate alone, but also on future cash flows. However, the discount rate has a disproportionately large impact on the NAV, and pricing accuracy depends primarily on getting the discount rate right — a point illustrated in the Appendix.

■ **TABLE 7 · AVERAGE DIFFERENCE BETWEEN MODEL-PREDICTED AND OBSERVED TRANSACTION PRICES**

CODE	TICCS NAME	AVG. DIFFERENCE	LOWER BOUND	UPPER BOUND
IC10	Power	-1.1%	-6%	1%
IC20	Environmental services	0.0%	-1%	1%
IC30	Social	-2.1%	-7%	4%
IC40	Natural resources	-0.5%	-4%	1%
IC50	Data	+0.6%	0%	2%
IC60	Transport	-0.2%	-3%	2%
IC70	Renewables	-0.1%	-2%	2%
IC80	Network utilities	-0.6%	-3%	1%

Source: Scientific Infra & Private Assets, infraMetrics®. Average difference between model-predicted shadow prices and observed transaction prices by TICCS segment, with confidence bounds.

■ **FIGURE 3 · MODEL-PREDICTED AND TRANSACTION EV/EBITDA MULTIPLES BY TICCS SEGMENT**



Source: Scientific Infra & Private Assets. Observed medians from the transaction dataset (Table 4); model-predicted multiples apply the average segment differences reported in Table 7. Chart rebuilt natively from the underlying figures.

2 · Accuracy of the predicted valuation ratios

Table 8 shows that estimated transaction values are very close to actual transacted deal values. Robust valuations indicate that the infraMetrics indices and benchmarks represent the risk of the private infrastructure asset class as it stands on the calibration date.

■ **TABLE 8 · ESTIMATED VS. REPORTED VALUATION RATIOS AND MODEL GOODNESS OF FIT**

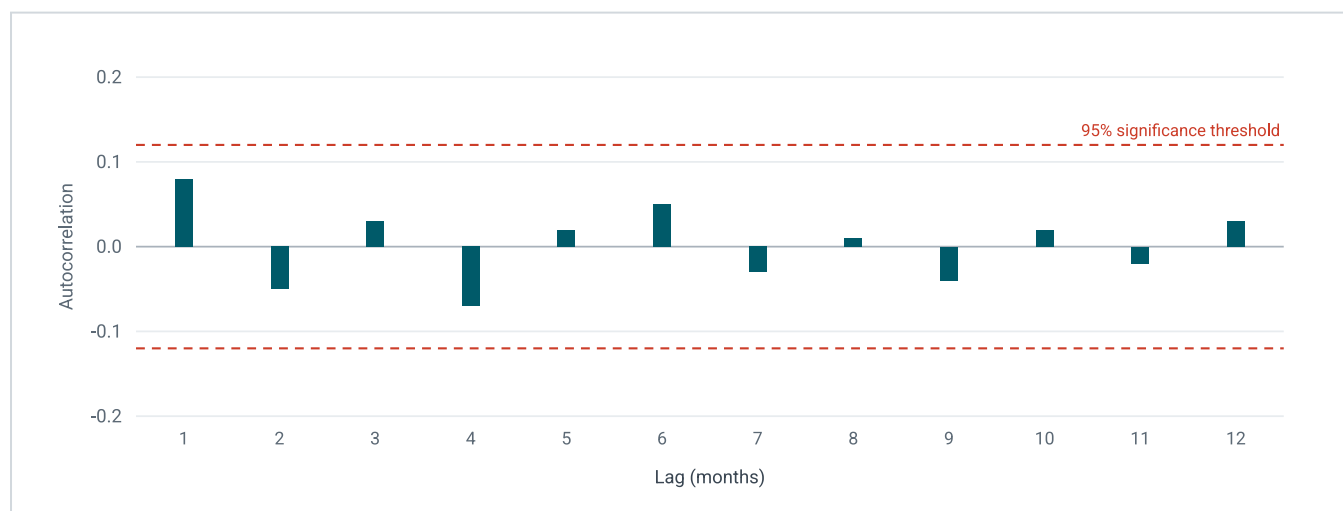
RATIO	REPORTED MEAN	ESTIMATED MEAN	REPORTED MEDIAN	ESTIMATED MEDIAN	R ²
EV / EBITDA	15.54	15.34	12.98	12.61	97%
Price / book	2.37	2.28	1.65	1.59	87%
Price / sales	3.35	3.21	2.52	2.32	85%

Source: Scientific Infra & Private Assets, infraMetrics®. Estimated columns (tinted) are model output; R² measures goodness of fit against reported ratios.

3 · Absence of smoothing in the returns

A standard indication of ‘smoothed’ returns — and the underestimation of volatility — is autocorrelation in private-asset return indices. infraMetrics indices such as the infra300® exhibit no serial correlation (Figure 4), demonstrating that they capture the true risk of private markets. Table 9 confirms this, comparing the appraisal-based MSCI Global Unlisted Infrastructure index and the fund-level, post-fee Preqin Unlisted Infrastructure index with the infra300®.

■ FIGURE 4 · AUTOCORRELATION OF RETURNS IN THE INFRA300® INDEX



Dashed lines indicate the statistical-significance threshold. All lags fall within the band — consistent with no serial correlation.

■ TABLE 9 · RISK-RETURN PROFILE AND STATISTICAL CHARACTERISTICS OF UNLISTED INFRASTRUCTURE INDICES

INDEX	10-YR TOTAL RETURN	10-YR VOLATILITY	MAX DRAWDOWN	SERIAL CORRELATION
Preqin Unlisted Infrastructure	10.41%	3.11%	1.37%	Significant
MSCI Unlisted Global Infrastructure	13.42%	3.26%	0%	Significant
infra300®	12.03%	13.90%	14.67%	None

Source: Amenc et al. (2017), Preqin, MSCI and privateMetrics®. The infra300® (highlighted) shows realistic volatility and drawdown and no serial correlation, unlike the smoothed appraisal- and fund-level series.

4 · Realistic risk-adjusted returns

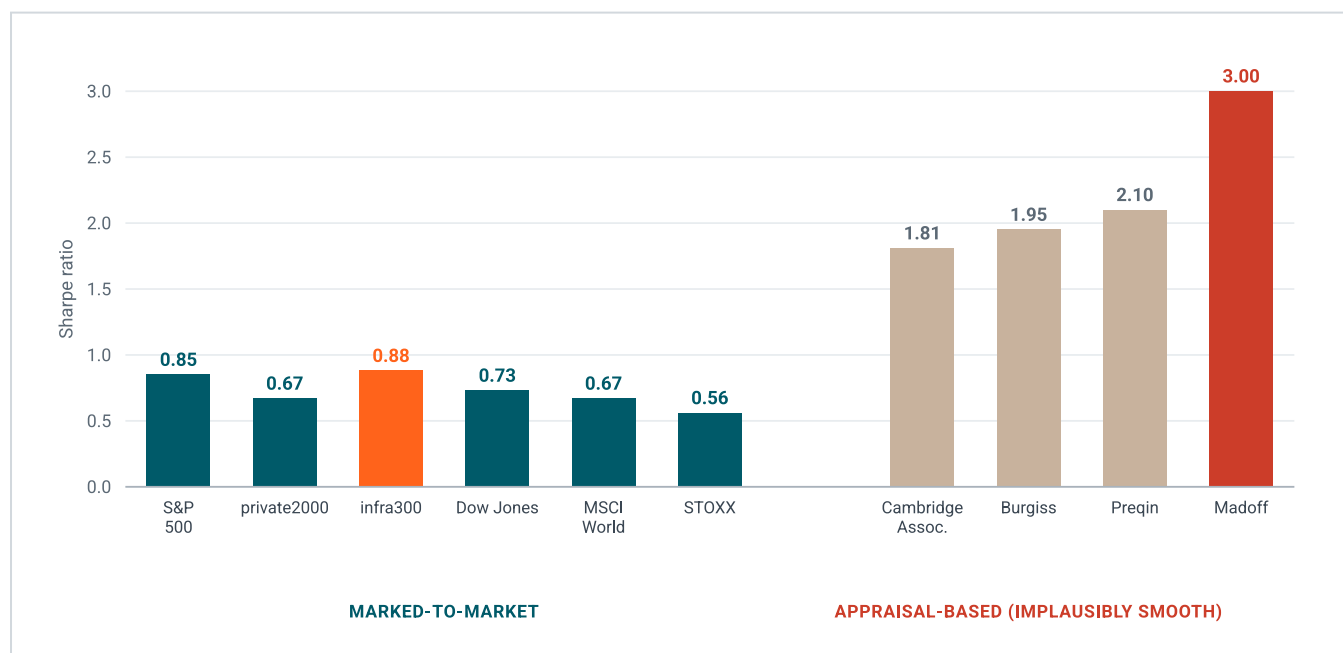
Because appraisal NAVs are stale, their risk-adjusted returns are unrealistic. As infraMetrics indices are calibrated to market, the infra300®'s Sharpe ratio — excess return per unit of risk — is in line with capital markets and other marked-to-market asset classes. Appraisal-based indices, by contrast, report implausibly high values (Figure 5).

WHY MARKING TO MARKET MATTERS

Appraisal NAVs can resemble Ponzi-scheme returns

Because appraisal-based indices smooth their reported NAVs, their Sharpe ratios climb to levels closer to a fabricated track record than to any genuinely marked-to-market asset class. The infra300®, calibrated to market, sits firmly among real capital-market indices.

■ **FIGURE 5 · SHARPE RATIO OF MONTHLY TOTAL RETURNS (USD), 2013–2024**



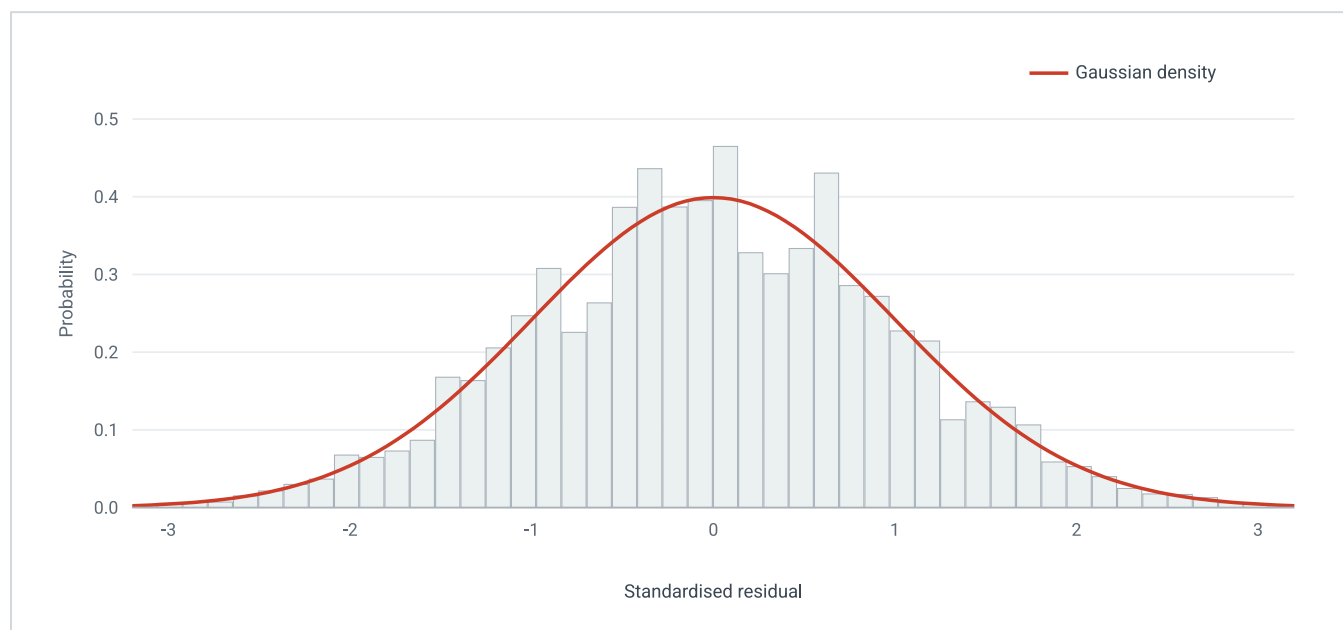
Risk-free rate assumed at 1%. The “Madoff” reference marks the implausible territory that smoothed, appraisal-based series approach.

Source: Scientific Infra & Private Assets, *infraMetrics®*, with public and appraisal-based index data.

5 · Normal residuals

Because the model separates the signal of market prices (the factor premia) from the noise of individual transactions, its residuals — the difference between what the model predicts and what is observed — should be just that: noise. The *infraMetrics* residuals have a mean of zero and a symmetrical distribution (Figure 6), which is exactly what statistical white noise looks like.

■ **FIGURE 6 · INFRAMETRICS MODEL RESIDUALS**



Standardised residuals (log scale) against a fitted Gaussian density.

Source: Scientific Infra & Private Assets, *infraMetrics®*.

Application: Anchoring Market Comparables

Shadow pricing the universe

The infraMetrics asset pricing model is updated monthly with the latest transaction data and produces an estimate of the risk premia prevailing in the market. Its most direct application is to price other assets that do not trade at month-end but whose TICCS classes, financials and cash-flow forecasts are known.

The infraMetrics database holds TICCS classifications, financial information and cash-flow forecasts for hundreds of private infrastructure companies, all of which can be shadow priced each month using the latest calibration of the market price of risk. Table 10 shows the mean factor exposures (betas) used in the model from January 2000 to August 2024.

Using these betas, an equity risk premium is estimated for each asset each month. This premium is added to a yield curve of risk-free rates matching the asset’s country and investment horizon, and the resulting discount rate is used to shadow price more than 800 assets across the unlisted infrastructure equity universe.

1,200+ Unlisted infrastructure equity transactions in the calibration dataset	25 yrs Of monthly model calibration, 2000–2024	800+ Assets shadow priced across the universe each month	130,293 Shadow prices computed over the period
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These shadow prices correspond to the valuation of the systematic component of asset prices — the part driven by market forces. Each represents the typical, average price of an asset with the same factor exposures; it does not integrate any idiosyncratic, asset-specific element. Because the model prices accurately on average, once aggregated these shadow prices also represent the average price of a market segment accurately. Table 11 shows that the model computes more than 130,000 shadow prices over 25 years.

With so much more data, it becomes possible to build comparables that are both **robust** — accurate on average — and **granular** — truly matching the profile of the investment of interest.

TABLE 10 · MEAN FACTOR LOADINGS BY TICCS SECTOR, JAN 2000 – AUG 2024

TABLE 11 · SHADOW PRICES BY TICCS SECTOR, 2000–2024

CODE	TICCS NAME	SIZE (USDM)	LEVERAGE	PROFIT	INVEST.	CODE	TICCS NAME	SHADOW PRICES
IC10	Power	850.4	68.8%	12.6%	6.2%	IC10	Power	18,507
IC20	Env. services	419.7	84.5%	11.3%	7.9%	IC20	Env. services	4,461
IC30	Social	360.7	93.4%	8.0%	6.6%	IC30	Social	15,348
IC40	Nat. resources	1,515	66.2%	16.2%	10.1%	IC40	Nat. resources	8,958
IC50	Data	1,358	67.2%	8.6%	18.5%	IC50	Data	3,009
IC60	Transport	1,267	79.3%	9.5%	7.9%	IC60	Transport	40,902
IC70	Renewables	435.4	73.7%	15.1%	7.9%	IC70	Renewables	24,522
IC80	Net. utilities	850.4	74.2%	10.3%	8.1%	IC80	Net. utilities	14,586
						Total		130,293

Anchoring price comparables

Once computed, shadow prices can be used to build genuine comparables for investment due diligence and asset valuation. The comparables method requires assets with characteristics similar to the one being evaluated — the same market segments and risk profile. Because infraMetrics shadow prices are accurate on average, sufficiently numerous and continuously updated, they allow the creation of comparables that truly share the characteristics of any asset under consideration.

Figure 7 illustrates this. After choosing a combination of market segments — here, a contracted, project-financed renewable-energy asset in France in June 2024 — the risk-factor exposures (size, capex, leverage and so on) are adjusted to obtain the most relevant comparable, or Anchor, discount rate. From there, any number of adjustments can be made to reflect the idiosyncratic dimensions of the investment that are not captured by the average market price of risk.

■ FIGURE 7 · EXAMPLE OF A DISCOUNT-RATE MARKET ANCHOR, CONTROLLING FOR TIME, TICCS PROFILE, GEOGRAPHY AND RISK-FACTOR PROFILE

SEGMENT / FACTOR	EXPOSURE	DISCOUNT RATE (JUN 2024)	DATA POINTS
MARKET SEGMENTS			
France	—	6.5%	1,000
Contracted (TICCS Pillar I)	—	7.4%	13,702
Renewables (TICCS Pillar II)	—	6.7%	3,160
Project finance (TICCS Pillar IV)	—	6.7%	8,149
RISK-FACTOR PROFILE (WITHIN THE MARKET SEGMENTS)			
Size	Low exposure	4.7%	486
Capex	Low exposure	5.8%	486
Leverage	Neutral exposure	6.2%	486
Profitability	High exposure	3.9%	486
Maturity	Medium exposure	6.1%	486

3.9%

Anchor minimum

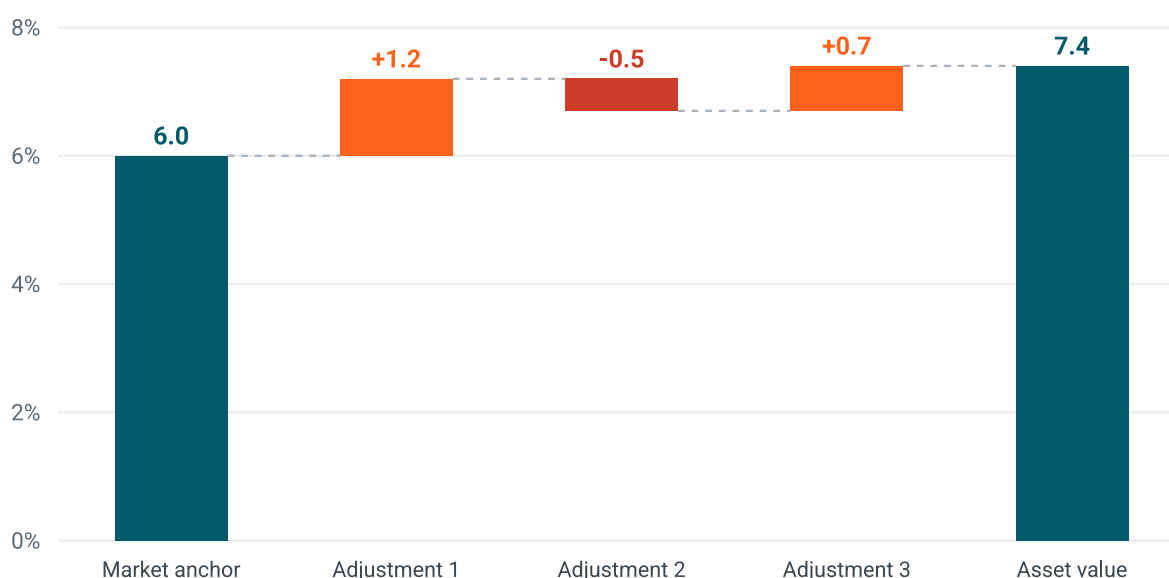
6.0%

Anchor median

7.4%

Anchor maximum

ILLUSTRATIVE ADJUSTMENTS TO THE MARKET ANCHOR



The valuer starts from the market Anchor (median 6.0%) and applies transparent, documented adjustments for asset-specific factors to reach the asset value — here 7.4%, at the top of the Anchor range.

Source: Scientific Infra & Private Assets, *infraMetrics®*. June 2024 valuation date. Adjustment path shown for illustration.

A quantitative, model-based approach to private-asset valuation offers several advantages:

- **Robust.** The calculation is customised to the segments and risk-factor profile of the asset of interest while relying on enough data points.
- **Transparent.** The factors contributing to the valuation are explicit and defined, grounded in an economic rationale (higher profits imply higher value, all else equal) that is documented to be persistent.
- **Dynamic.** On each valuation date a fresh market benchmark can be used, anchored to the asset's risk profile and adjusted for asset-specific elements. Unlike traditional approaches, the NAV never becomes stale — it is anchored to a continuously evolving private-market benchmark.
- **A clear systematic / idiosyncratic split.** Anchoring separates market-level from asset-level risk and dispenses with the need to assume an 'illiquidity premium', because the inputs come from the same illiquid markets in which the assets are priced, not from listed markets.
- **Consistent with fiduciary duty.** NAVs that are neither stale nor smoothed let investors measure and manage risk and report valuations fairly to final investors in pension, insurance and wealth-management products.

Appendix

Why getting the discount rate right matters more than the cash flows

Because infrastructure projects are long-dated, errors in the estimation of the cost of equity (COE) can lead to very large errors in the NAV. As Figure A1 illustrates, for a standard 30-year investment with a typical payout profile, a 100 basis-point error in the COE is equivalent to a 20% error in the dividend forecast for a project with a 20-year horizon.

7.0% Original discount rate → NAV of USD 3,880	-20.0% NAV impact of a 20% cut to the dividend forecast → USD 3,104	-21.0% NAV impact of a +100 bp discount-rate error → USD 3,066
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A 100 bp discount-rate error (-20.97%) does almost as much damage to the NAV as a 20% cut to the entire dividend forecast (-20.00%). The reason is visible in the payout profile below: shareholder cash flows are heavily back-loaded, so the terminal years — the most sensitive to the discount rate — dominate present value.

FIGURE A1 · ESTIMATION ERROR FROM A 100 BP DISCOUNT-RATE ERROR VS. A 20% CASH-FLOW ERROR, 30-YEAR PROJECT



Actual project equity-payout forecast. Terminal-year distributions dominate the shareholder cash-flow profile.

Source: Scientific Infra & Private Assets. Illustrative 30-year equity payout forecast; NAV impacts computed on the discounted cash-flow model.

infraMetrics & IFRS

IFRS 13, 'Fair Value Measurement', provides specific guidance on using market data — particularly data from the principal market — to measure fair value. infraMetrics is designed to follow that guidance closely in all its key aspects.

1 · Principal market

IFRS 13. The principal market is the market with the greatest volume and level of activity for the asset that an investor can access; fair value must reflect the price in that market.

infraMetrics. infraMetrics addresses the principal market through its coverage of the 25 most active national markets worldwide – the Broad Infrastructure Market Universe (BIMU). Markets in the BIMU exhibit a minimum level of activity in both the number of transactions and the number of individual buyers and sellers. The BIMU represents approximately 10,000 private infrastructure firms as of early 2024.

2 · Unit of account

IFRS 13. The unit of account is the level at which an asset is aggregated or disaggregated for recognition purposes. IFRS 13 does not dictate it but requires the fair-value measurement to be consistent with it, so value aligns with how the asset is recognised and reported.

infraMetrics. infraMetrics values private infrastructure investments accessed through vehicles ranging from closed- and open-ended funds to retail life-insurance products. It therefore takes the infrastructure company as the unit of account and values the equity and quasi-equity (shareholder debt) owned in such firms – a company-level focus consistent with the TICCS® taxonomy.

3 · Use of market data

IFRS 13. Fair value must use the inputs that participants in the principal market would use – inputs customary in that market, seen from the perspective of independent, knowledgeable and willing participants who are not compelled to transact.

infraMetrics. infraMetrics uses principal-market data to derive Market Anchor metrics: private infrastructure equity transactions to calibrate an equity risk-premium model, and interest rates at the time of valuation in the relevant country and at the horizon of the investment. Other customary inputs – the size, leverage and profitability of the companies – are obtained from audited sources.

4 · Choice of valuation technique and market-based inputs

IFRS 13. Valuation techniques should maximise relevant observable inputs and minimise unobservable ones. Calibration matters most when conditions change or new markets develop – large interest-rate moves, or macro shocks such as COVID-19 – so inputs and techniques must be updated to reflect current principal-market information.

infraMetrics. infraMetrics uses the income method and maximises observable transaction data through a parsimonious risk-factor model that captures asset-price dynamics. The model is re-calibrated monthly, and a yield curve is recomputed on each valuation date from the latest Treasury and interest-rate data in the relevant country, reflecting the sensitivity of long-lived assets to the time value of money. The DCF method requires a dividend forecast at the valuation date and a discount rate reflecting both the time value of money and the risk of the dividend stream; the yield curve itself is estimated with a Nelson-Siegel-Svensson (NSS) model calibrated to government-bond yields across maturities.

5 · Consistent calibration of valuation techniques

IFRS 13. Calibration adjusts the technique so that, at the measurement date, its outcome matches the transaction price; subsequent measurements use a consistent methodology, recalibrating as needed. Fair value should reflect a potential exit price at the time of valuation, not at some future date.

infraMetrics. infraMetrics calibrates its model to the most recent private infrastructure equity transactions and interest-rate data, matching average observable transaction prices. Subsequent shadow prices for the same companies use a consistent technique and an updated calibration on each valuation date.

6 · Hierarchy of inputs

IFRS 13. IFRS 13 prioritises observable inputs (Levels 1 and 2) over unobservable ones (Level 3). Where observable principal-market inputs exist they are used without modification; Level 3 inputs reflect the assumptions market participants would use, based on the best information available.

infraMetrics. infraMetrics relies on Level 3 information to produce a best estimate of the Market Valuation Anchor (MVA) — the value of a typical company with the same TICCS and systematic risk-exposure profile. Company-specific adjustments are then added by individual users. infraMetrics applies a consistent framework, re-calibrating monthly to reflect the latest information.

7 · Adjustments

IFRS 13. Adjustments to the technique may be necessary so that fair value reflects what knowledgeable, willing parties would exchange at the measurement date under current conditions.

infraMetrics. The Market Valuation Anchor, representing the systematic drivers of value, is designed to allow adjustments focused on asset-specific characteristics. This enables a clear separation between systematic and asset-specific adjustments and supports both continuous updating to market and transparent documentation of asset-specific choices.

8 · Disclosure

IFRS 13. Extensive disclosure is required for measurements using significant unobservable (Level 3) inputs, including the valuation process, the sensitivity of the measurement to those inputs, and the effect of measurement uncertainty.

infraMetrics. infraMetrics reports the loadings and returns of each risk premium in the market price of risk; the NAV impact of changes in cash flows, equity risk premia and the yield curve; the modified duration (discount-rate sensitivity) of infrastructure equity values; and a range of possible values reflecting different risk preferences — a measure of valuation uncertainty relevant to regulatory stress testing.

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Contact Information

For more information about infraMetrics®, SIPA's valuation methodology, or access to the underlying data and documentation, contact the team or explore the online documentation.

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