Infrastructure investment in a new macroeconomic environment

Roundtable, 17th September 2025

CONFIDENTIAL

Agenda

0 **VAPRI—Vallorii's Price of Risk model—performs AI-enabled, forward-looking risk analysis for transaction, portfolio and scenario analysis across assets, sectors and countries**

1 **Can the supply of capital meet demand after the structural macro break of 2022?**

- Structural macroeconomic break in 2022: +400 bps gov. yields, +100 bps inflation
- Supply of capital for infrastructure re-bounces in 2025 as long-term inflation expectations stabilizes around 3%
- ➢ Demand for infrastructure capital exceeds supply, driving up return requirements by 20-25%

2 **What impact would a bond-market crash have on infrastructure returns?**

AI

- Vallorii forecasts 18% probability of >10% bond yields before 2030
- *Case study:* Sustained bond yields above 8% could wipe out Heathrow dividends due to high gearing levels
- ➢ Bond-market uncertainty drives 480 bps CoE increase for highly leveraged assets

3 **How to mitigate bond market risks for highly leveraged assets?**

- Regulatory CoD passthrough limits CoE impacts to 50-80 bps for LHR but does not mitigate bond risks entirely
- Equity re-financing would remove 50-80 bps markup but also lower IRR by 380 bps due to WACC-based regulated returns

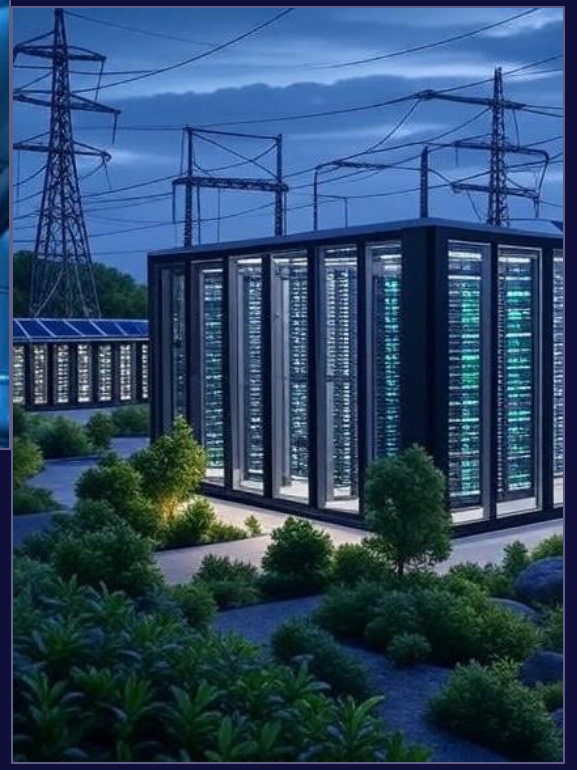
Advancements in AI in the past 2 months include advancing memory, hallucination research, digital gov. ministry and large CAPEX contracts

With memory baked in, ChatGPT evolves from a tool into a long-term partner that learns your workflow.

An AI ‘minister’ (Diella) is now in charge of public procurement in Albania, aiming to reduce corruption and bias.

Thinking Machines Lab is tackling hallucinations and nondeterminism, paving the way for safer AI in regulated sectors.

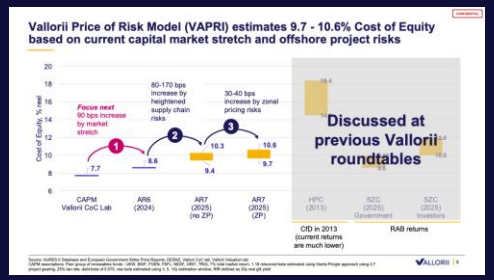
The biggest cloud contract in history makes AI infrastructure a market-moving asset class.



Sources: ChatGPT Memory feature, Defeating non-determinism, Diella, Oracle Cloud deals, All images generated by grok

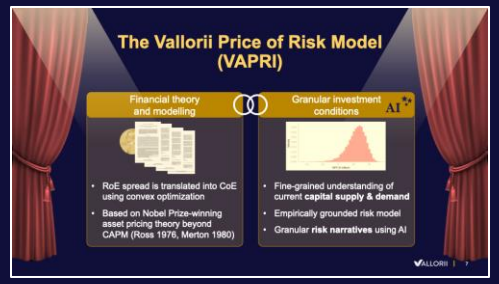
VAPRI – The Vallorii Price of Risk Model
Today: New implementation of balance sheet and macro risks

CfD Workshop



- Current capital market environment
- Supply chain risks in offshore wind
- Zonal pricing risks

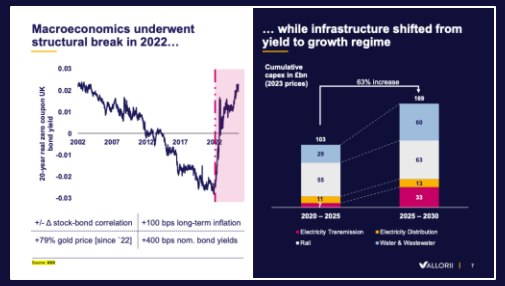
July Roundtable



Introduction of VAPRI

- Construction risks in greenfield CapEx
- Counterparty risks

September Roundtable



- Macroeconomic risks, especially bond market
- Balance sheet details for brownfield assets
- *Airports: LHR*

November Roundtable

Application of VAPRI to existing assets and regulatory policy

- Asset health status and risks
  Water: PR29
- Net zero growth risks on current portfolios
  Energy: T3/ED3

VAPRI provides a new lens on cost of equity across infrastructure assets

Sector	Asset	CAPM, real	VAPRI, real (*preliminary*)
Electricity Generation	Offshore wind (2025 AR7 CfD)	**~14%** (DESNZ)	**9.7 – 10.6%**
	Hinkley Point C (2015 CfD)	**5.7 – 7.3%**	**13.5 – 15.5%**
	Sizewell C (RAB)		**10.0 – 12.0%** *(FID: 10.8%)*
Electricity Transmission	National Grid	**5.64%** (Ofgem T3 DD)	**5.6 – 7.8%**
	SSE		**7.8 – 8.7%**
	Scottish Power		**7.9 – 8.6%**
Electricity Distribution	National Grid	**5.23%** (Ofgem ED2 FD) ED3 SSMC expected Sep/Oct 2025	**5.3 – 6.5%**
	SSE		**5.9 – 6.6%**
	Scottish Power		**6.4 – 7.2%**
	UKPN		**4.6 – 6.0%**
Gas Transmission & Distribution	National Gas	**6.04%** (Ofgem T3 DD)	**5.4 – 5.9%**
	Cadent Gas		**6.3 – 7.4%**
	Northern Gas Network		**4.7 – 5.6%**
	SGN		**6.3 – 7.5%**
Telecoms	5G Auctions	**5.5 – 7.9%**	**10.4 – 13.1%**
Water (Sewage)	Beckton Water Recycling DPC	**6.3%**	**9.2 – 9.6%**
	HARP DPC	**6.3%**	**7.7 – 8.5%**
	Cheddar II DPC		**7.7 – 8.5%**
Airports	London Heathrow (excl. 3rd runway)	**8.87%** (LHR BP)	**7.0 – 8.5%**
	London Gatwick (excl. 2nd runway)	**8.6%** (CoC Lab)	**7.4 – 8.9%**
	Manchester		**7.5 – 9.0%**

Vallorii Cost of Capital Lab

Models in development

- Multi-factor & dynamic models
- NAV, DGM, other cross-checks

Application pipeline

- Electricity networks
- Water companies
- NISTA infrastructure pipeline

Case study July RT

Case study today

Source: Vallorii analysis (Vallorii CoC Lab, Vallorii Research Lab), regulators' final determination documents

Today: We discuss the 2022 structural macroeconomic break and use AI to investigate bond market risks for infrastructure assets

Risks analysed in previous roundtables

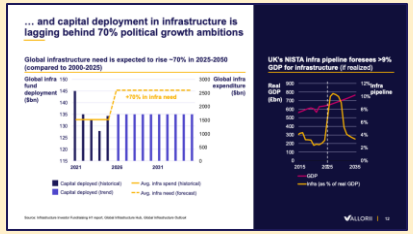
- Asset Health risks
- Illiquidity risks
- Counterparty & Financial default risks
- Infrastructure demand risks
- System risks
- Construction risks
- Political / regulatory risks
- Bond market risks

Risks to be considered at future roundtables

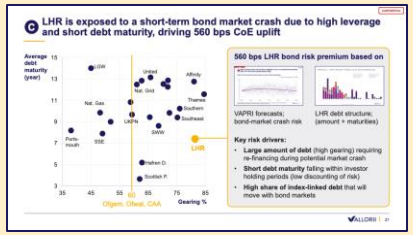
- Exchange rate risks
- …

Bond market risks

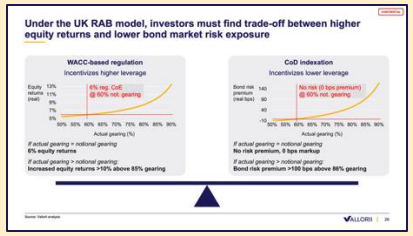
Higher bond yields put pressure on infrastructure funds and stretched balance sheets



Can the **supply of capital meet the demand** of capital after the structural break in 2022?



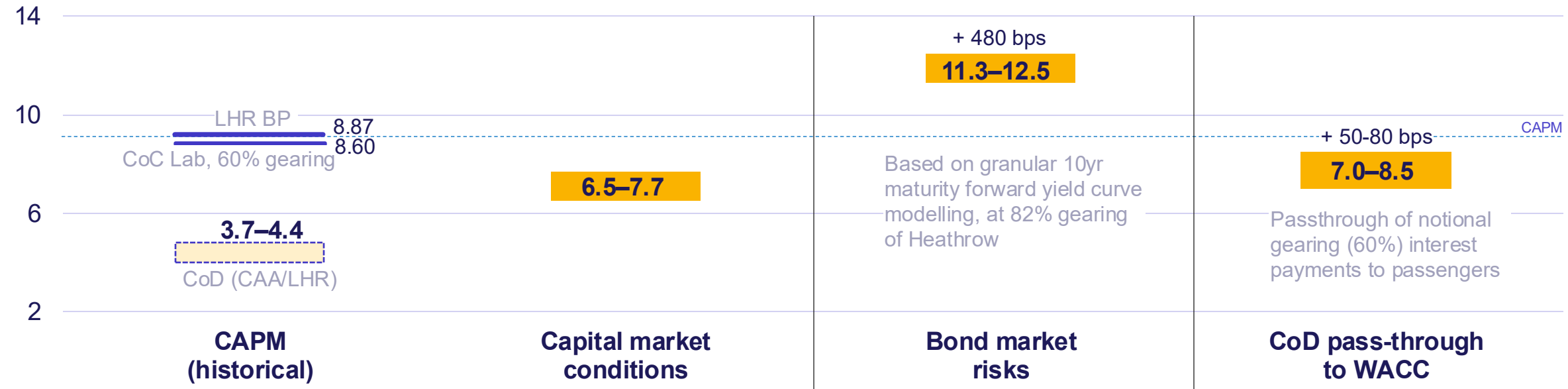
What impact would a **bond-market crash** have on infrastructure returns?



How to mitigate bond market risks for highly leveraged assets?

Case study: VAPRI estimates CoE of 7.0-8.5% for *Heathrow H8* based on asset-specific forward-looking risks, and regulatory underwriting

Excluding LHR 3rd runway



1 Current market conditions

6.5–7.7% CoE based on:

- Long-term equity market returns
- 86–108 bps increase in expected market return due current capital supply shortage

2 Asset-specific risk

Asset-specific, forward-looking risk based on AI-generated stochastic modelling

AI

3 Risk allocation

Fine-grained risk allocation within regulatory framework

Sources: 6.6-8.2% CoE determined using 5.5-7.4% ERP using "in-cycle" interpretation implied by infrastructure funds' NAV discounts, beta calculated using 5y estimation window, SVT and UU as comparator companies, RfR defined as 20y UK real gilt yield; Construction risk defined as risk of capex cost overrun, counterparty risk defined as risk of water company default resulting in missed payments or CAP termination; asset health risks defined as risk of performance penalties and terminal payment discount due to lower asset health quality; contractor underwriting defined as EPC covering cost overruns up to 110% of capex, consumer underwriting defined as consumers covering cost overruns in excess of 50% and reducing likelihood of counterparty payment default by 20%

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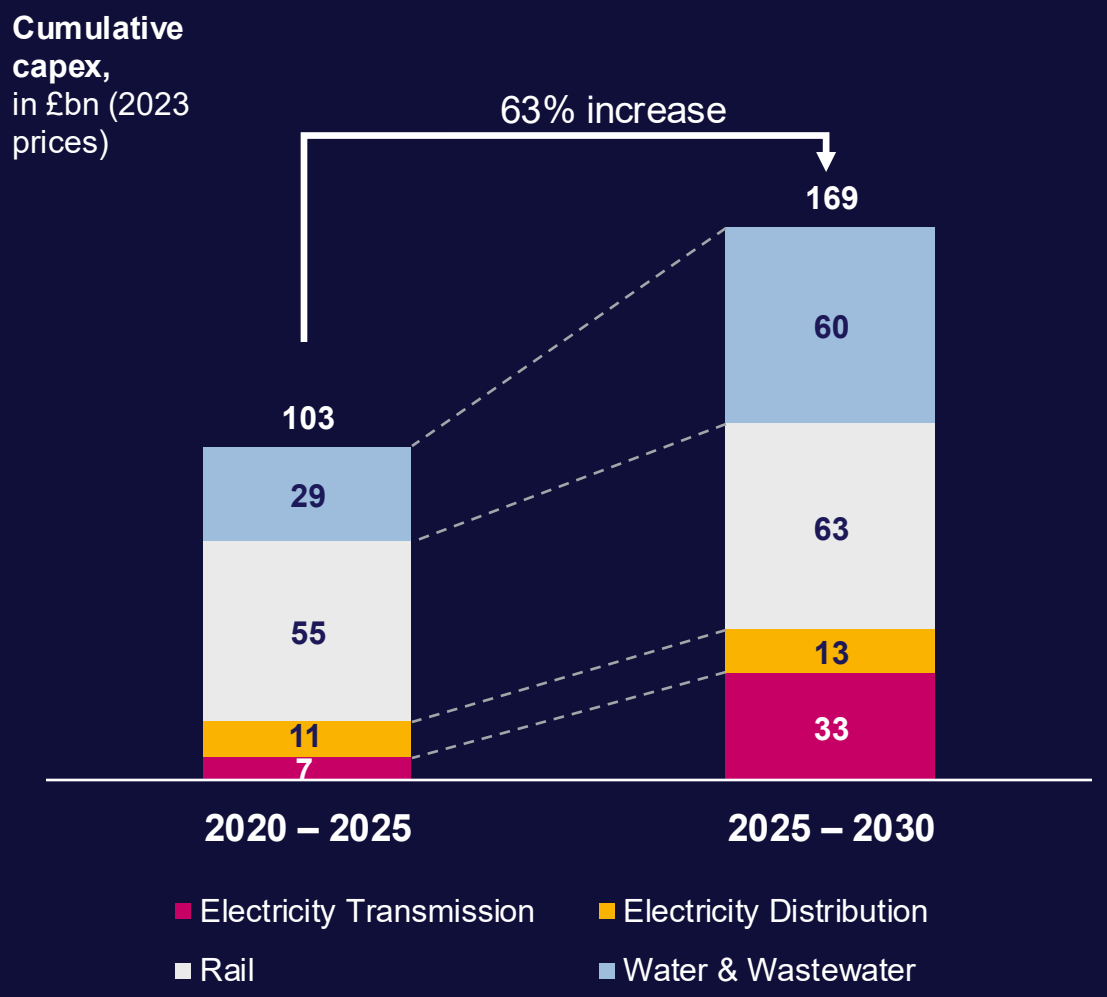
Macroeconomics underwent a large structural break in 2022…

Gilt yields highest since 1998	+100 bps long-term inflation
Gold price hits record high	Stock-bond correlation flips

… while infrastructure is shifting from a yield to growth regime



Source: Bank of England gilt yields data; ET: Ofgem: RFPRs & RIIO-T3 Business Plans, DESNZ: Appendix I: Electricity Networks Modelling; ED: Ofgem: RFPRs & DESNZ: Appendix I: Electricity Networks Modelling; Water: Ofwat APRs & PR24 FD, 2nd NIA; Rail: ARs (Network Rail & HS2), NIC: 2nd NIA

POLL #1: Is there enough capital to fund global infrastructure ambitions?

- Extreme capital scarcity
  (most projects will not receive funding)
- Some capital scarcity
  (some sectors will not receive sufficient funding)
- Supply = demand
  (viable projects will get funded)
- Some capital oversupply
  (excess capital driving down prices)
- Extreme capital oversupply
  (large competition for projects to deploy capital)

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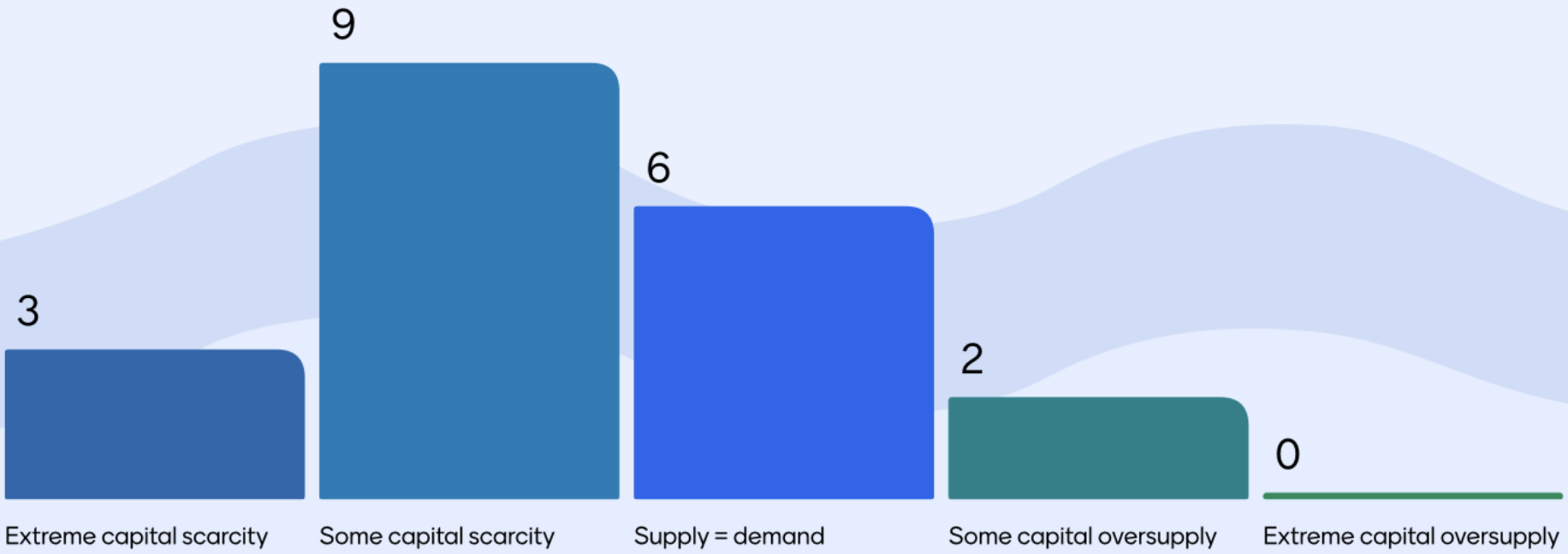
Is there enough capital to fund global infrastructure ambitions?



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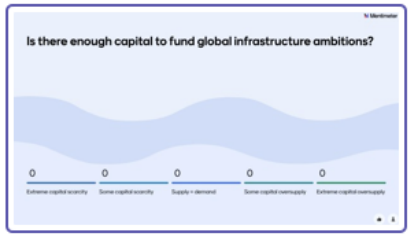
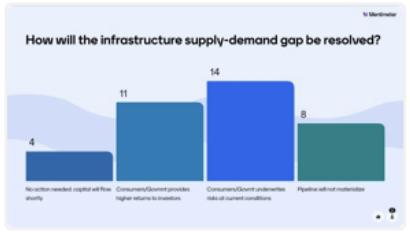
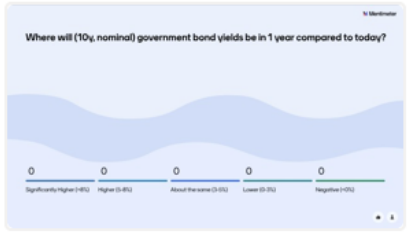
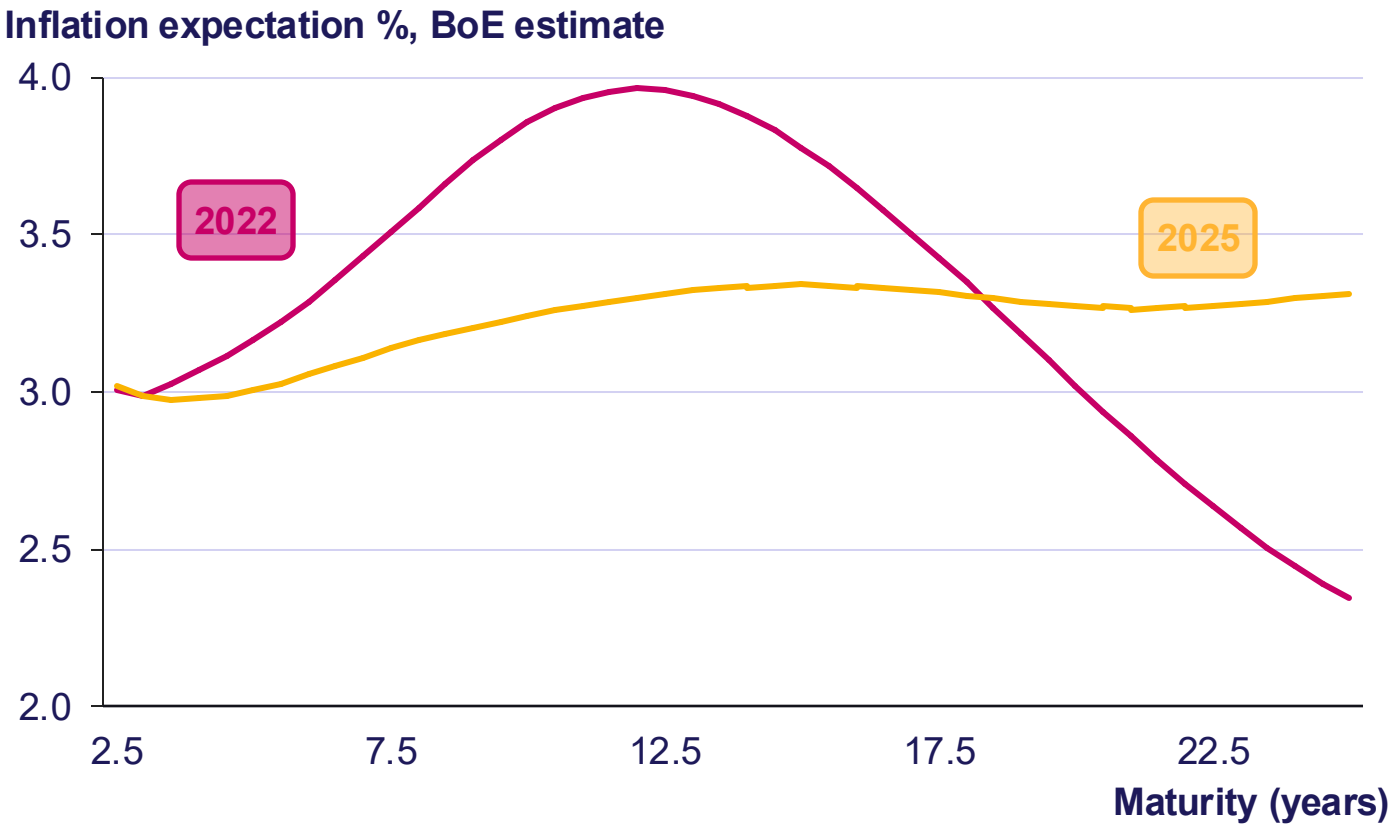






Infrastructure assets attractive to hedge against long-term inflation expectations >3%

Long-term BoE inflation expectations stabilise above 3%



Source: BoE yield curves

Infrastructure assets are attractive to hedge against long-term inflation

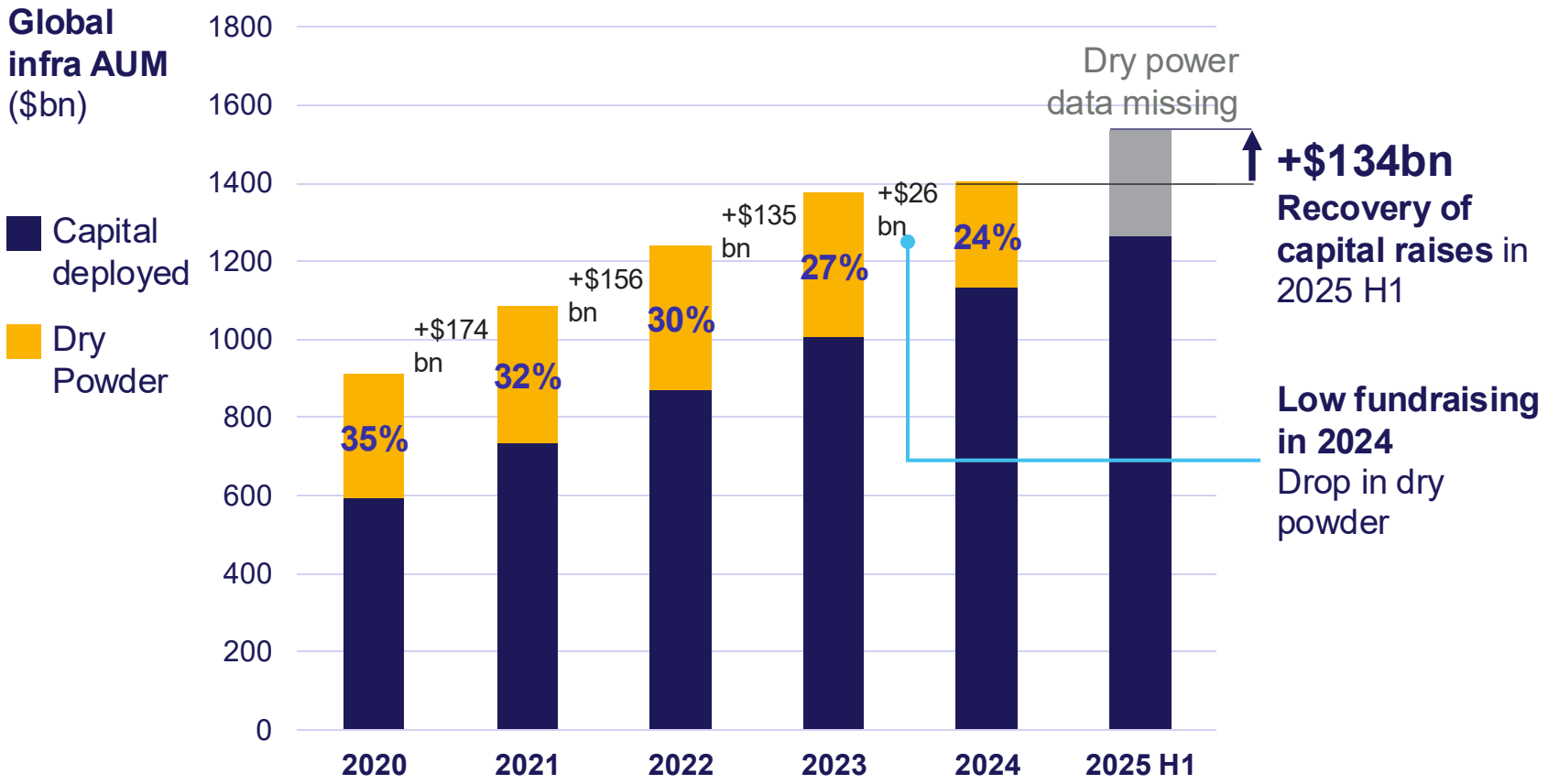
- Inflation-linked revenues support operating margins
- Inflation-linked CoD supports strong debt & equity returns in regulated infrastructure

Market does not expect BoE to meet its 2% inflation target in coming 20 years

- Potential de-coupling of interest rates and inflation
- Continued pressure on consumers and affordability

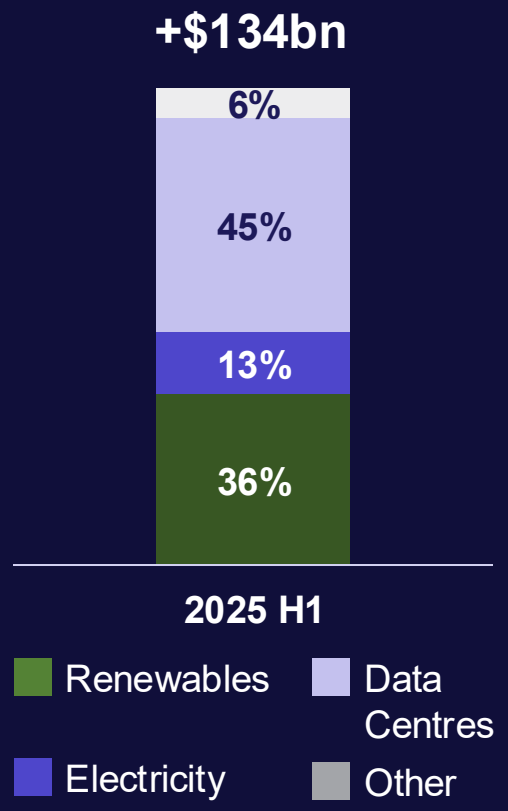
Infrastructure funds are raising and deploying more capital, with 2025 on track to break records

Global infrastructure AUM – thereof capital deployed and dry powder



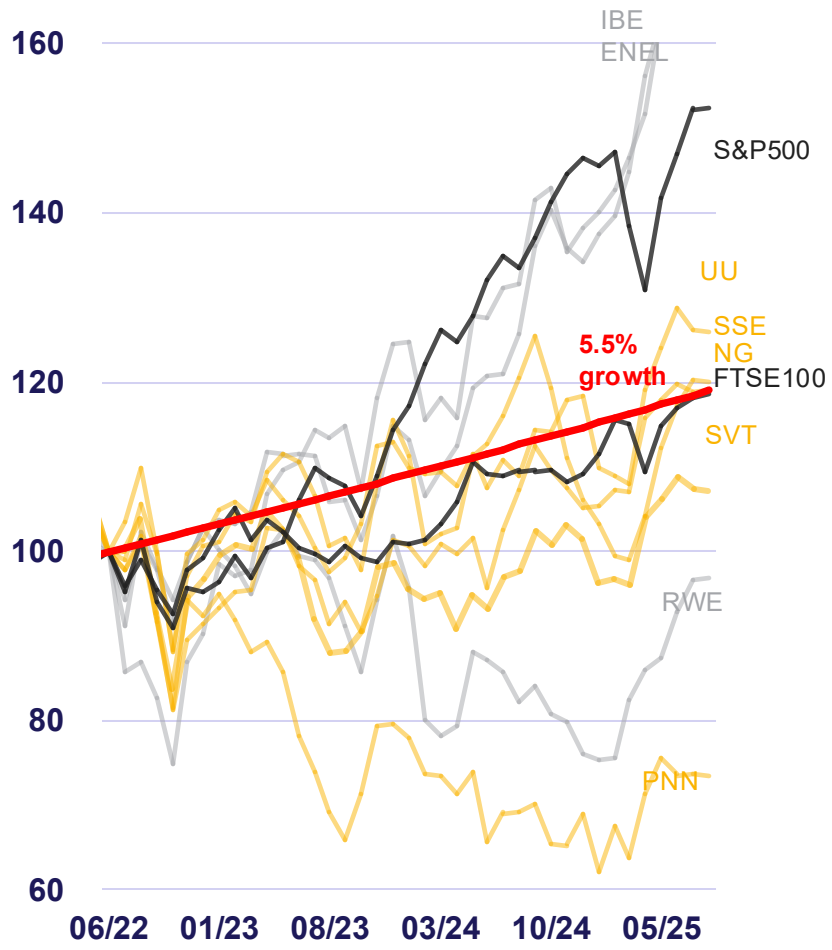
Source: Infrastructure Investor Fundraising H1 report, Preqin 2025 Global Report: Infrastructure

2025 H1 capital raise, sector breakdown

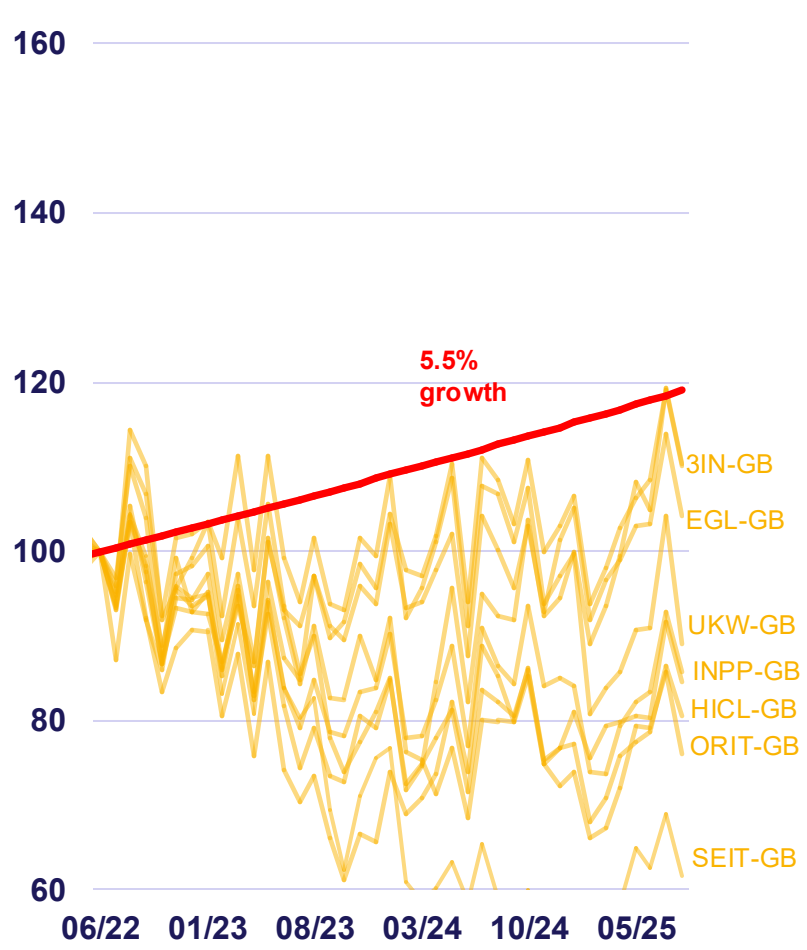


Yet UK infra stocks and funds have mostly underperformed since 2022, with shareholder returns lagging an average inflation rate of 5.5% ...

Stock prices (split & dividend-adj.)



Fund prices (split & dividend-adj.)



UK inflation

- CPIH inflation average 5.5% since June 2022

UK shareholder returns

- UK infra stock returns average <5.5% inflation
- UK infra fund returns mostly negative

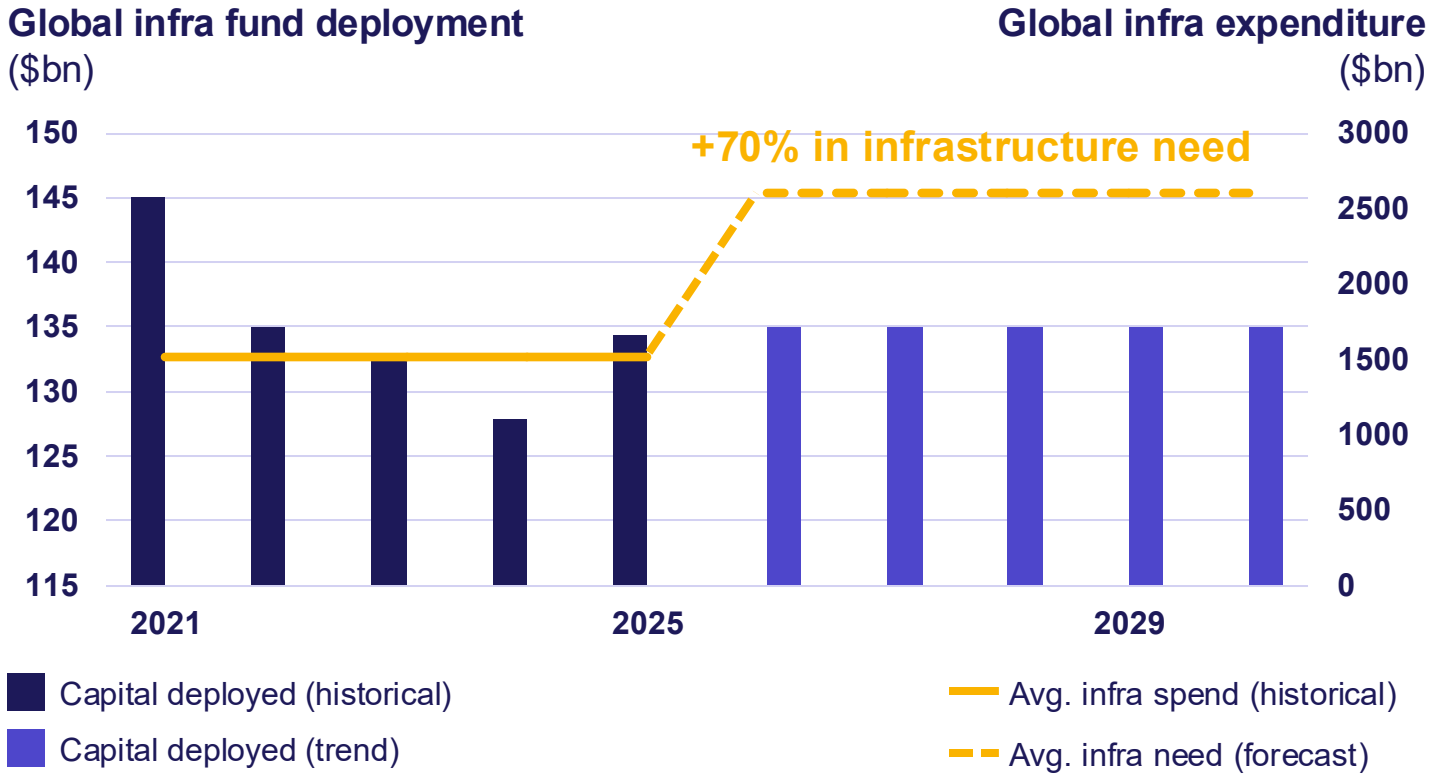
International comparators

- S&P 500 and some EU utilities >7% returns

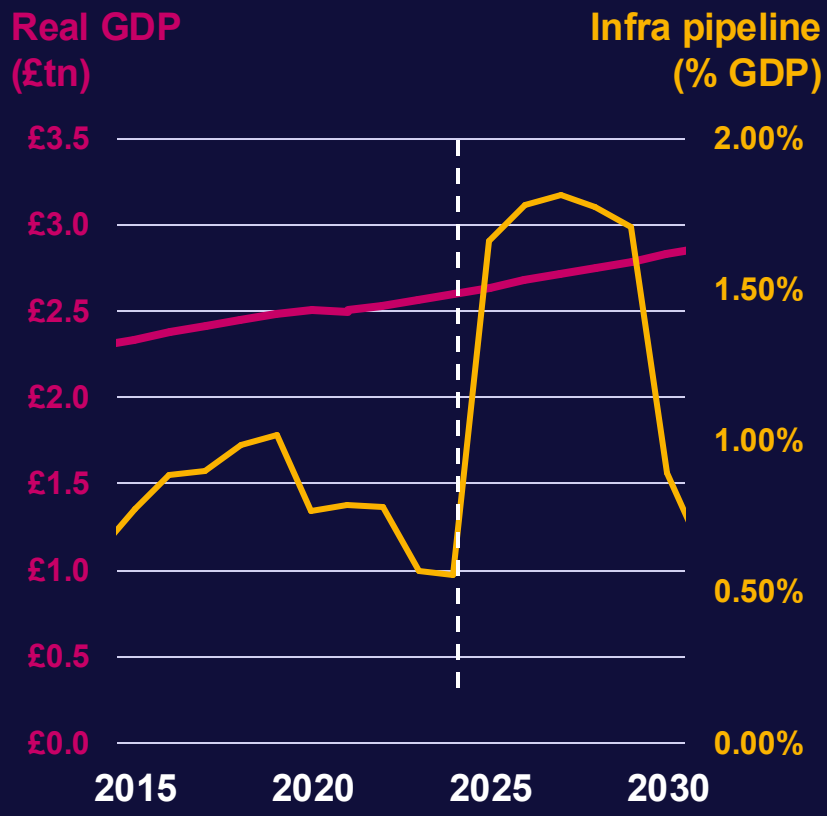
Source: Factset, ONS CPIH series, Stock and fund prices are indexed to June 2022 = 100

… and capital deployment in infrastructure is lagging political growth ambitions by 70%

Global infrastructure need is expected to rise ~70% in 2025-2050 (compared to 2000-2025)



UK's NISTA pipeline foresees >1.5% GDP for infrastructure (if realized)



LHS Source: Infrastructure Investor Fundraising H1 report, Global Infrastructure Hub, *Global Infrastructure Outlook*
RHS Source: GDP data from OECD Long term Economic Scenarios (UK), historic infrastructure ONS Market Sector Investment for Infra, forecast infra data from NISA infrastructure pipeline

POLL #2: How will the global infrastructure supply-demand gap be resolved?

- No action needed: capital will flow shortly
- Consumers / Government provides higher returns to investors
- Consumers / Government underwrites risks at current returns
- Pipeline will not materialise

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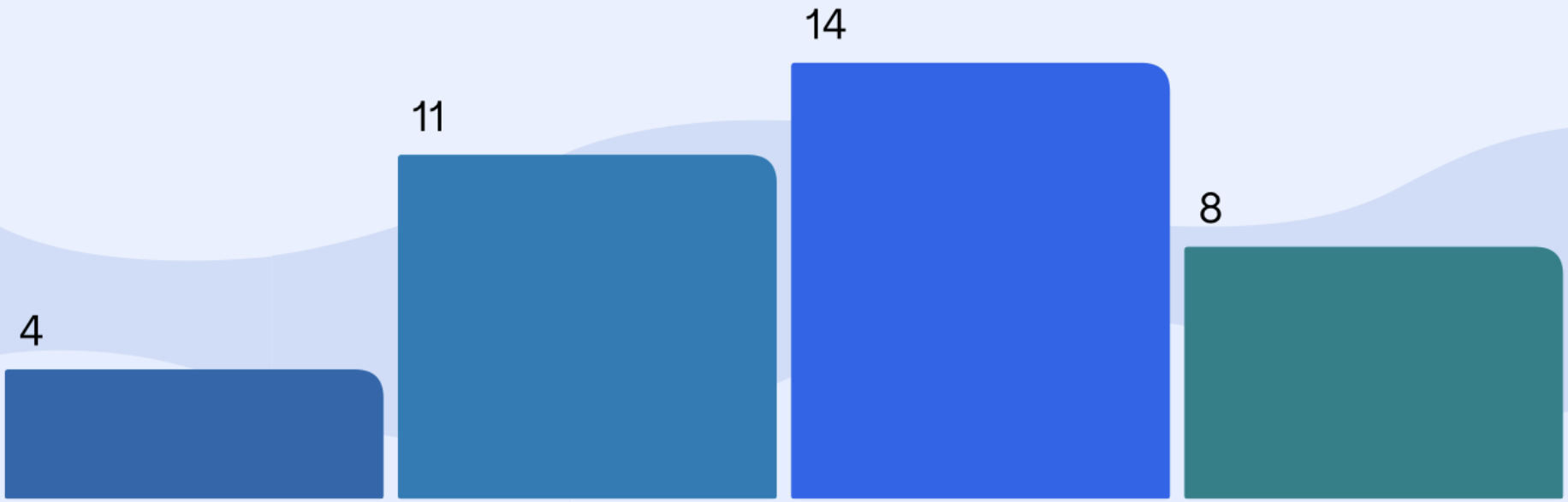
How will the infrastructure supply-demand gap be resolved?



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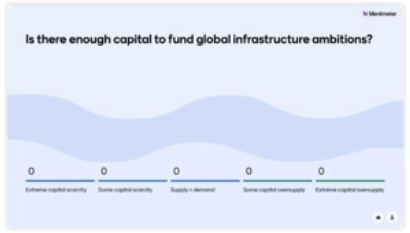
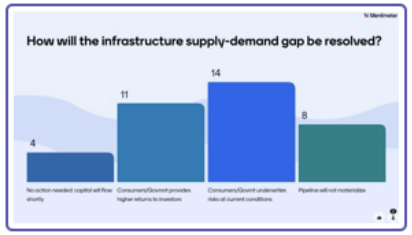
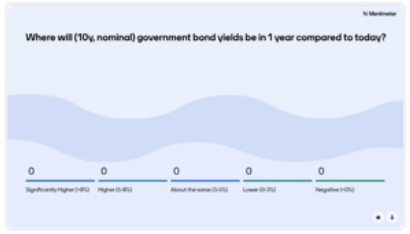
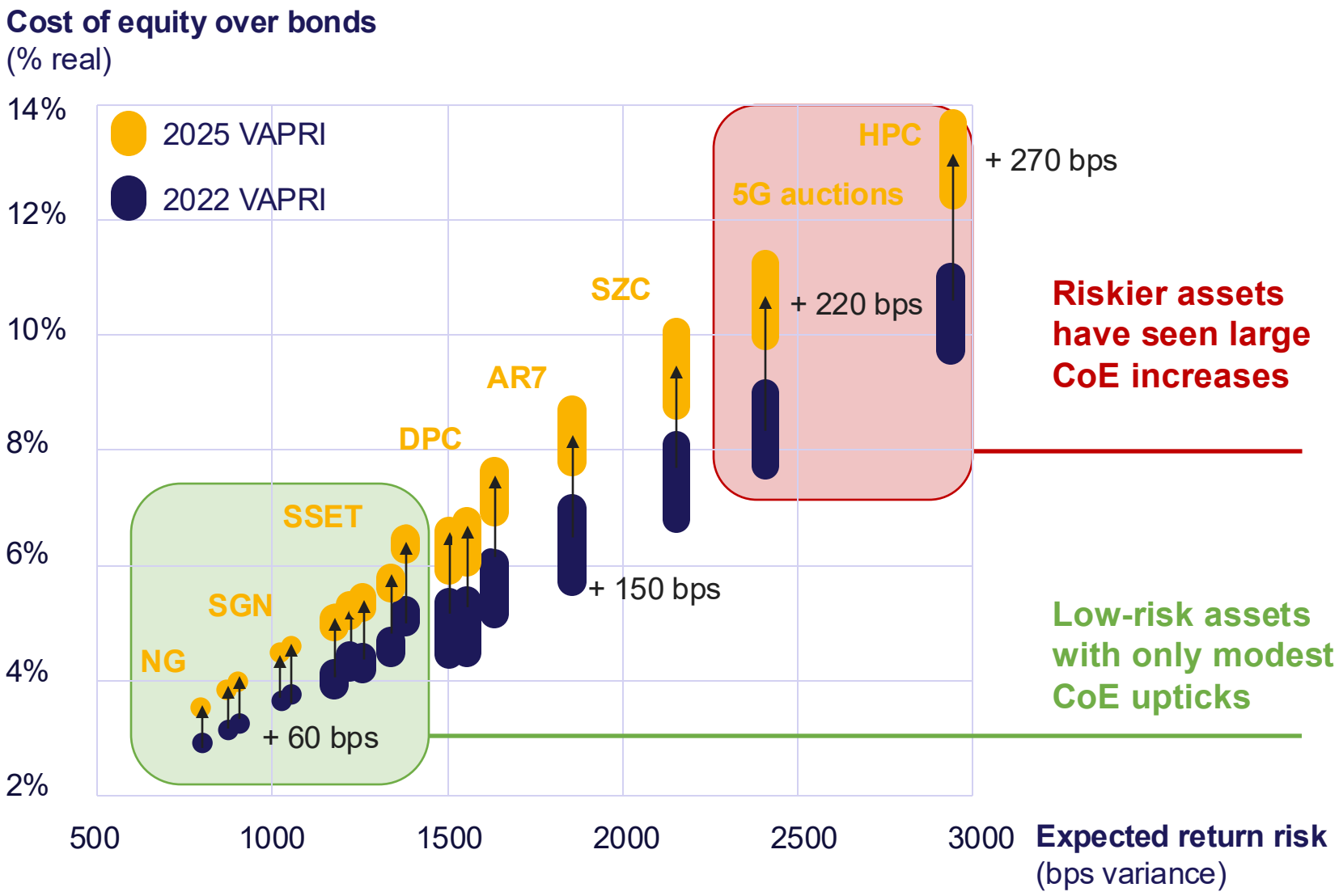






VAPRI derives an asset's required CoE for investability, given elevated capital demand gap since 2022



Source: Vallorii Analysis

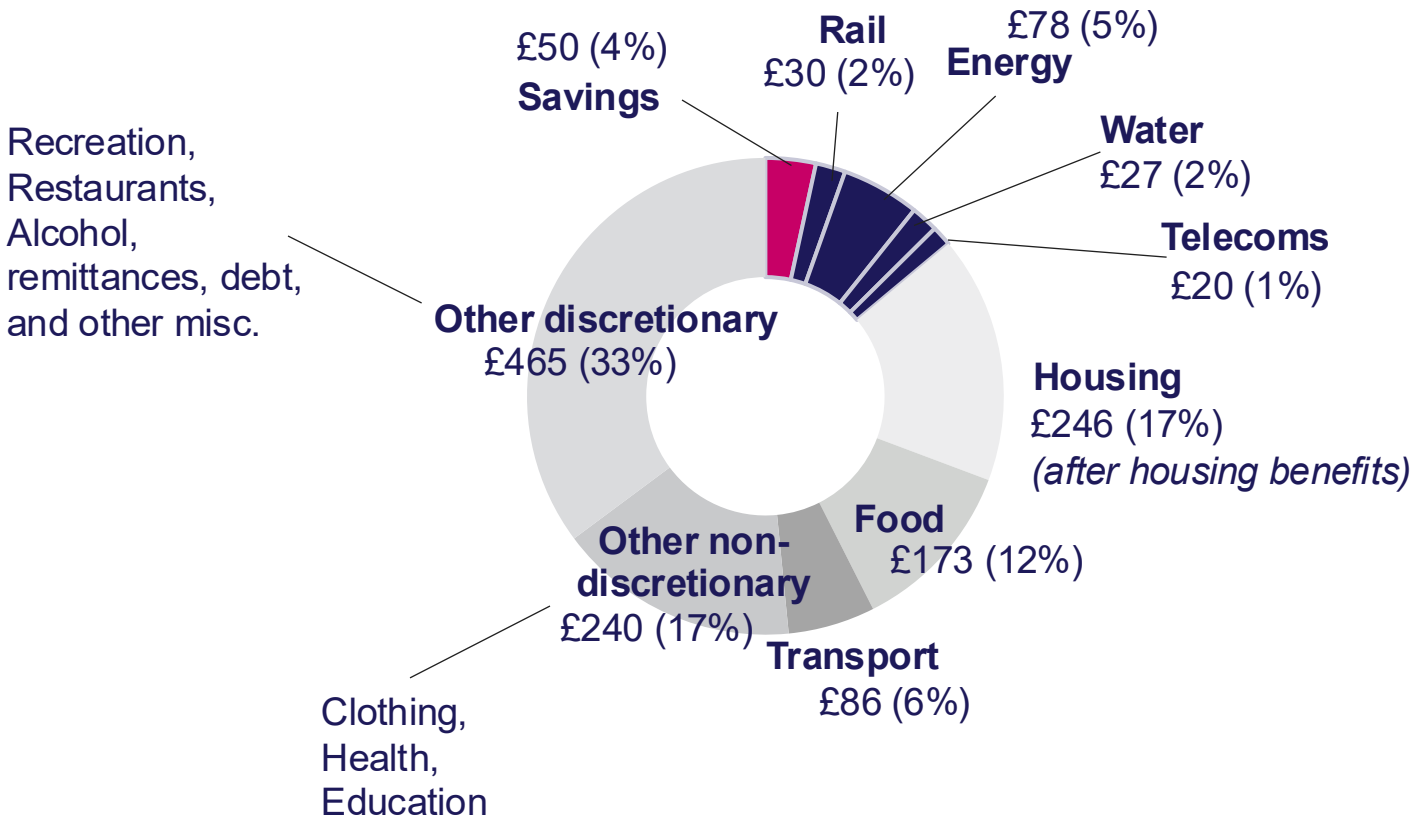
Since 2022, a higher supply-demand cap for infrastructure capital has **steepened the the risk–return curve**

Higher risk premia since 2022:

- + 270 bps for high-risk assets
- + 60 bps for low-risk assets

However, consumer wallets are already stretched, with little room to pay for additional infrastructure – driving up political risks

Median monthly expenditure of lowest-income 30% of households, GBP (% of wallet)



In 2024, the lowest-income 30% of UK households spent **11% of their disposable income on utilities.**

Source: Vallorii analysis based on regulator price determination reports - annual nominal price increases: Ofgem 6.4%, Ofwat 7.2%, Ofcom 6.4%, ORR 4.6%; historical CPI data from OBR, CPI for 2025 and beyond assumed to be 2%; share of wallet data from ONS Living Costs and Food Survey, 2025 utility bills are adjusted for inflation using HCI inflation for Income Decile 2

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POLL #3: Where will (nominal) 10 year UK gov't bond yields be in 1 year?

- Much higher (>7%)
- Higher (5-7%)
- About the same (3-5%)
- Lower (1-3%)
- Much lower (<1%)

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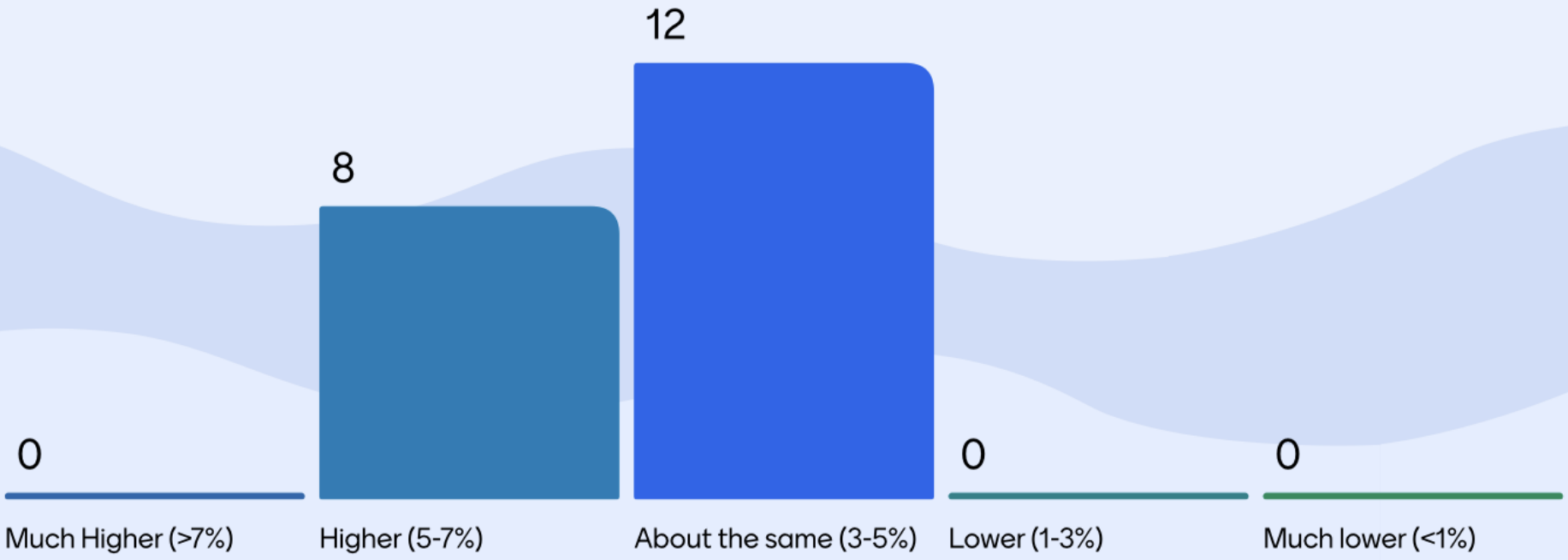
Where will (nominal) 10y UK government bond yields be in 1 year?



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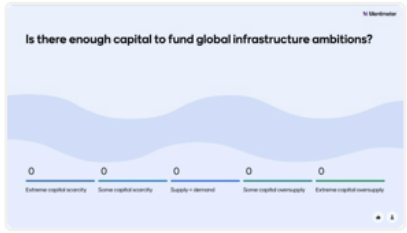

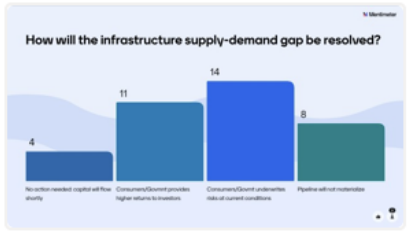

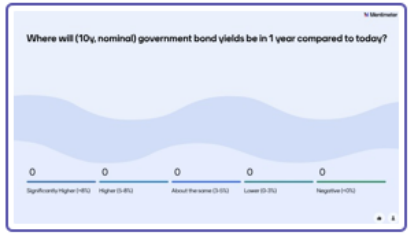

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VAPRI AI can be used to model bond market risks and company impacts depending on specific debt structures

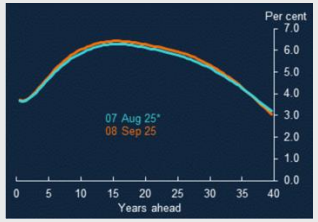
A AI scenarios create plausible future paths

Multiple examples showcase bond market volatility

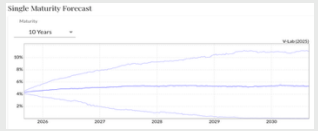
B Use data to discard hallucinations

BoE UK instantaneous nominal forward curve

Estimate market expectation future bond yields + credit spread

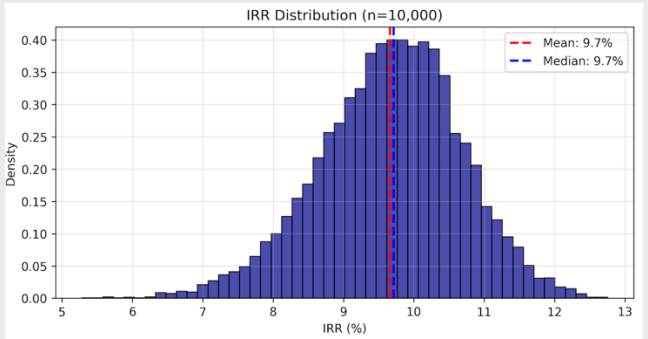


NYU Stern Uncertainty bands



Fixed Income Analysis of bond yield volatility provide uncertainty bands

C DCF quantifies IRR impacts



IRR distribution

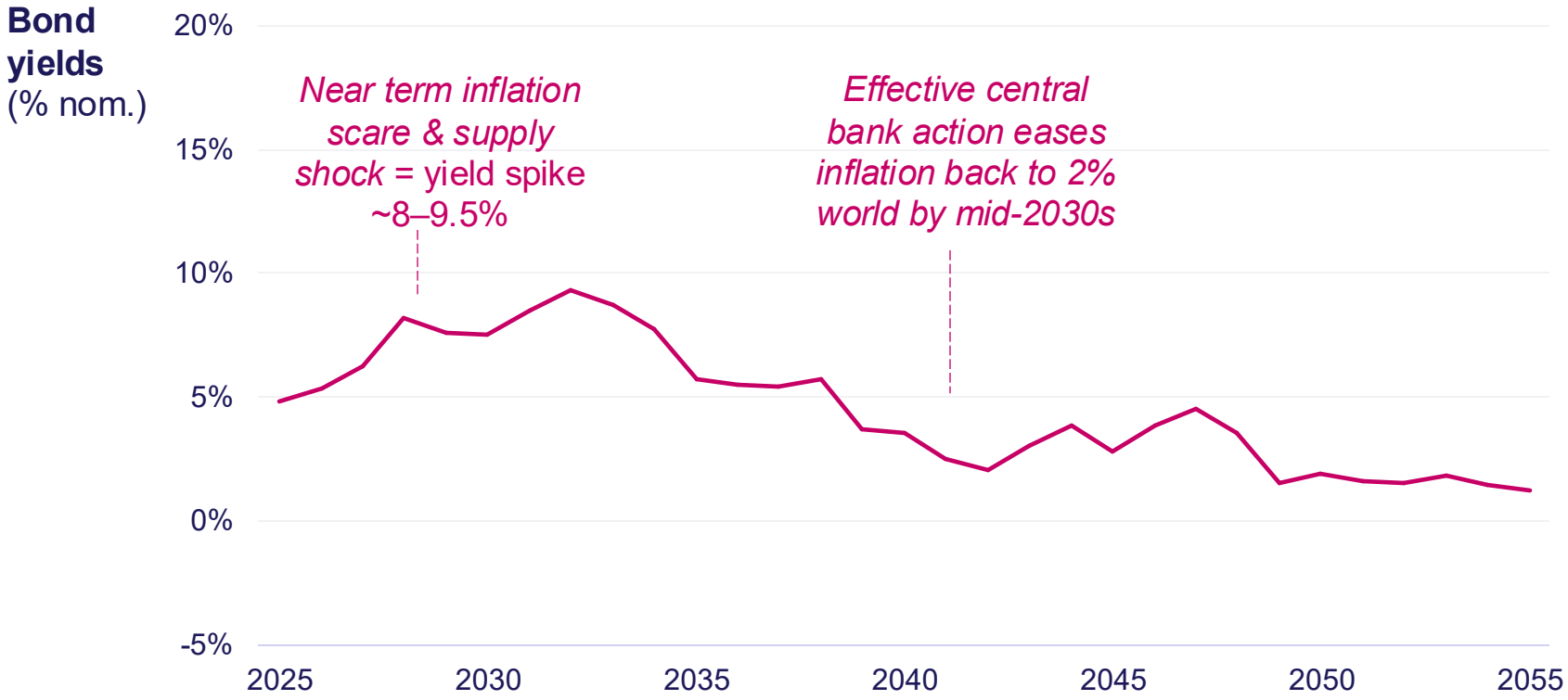
Modelling debt maturity schedule over time, refinancing affected by future cost of debt

Source: Vallorii analysis; AI scenarios generated using OpenAI 4.1mini; Counterparty risk data: S&P Global Ratings, *2023 Annual Global Corporate Default and Rating Transition Study* and Thames Water S&P credit report (February 2025); Construction risk data from paper on costs of 1093 water infrastructure projects; asset health data from Thames Water asset deficit report

A VAPRI AI stories generate key narratives that could drive bond market risks

10y- bond yield forecasts based (investment grade)

1 Near-term inflation is tempered by effective central bank action, and long-term rates settle back to pre-Covid regime



Source: Vallorii Analysis

Narratives as transparent box

One event can have multiple outcomes – and scenarios

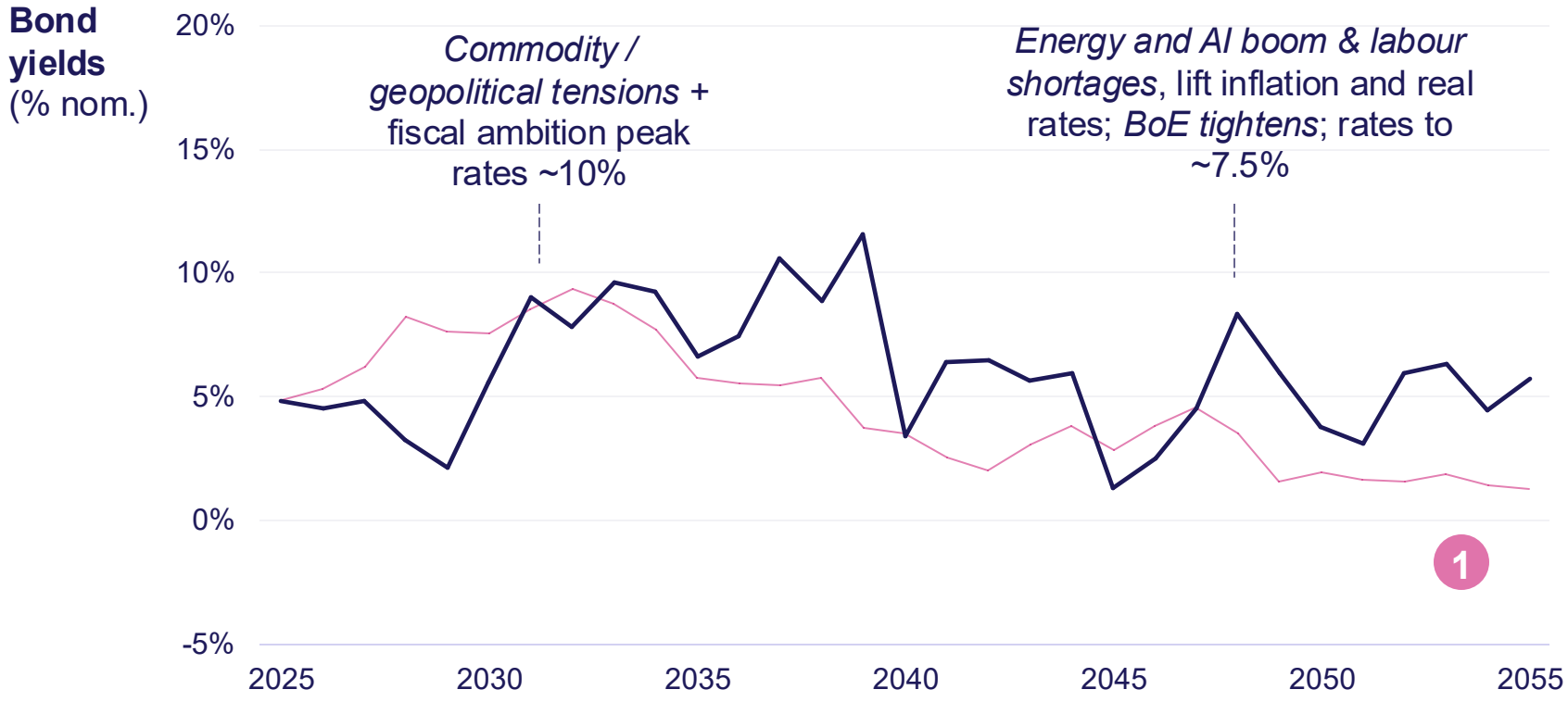
AI generated scenarios can be used to quantify qualitative expectations

1000s of AI-generated narratives ensure that no risks are overlooked.

A VAPRI AI stories generate key narratives that could drive bond market risks

10y- bond yield forecasts based (investment grade)

2 Rates soar due to geopolitical tensions in the short term, before volatile energy and AI boom lift inflation and require rate increases



Source: Vallorii Analysis

Narratives as transparent box

One event can have multiple outcomes – and scenarios

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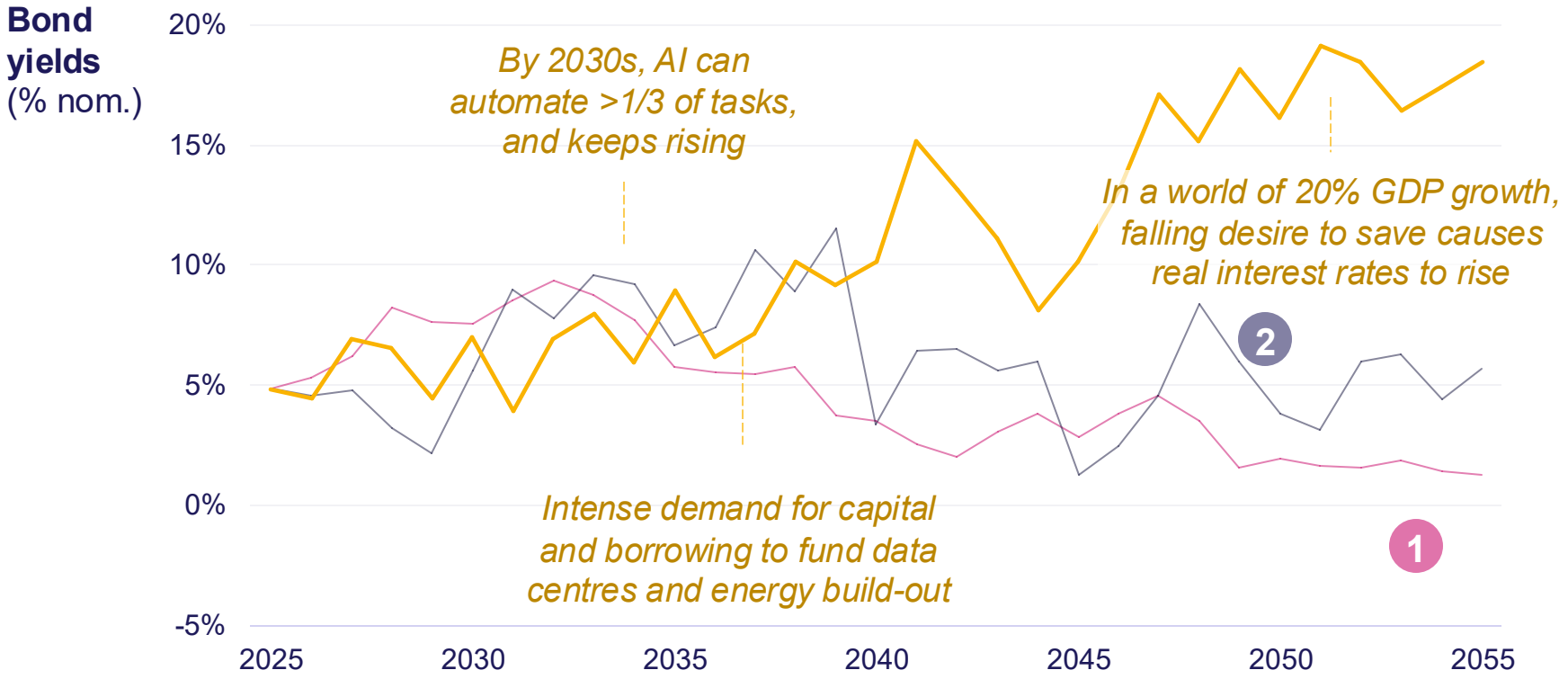
1000s of AI-generated narratives ensure that no risks are overlooked.

A VAPRI AI stories generate key narratives that could drive bond market risks

10y- bond yield forecasts based (investment grade)

3 Artificial General Intelligence ushers in era of 20% annual GDP growth, causing explosion in interest rates



Source: Vallorii Analysis, The Economist, "What if AI made the world's economic growth explode?" (July 2025)

Narratives as transparent box

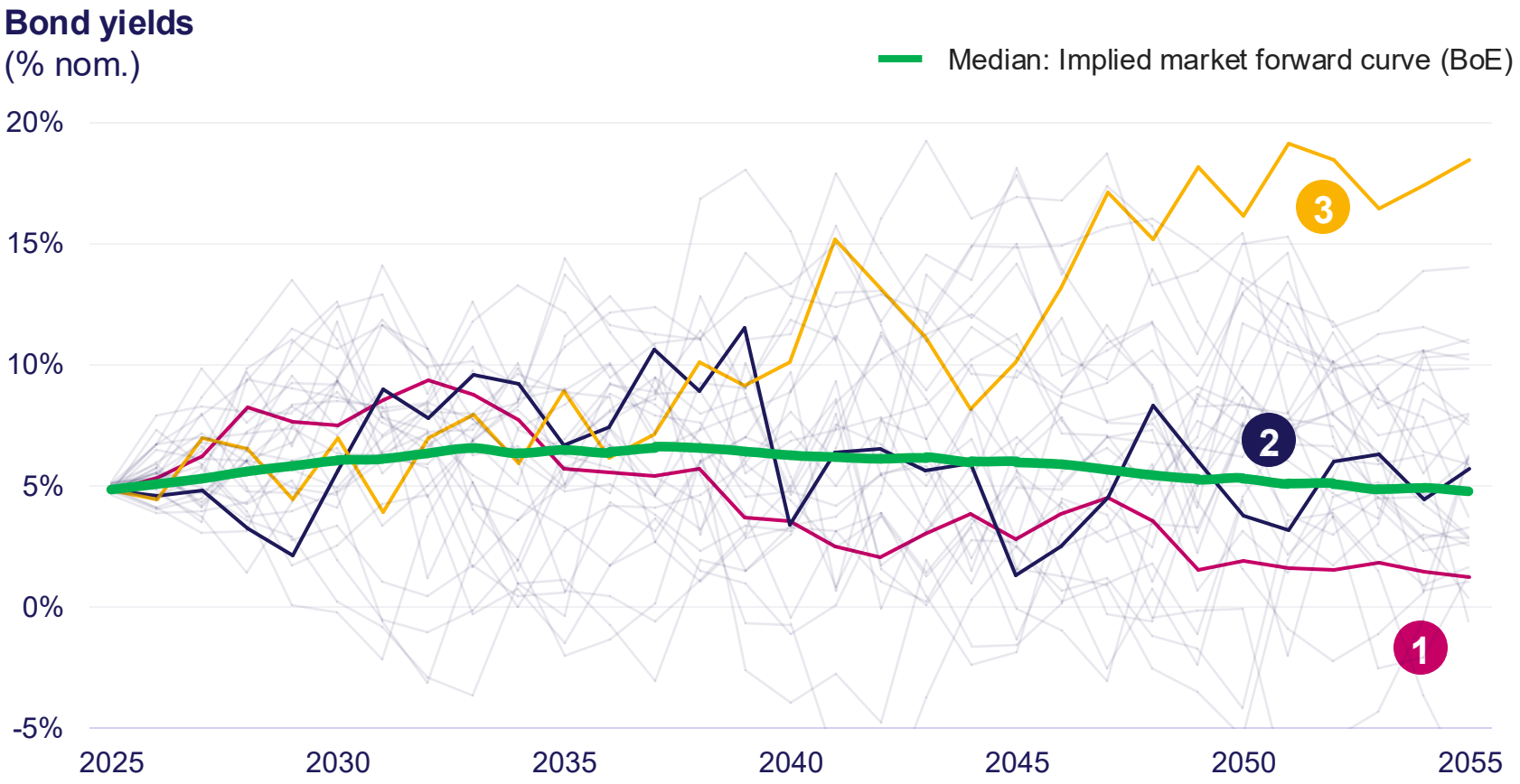
One event can have multiple outcomes – and scenarios

AI generated scenarios can be used to quantify qualitative expectations

1000s of AI-generated narratives ensure that no risks are overlooked.

BoE forward rates and market volatility serve as empirical guardrails; 18% prob. of >10% bond yields before 2030

10y- bond yield forecasts based (investment grade)



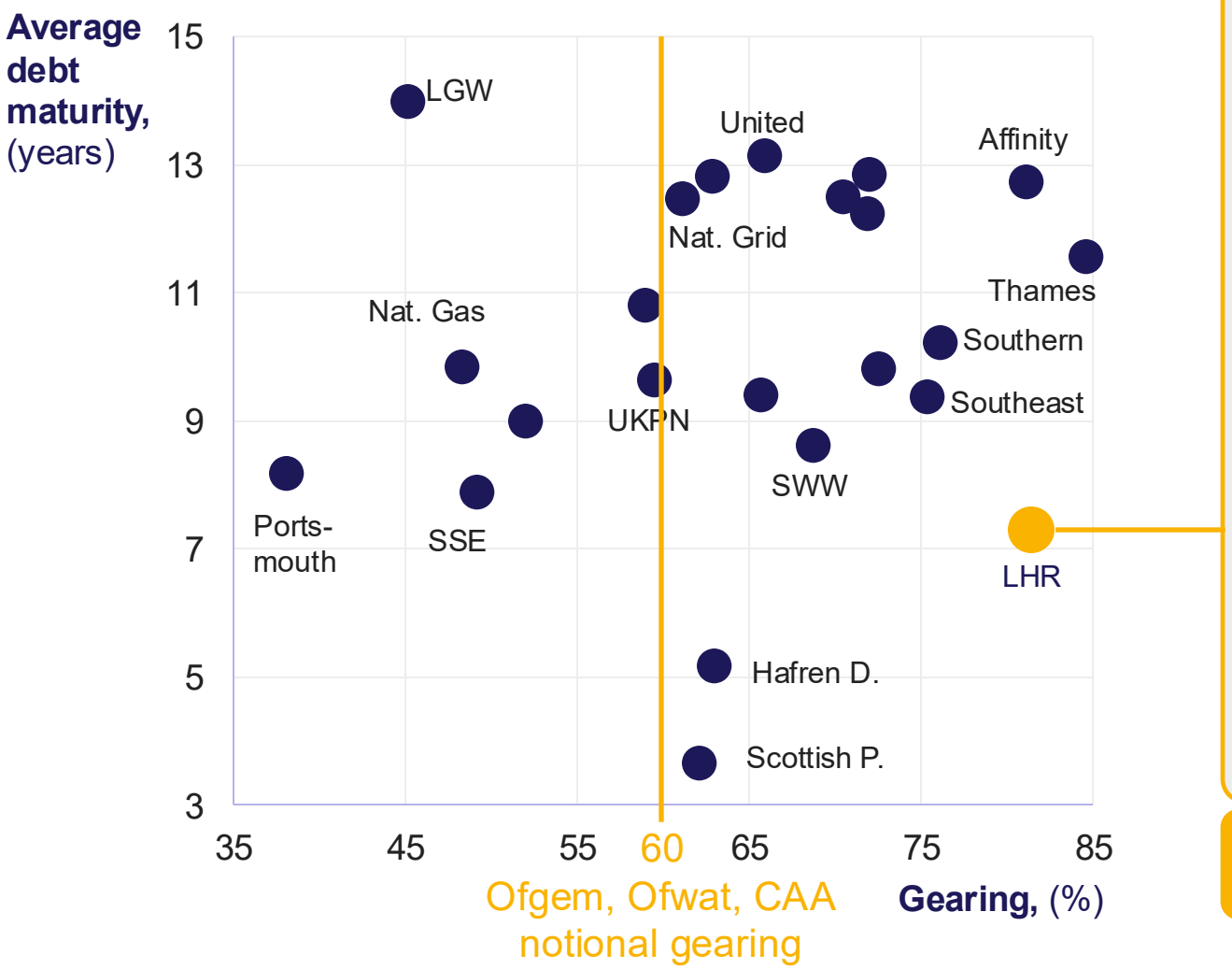
Source: Vallorii Analysis: The model applies a time-varying Ornstein–Uhlenbeck process for deviations around the 10-year forward curve, drawing on Vasicek (1977) and Hull–White (1990), and aligning with the Heath–Jarrow–Morton (1992) framework where forward rate dynamics are governed by the volatility structure.

Robust methodology

Instantaneous forward curve provided by BoE provides core guidance to calculate median expectation of bond yields

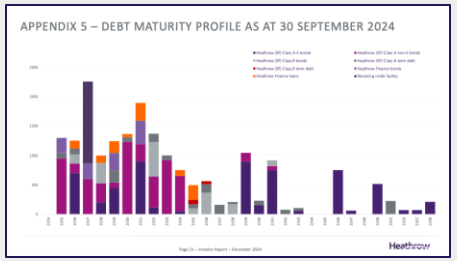
Uncertainty surrounding bond yields can be modelled based on rigorous academic research and calibrated with volatility lab

C LHR is exposed to a short-term bond market crash due to high leverage and short debt maturity, driving 480 bps CoE uplift



480 bps LHR bond risk premium based on

VAPRI forecasts; bond-market crash risk



LHR debt structure; (amount + maturities)

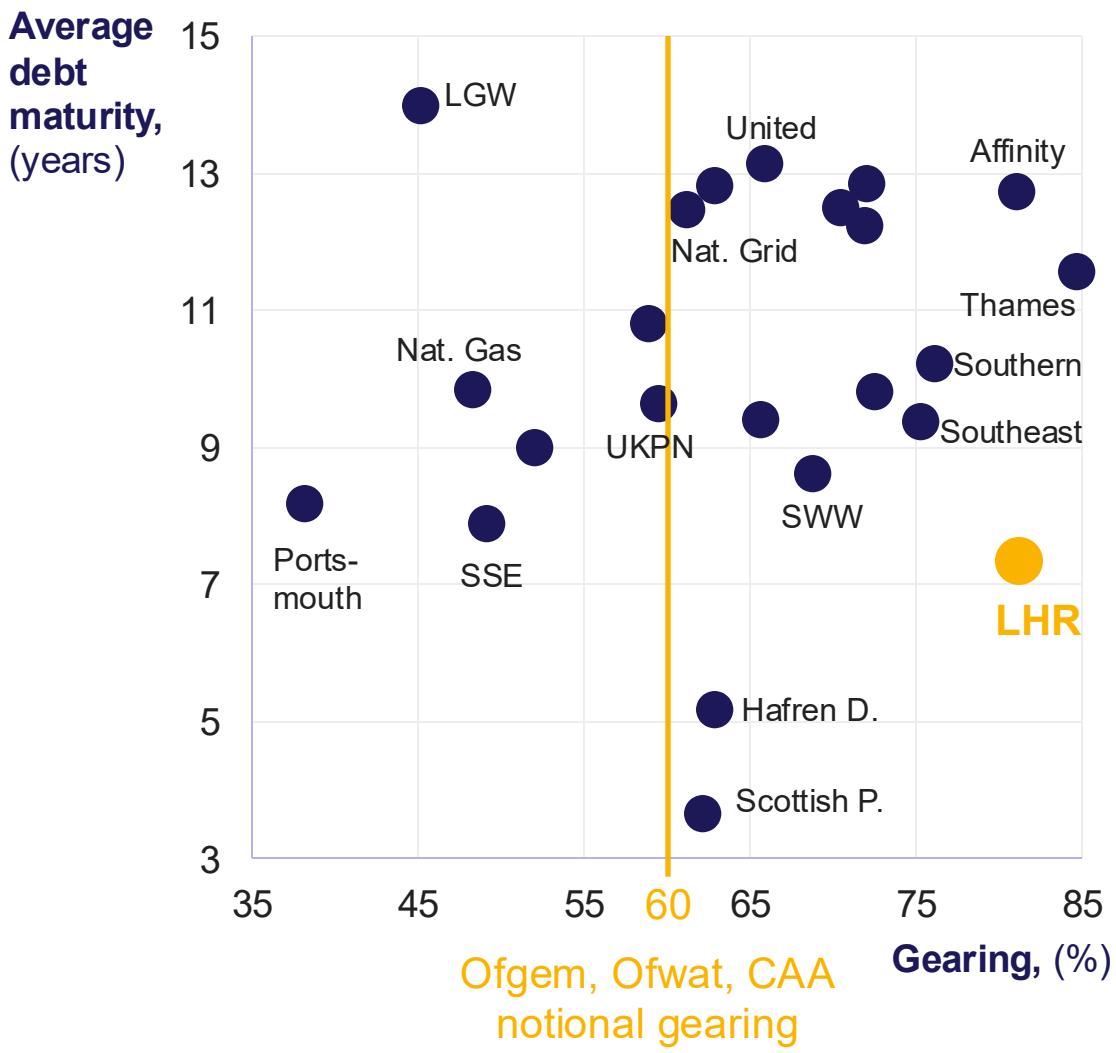
Key risk drivers:

- **Large amount of debt** (high gearing) requiring re-financing during potential market crash
- **Short debt maturity** falling within investor holding periods (low discounting of risk)

Excluding regulatory pass-through (next section)

Source: Factset, Annual Reports, Ofwat APRs, Ofgem RFPRs,

C Highly geared utilities are exposed to refinancing-risks…



Source: Vallorii analysis, Factset, Annual Reports, Ofwat APRs, Ofgem RFPRs,

… driving CoE impacts across sectors

Sector	Asset	Gearing	CoE impact (unmitigated)	CoE impact (mitigated)
Water	Thames Water	85%	500-540 bps	**130-170 bps**
	Affinity Water	81%	380-420 bps	**80-100 bps**
	Southern Water	76%	270 – 310 bps	**30-70 bps**
	Southeast Water	75%	270 – 310 bps	**30-70 bps**
	Northumbrian Water	72%	230-270 bps	**20-60 bps**
	Wessex Water	72%	230-270 bps	**20-60 bps**
	Anglian Water	72%	230-270 bps	**20-60 bps**
	Yorkshire Water	70%	220-260 bps	**10-50 bps**
	South West Water	69%	220-260 bps	**10-50 bps**
	United Utilities	66%	140-180 bps	**<20 bps**
Airports	LHR	81%	420-500 bps	**50-80 bps**
	LGW	73%	230-270 bps	**20-60 bps**
	Manchester	64%	140-180 bps	**<20 bps**
Energy	SGN	*65%*	140-180 bps	**<20 bps**
	Scottish Power	*62%*	140-180 bps	**<20 bps**
	National Grid	*61%*	140-180 bps	**<20 bps**
…	…	…		

Agenda

0 **VAPRI—Vallorii's Price of Risk model—performs AI-enabled, forward-looking risk analysis for transaction, portfolio and scenario analysis across assets, sectors and countries**

1 **Can the supply of capital meet demand after the structural macro break of 2022?**

- Structural macroeconomic break in 2022: +400 bps gov. yields, +100 bps inflation
- Supply of capital for infrastructure re-bounces in 2025 as long-term inflation expectations stabilizes around 3%
- ➢ Demand for infrastructure capital exceeds supply, driving up return requirements by 20-25%

2 **What impact would a bond-market crash have on infrastructure returns?**

AI

- Vallorii forecasts 18% probability of >10% bond yields before 2030
- *Case study:* Sustained bond yields above 8% could wipe out Heathrow dividends due to high gearing levels
- ➢ Bond-market uncertainty drives 480 bps CoE increase for highly leveraged assets

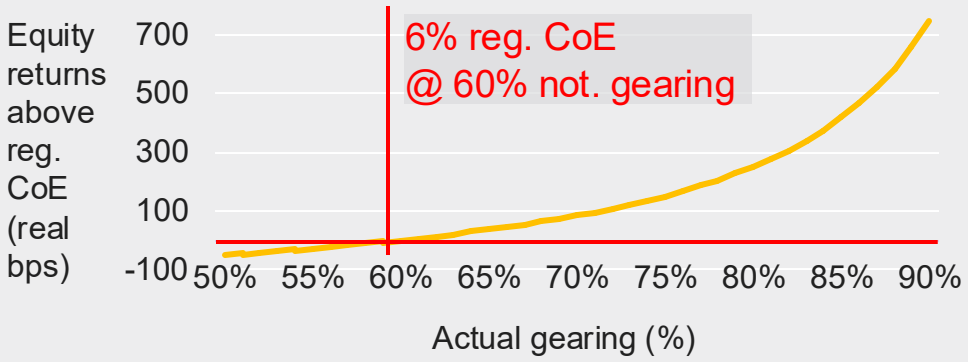
3 **How to mitigate bond market risks for highly leveraged assets?**

- Regulatory CoD passthrough limits CoE impacts to 50-80 bps for LHR but does not mitigate bond risks entirely
- Equity re-financing would remove 50-80 bps markup but also lower IRR by 380 bps due to WACC-based regulated returns

Under the UK RAB model, investors must find trade-off between higher equity returns and lower bond market risk exposure

WACC-based regulation

Incentivizes higher leverage

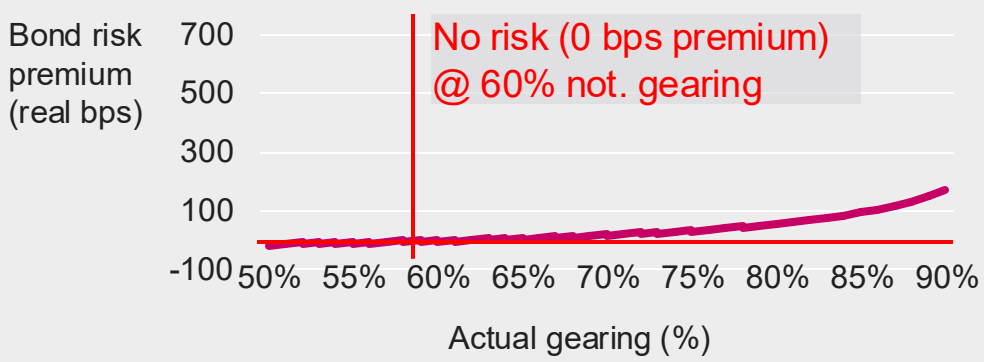


If actual gearing = notional gearing
6% equity returns

If actual gearing > notional gearing:
Increased equity returns >10% above 85% gearing

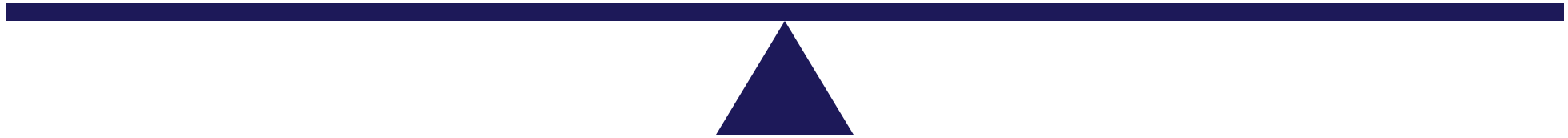
CoD indexation

Incentivizes lower leverage



If actual gearing = notional gearing
No risk premium, 0 bps markup

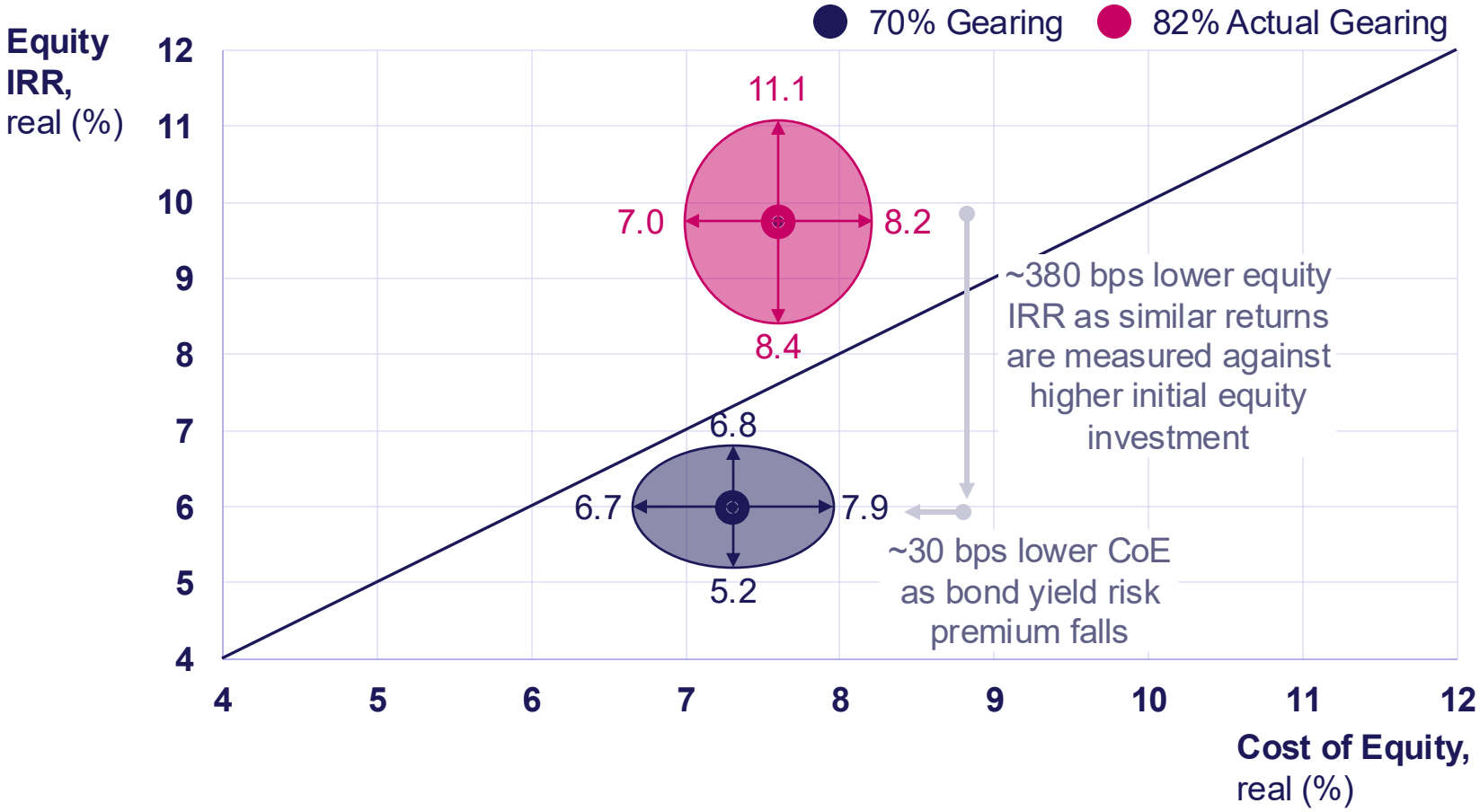
If actual gearing > notional gearing:
Bond risk premium >100 bps above 86% gearing



Source: Vallorii analysis

VAPRI shows that lower Heathrow gearing reduces CoE by ~30 bps, but reduces equity IRR by ~380 bps

Lower gearing reduces risk but significantly dilutes equity returns



Source: Vallorii analysis

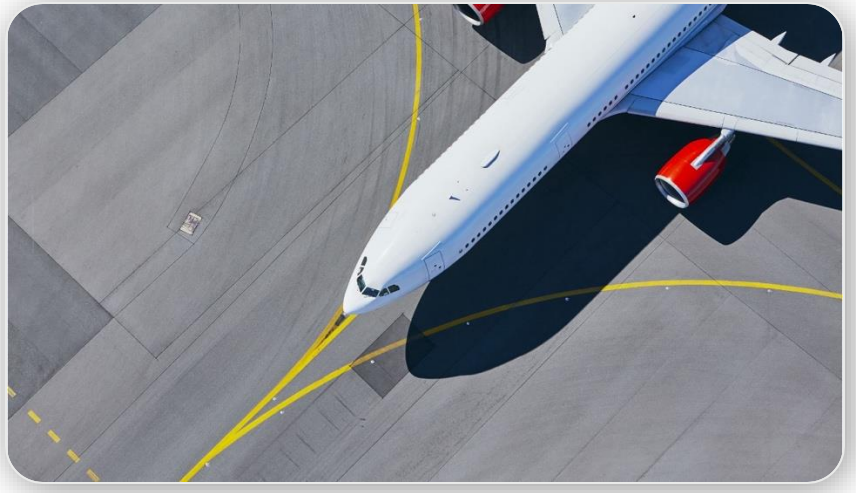
Key insights

Hypothetical lower gearing of 70% (due to reduced debt level and higher equity level) **would reduce both CoE and equity IRR**

Bond yield risk premium falls due to debt–paydown lowering interest expense

Equity IRR falls as cash flows to equity are measured against a larger denominator

Bespoke Advisory Projects
Applying AI-enabled models to your portfolio



Limited availability in Q3/Q4

Please come and talk to any of us – or reach out to Sandy Arbuthnott (vallorii@vallorii.com)

Tailored modeling and valuation insights for new or existing infrastructure investment decisions

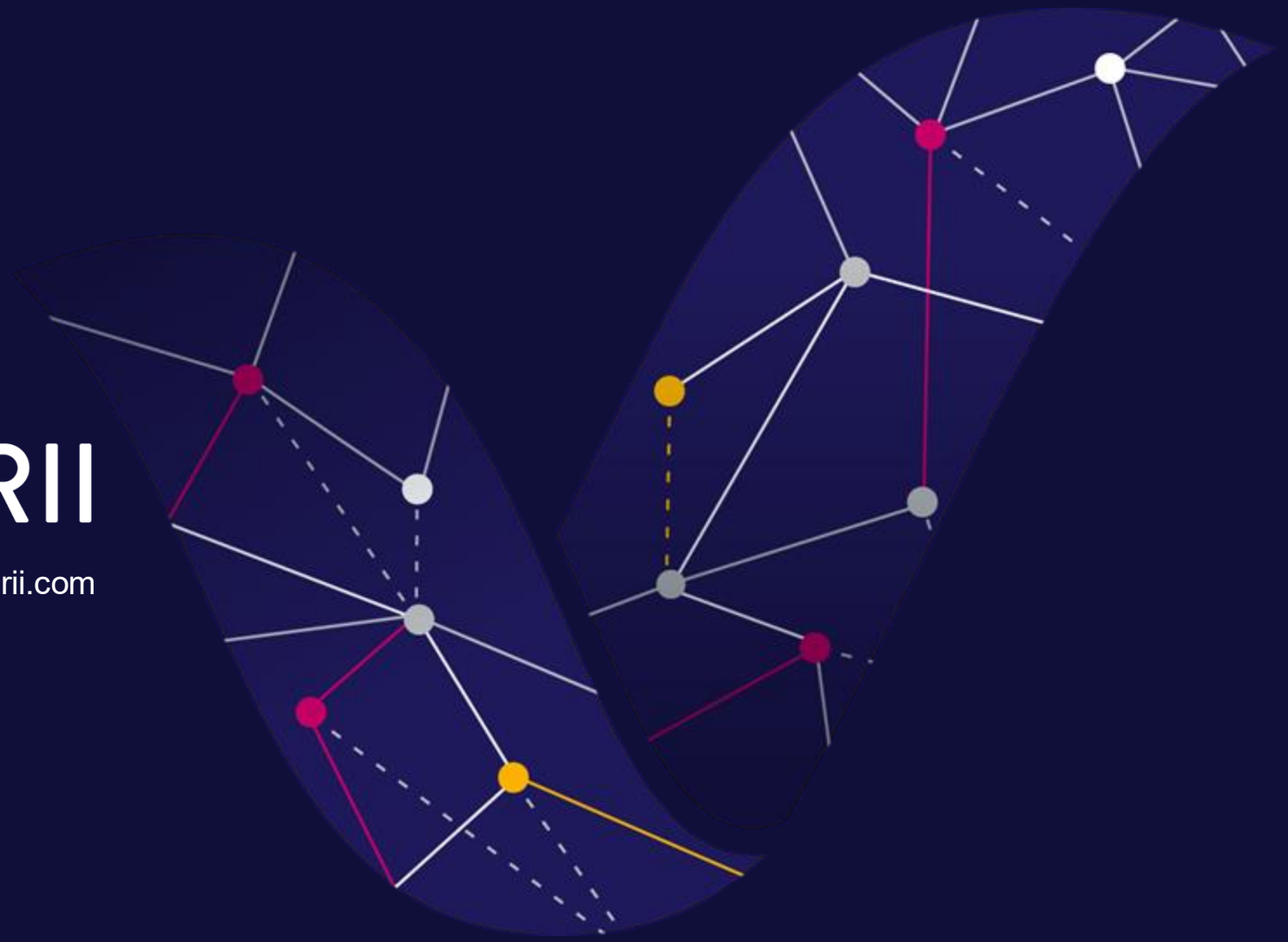
Applications
- Rapid asset valuation
- Fair cost of equity
- Portfolio risk analysis

Approach
- AI-based scenario generation
- Multi-risk perspective
- Rich sensitivity analysis
- Total Portfolio Approach

Next Vallorii Roundtable
26th November 3-4.30pm

Application of VAPRI to existing assets, with regulatory implications

- Asset health status and risks through lens of Water PR29
- Net zero growth risks for current portfolios, including electricity T3/ED3



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