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Civil Aviation Authority

Cost of Capital Strategy for H8

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Executive Summary

1.   This report has been prepared for the Civil Aviation Authority ("**CAA**") for the purpose of reviewing the methodology for determining the weighted average cost of capital ("**WACC**") for Heathrow Airport Limited ("**HAL**") in the next price control period, H8.

2.   During the previous price control period, H7, the CAA faced the unprecedented circumstances of needing to estimate the cost of capital during the Covid-19 pandemic, which had a significant impact on the aviation sector as a result of the restrictions placed on cross-border travel.

3.   The CAA was therefore required to set the methodology for determining HAL's WACC (and wider regulatory framework) in a period of significant uncertainty regarding the future operations of airports. The CAA were also required to draw inferences from volatile capital markets data. This necessitated the introduction of new mechanisms and methodologies to reflect the impact of the pandemic on HAL.

4.   In this report, we estimate the parameters as specified using the H7 methodology, and in doing so review whether the approach adopted by the CAA in H7 is still appropriate for H8. We also consider the other mechanisms or adjustments that could be used to further improve the H7 methodology ahead of H8.

A. WACC parameters and their estimation methodology in H7

5.   In this report, we have reviewed the methodology employed by the CAA in determining the parameters underlying the H7 vanilla WACC,[1] and updated the parameters implied by the H7 methodology as at 31 July 2024. We use the updated parameters to provide an early view of the WACC for the H8 price control, which is expected to run from 2027 to 2031.

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[1]   We do not comment on the CAA's approach for applying a tax uplift to the cost of capital as part of this report.

6.   We have reviewed each parameter underlying the WACC calculation:

- Inflation;

- Risk-free rate;

- Betas and gearing;

- Total Market Return ("**TMR**");

- Cost of embedded debt;

- Cost of new debt; and

- Issuance and liquidity costs.

7.   For all the parameters listed above, we have followed the final H7 methodology, updating for latest market evidence and the expected market conditions over H8.

8.   The changes in inflation forecasts since the H7 determination and the expected alignment between the retail price index ("**RPI**") and the consumer price index including owner occupiers' housing costs ("**CPIH**") from 2030 impact the TMR and cost of debt estimates. Similarly, changes in the interest rates since the H7 determination impact the risk-free rate and cost of debt estimates.

9.   We present the cumulative impact of our update to the H7 methodology reflecting latest market evidence and the implied WACC for H8 in Table 1 below.

Table 1: H7 and H8 early view WACC

Component	H7 Final Decision		H8 early view (31 Jul 2024) *Based on H7 methodology using updated data*	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	0.59%	0.59%	1.29%	1.29%
TMR	5.85%	5.85%	6.75%	6.75%
Equity risk premium	5.26%	5.26%	5.46%	5.46%
Asset beta	0.62	0.44	0.61	0.44
Debt beta	0.05	0.1	0.05	0.1
Equity beta	1.47	0.95	1.44	0.94
Post-tax cost of equity	8.32%	5.59%	9.14%	6.43%
Cost of new debt	4.17%	4.17%	3.65%	3.65%
Cost of embedded debt	(0.12%)	(0.12%)	1.96%	1.96%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	0.62%	0.62%	2.41%	2.41%
Vanilla WACC (RPI-deflated)	**3.70%**	**2.61%**	**5.10%**	**4.02%**
Midpoint (RPI-deflated)		**3.16%**		**4.56%**

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.6 (link); CAA (2024), Economic regulation of Heathrow airport: H7 final issues, ¶2.15 (link); FTI analysis.

Note: We have presented H8 estimates in RPI-deflated terms for ease of comparison with the parameters as set in H7. However, we do not consider this as an appropriate basis for comparison given the expected change in RPI definition from 2030 (partway through H8).

10. As set out above, the midpoint of the early view H8 RPI-deflated WACC range (based on the H7 methodology with updated data) is c. 140 bps higher than the midpoint of the H7 RPI-deflated WACC range.

11. Of this, c. 90% of the difference (c. 130 bps), is due to changes in inflation forecasts. This is due to a lower inflationary environment (e.g., RPI is not expected to exceed 3% over H8 but reached 11.6% during H7) and expected alignment between RPI and CPIH from 2030. These factors contribute to average forecast RPI decreasing from c. 5.3% over H7 to c. 2.6% over H8.

12. The lower inflation forecasts result in an increase in the RPI-deflated values for capital market evidence presented in nominal terms e.g., corporate bond yields. The remaining portion of the change in the WACC estimate is largely due to our assumption that HAL's cost of embedded debt will increase due to new debt in H7 (which is more expensive than HAL's embedded debt in H7) becoming part of the H8 embedded debt.

B. Potential updates to the CAA's WACC methodology for H8

13. As discussed previously, the methodological decisions made by the CAA for H7 aimed to ensure accuracy and predictability in a time of significant uncertainty regarding both the operations of airports and capital market evidence.

14. Although there is currently uncertainty regarding the geopolitical context that the H8 determinations will be made in, it is expected that H8 will be determined in a more stable macroeconomic environment than H7 and that HAL will be operating at close to capacity. Therefore, it is relevant to consider the appropriateness of the H7 methodology within the H8 context.

15. Based on our review of the H7 methodology, there is only one update which is required, as a result of the CAA indicating that it intends to transition from RPI to either consumer price index ("**CPI**") or CPIH. This would affect the risk-free rate, the TMR, and the cost of debt.

16. We have considered other updates the CAA could make to its methodology for H8 which might merit discussion with stakeholders based on our review of the H7 methodology, regulatory precedent and financial theory. We classify these recommendations as 'discretionary' given the need for further work and consultation with stakeholders.

17. We assess all discretionary updates against five assessment criteria: the impact on accuracy, the regulatory precedent, the scale of the wider price control impacts, the statistical robustness and the practicality of implementation. The results of our assessment are set out below.

18. As part of the development of the H8 price control, the CAA may wish to consider these updates and evidence from stakeholders on these issues. The CAA and stakeholders may raise additional issues beyond what is raised in this report as our list is not exhaustive.

Table 2: Assessment of discretionary updates to the methodology

Metric	Accuracy	Regulatory precedent	Limit wider price control impact[2]	Statistical robustness	Practicality
Other inflation changes					
Long-term inflation forecasts	✓	✓	✓	✓ ?	✓
Risk-free rate					
Indexation	✓	✓	✗	✓	?
Removal of convenience yield	✓	✓	✓	✓	✓
Asset beta estimation					
Choice of comparators	✓	✓	✓	✓	✓
Treatment of pandemic period	✓	✓	✓	✓	✓
Recalibrating the adjustment for the TRS mechanism	✓	✗	✓	✓	✗
TMR					
Diverging from 'stable TMR theory'	✗	✗	✗	✗	✗
Cost of debt					
Aligning with RAB indexation	✓	✓	✗	✓	✓
Other methodological changes					
Cross-checks	?	✓	✓	?	?

Source: FTI analysis.

19.   We have analysed the impact of including discretionary changes which score 5/5 on these criteria. These are removal of the convenience yield, updating the choice of comparators, and the treatment of pandemic period when estimating the beta.

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2   'Limit wider price control impact' refers to a criterion in which we assess whether the update has an impact on other related aspects of the price controls, and therefore the incentives and risk-reward balance of the determination. See ¶3.10 for further detail.

20. Table 3 illustrates our early view of the H8 WACC range (both with and without our discretionary recommendations). The midpoint of our indicative H8 range on a CPI/CPIH-basis following these discretionary updates to the parameters is 4.64%, which is 2 bps higher than the midpoint of our update of the H7 methodology on the same basis (CPI/CPIH). This is an indicative value given the nascent nature of the H8 process.

Table 3: H8 early view WACC, with required and selected discretionary changes to the methodology

Component	H8 early view Based on H7 methodology using updated data (Inflation shift from RPI to CPIH)		H8 early view Based on H7 methodology using updated data (Incl. discretionary recommendations)	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	1.35%	1.35%	1.27%	1.27%
TMR	6.81%	6.81%	7.00%	6.30%
Equity risk premium	5.46%	5.46%	5.73%	5.03%
Asset beta	0.61	0.44	0.61	0.45
Debt beta	0.05	0.10	0.05	0.10
Equity beta	1.44	0.94	1.45	0.99
Post-tax cost of equity	9.21%	6.49%	9.57%	6.23%
Cost of new debt	3.71%	3.71%	3.71%	3.71%
Cost of embedded debt	2.02%	2.02%	2.02%	2.02%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	2.46%	2.46%	2.46%	2.46%
Vanilla WACC (CPI/CPIH-deflated)	**5.16%**	**4.07%**	**5.30%**	**3.97%**
Midpoint (CPI/CPIH-deflated)		4.62%		4.64%

Source: FTI analysis.

Note: Rows in blue indicate the parameters impacted by the potential discretionary updates to the methodology, while rows in green indicate the parameters for which we have proposed a range relative to the H7 methodology.

1.   Introduction

1.1   This report has been prepared for the Civil Aviation Authority ("**CAA**") for the purpose of reviewing the methodology for determining the weighted average cost of capital ("**WACC**") for Heathrow Airport Limited ("**HAL**") in the next price control period, H8.

1.2   The WACC is one of the components that determines the revenue that HAL is able to earn in each price control, which includes a provision for the company to earn a level of 'normal profit' or 'allowed return'.[3] Under the framework used for setting the revenue allowance for HAL, the CAA estimates the allowed return by multiplying the WACC by the regulated asset base ("**RAB**").

1.3   The WACC is estimated as the weighted average of the cost of equity and cost of debt. The cost of equity and cost of debt reflect the minimum expected return for equity and debt investors respectively.

1.4   Unlike the cost of debt, the cost of equity is not directly observable, and is instead estimated using various models. The model to estimate the cost of equity most commonly used by regulators in Great Britain ("**GB**"), including the CAA, is the Capital Asset Pricing Model ("**CAPM**"). The CAPM framework states that the cost of equity can be estimated using the following equation:

$$Cost\ of\ equity =\ RfR + \beta_e \times (TMR - RfR)$$

where RfR is the risk-free rate, β_e is the equity beta of the asset and TMR is the total market return ("**TMR**").

1.5   The theoretical model underpinning the CAPM is well understood, but the estimation of the different parameters can be difficult and is subject to some uncertainty and judgement.

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[3]   Normal profit corresponds to an economic profit of zero, when a company's total revenue equals the sum of its implicit and explicit costs. It differs from accounting profit, as the latter does not take into consideration implicit costs. A company may report high accounting profit but still be in a state of normal profit if the opportunity costs of maintaining business operations are high.

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1.6   The cost of debt can largely be observed based on the licensee's existing debt portfolio (sometimes referred to as "**embedded debt**"). Typically, regulators use benchmark debt indices in their estimate of the cost of embedded debt, based on a 'notional' capital structure (i.e., a hypothetical capital structure that is considered efficient). There is some uncertainty connected to the issuance of new debt over the price control, with regulators typically having to forecast the level and timing of issuance combined with the expected cost of debt for this issuance.

1.7   During the previous price control period, H7, the CAA faced the unprecedented circumstances of needing to estimate the cost of capital during the Covid-19 pandemic, which had a significant impact on the aviation sector as a result of the restrictions placed on cross-border travel. The CAA was therefore required to determine the WACC in a period of significant uncertainty regarding the future operations of airports. It also had to draw inferences from volatile capital markets data.

1.8   This necessitated the introduction of new mechanisms and methodologies to reflect the impact of the pandemic on HAL. As part of this report, we review whether the approach adopted by the CAA at H7 is still appropriate as the CAA, HAL, and stakeholders look forward to H8. Additionally, we consider what other mechanisms or adjustments could be used to further improve the methodology used for H7.

1.9   The report is structured as follows:

- **Section 2** discusses the key WACC parameters, describes the H7 methodology to estimate these, and updates this methodology using capital market data up to 31 July 2024 to estimate the implied WACC for H8 based on this methodology;

- **Section 3** discusses potential updates to the H7 methodology for H8, and discusses the impact these updates may have on the estimated WACC for H8; and

- **Section 4** concludes.

2.   WACC parameters and their estimation methodology in H7

2.1   As stated in the introduction, the methodology for determining HAL's WACC (and wider regulatory framework) for H7 was developed in the context of the Covid-19 pandemic, which had significantly impacted the operations of airports.

2.2   Consequently, airports observed a significant decrease in demand for their services and a reduction in the efficiency of their operations. This resulted in airports reporting substantial losses, with the Airports Council International estimating c. $125 billion of revenue losses from airports around the world in 2020 alone.[4] Specifically for HAL, passenger traffic declined by 72% in 2020,[5] with estimated losses of c. £3.3billion over the course of 2020 and 2021.[6]

2.3   The pandemic also had significant impacts on the wider economy. For example, inflation in the UK, as per the Consumer Price Index including owner occupiers' housing costs ("**CPIH**"), initially fell to 1% in 2020, before increasing to 7.9% in 2022 as economies reopened following the lifting of Covid-related restrictions and the subsequent impact of the Russia-Ukraine conflict.[7] This led to central banks raising interest rates to alleviate inflationary pressures. This had implications for various parameters used in setting the WACC, such as the risk-free rate, the TMR, and the cost of debt.

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[4]   Airports Council International (2021), *The impact of COVID-19 on the airport business and the path to recovery* (link).

[5]   HAL submitted evidence to Parliament stating that its passenger traffic, prior to the pandemic, was c. 80m passengers per year, and that in 2020, traffic reduced to 22.1m passengers. We calculate the percentage reduction in traffic by calculating (1 – (22.1/80)). See UK Parliament Committees (2022), *Written evidence submitted by Heathrow Airport: Managing cross-border travel during the COVID-19 pandemic*, page 1 (link).

[6]   Heathrow Airport Holdings Limited (2021), *Annual Report and Financial Statements 2021*, page 132 (link).

[7]   Office for National Statistics (2024), *CPIH Annual Rate 00: All Items 2015=100* (link).

2.4   The CAA acknowledged that estimating HAL's WACC for H7 was "subject to a significant degree of uncertainty" as a result of the Covid-19 pandemic.[8] In order to mitigate the "heightened risk that the WACC estimate will be set too high or too low", the CAA adopted an "inclusive approach" which considered a broad range of evidence, and led to "parameter ranges that are wider than they might otherwise [have been]".[9]

2.5   HAL, British Airways, Delta Air Lines and Virgin Atlantic appealed the CAA's H7 price control decision to the Competition and Markets Authority ("**CMA**"). The CMA found broadly in favour of the CAA barring a few amendments. The main change made by the CMA on the WACC was the removal of the inflation-linked premium on the cost of debt.[10] For the purposes of this report, we have focused on the final H7 methodology, post-CMA appeals.

2.6   In this section, we discuss the methodology employed by the CAA in determining the parameters underlying the H7 vanilla WACC,[11] and the updated parameters implied by the H7 methodology as at 31 July 2024, as an indication of the WACC for the H8 price control which will run from 2027 to 2031.

2.7   Specifically, we discuss the following in turn:

- Inflation;

- Risk-free rate;

- Betas and gearing;

- TMR;

- Cost of embedded debt;

- Cost of new debt; and

- Issuance and liquidity costs.

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[8]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues,* ¶9.7 (link).

[9]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues,* ¶¶9.8 – 9.9 (link).

[10]   The CMA found against the CAA relating to the inclusion of an index-linked debt premium in estimating the cost of debt, with the justification that the CAA had "made methodological errors, failed to take into account relevant considerations and reached a conclusion without a proper factual basis and foundation in the evidence such that its decision in this regard was irrational". See CMA (2023), H7 Heathrow Airport Licence Modification Appeals – Final Determinations, ¶7.305 (link).

[11]   We do not comment on the CAA's approach for applying a tax uplift to the cost of capital as part of this report.

A. Inflation

2.8 Inflation measures the changes in the prices of goods and services within an economy over time.

2.9 There are three main measures for inflation in the UK, which are the:

- Retail Price Index ("**RPI**"), which includes housing costs like mortgage interest and relies on the use of arithmetic means;

- Consumer Price Index ("**CPI**"), which excludes mortgage interest and uses a geometric mean; and

- CPIH, which includes a broader measure of housing costs with a geometric mean.

2.10 RPI is no longer considered a 'National Statistic',[12] and regulators across the UK have begun to (or have already) transitioned to CPI or CPIH in setting their regulatory determinations.

CAA H7 Determination

2.11 For H7, the CAA opted to retain RPI as the inflation basis for the price control. This was partly because stakeholders expressed a preference for RPI based on their familiarity with this measure,[13] but also as a comprehensive transition to an alternative inflation measure was deemed unfeasible in the period prior to the H7 determination.

2.12 As a result, for the purposes of the H7 price control, the CAA set an inflation rate of 4.88% in RPI terms. This figure was derived from contemporaneous inflation forecasts produced by the Office for Budget Responsibility ("**OBR**"), reflecting forecast inflation for the duration of the H7 period (2022-26).[14]

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[12] The 'National Statistic' designation is given to official statistics that "meet the standards of trustworthiness, quality and value, set out in the Code of Practice for Statistics". See Office for Statistics Regulation (2024), *National Statistics designation review* (link). The Office for National Statistics does not consider the RPI to be a 'National Statistic'; see Office for National Statistics (2023), *Consumer Price Inflation* (link).

[13] CAA (2021), *Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward*, Appendix D ¶5 (link).

[14] CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, Table 9.2 (link).

Updated evidence

2.13 Since the H7 determination, RPI forecasts have fallen as a result of falling commodity prices, economic slowdown and methodological updates. In 2030, the methodology used to calculate the RPI is expected to change fundamentally such that the RPI will become identical to the current CPIH measure.[15]

2.14 To construct the H8 early view of inflation forecasts as per the H7 methodology: [16]

- for 2027-28, we have used available OBR forecasts;

- for 2029, we assume that RPI inflation is the same as in 2028; and

- for 2030-31, we have reflected the UK Government's plan to align RPI's definition with CPIH. We use the long-term forecasts of CPI from the OBR to forecast CPIH, as CPIH forecasts are not currently available.[17] This results in an inflation forecast of 2% for 2030-31.

2.15 We present the inflation forecasts used for our H8 early view in Table 2-1 below.

Table 2-1: Inflation forecasts for the H8 early view

Metric	2027	2028	2029	2030	2031
RPI	2.95%	2.89%	2.89%	2.00%	2.00%
CPI	1.90%	2.00%	2.00%	2.00%	2.00%

Source: OBR (2024)*, March 2024 Economic and fiscal outlook – charts and tables: Annex A,* Sheet TA.1 (link), FTI analysis.

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[15] UKSA (2020), *Response to the joint consultation on reforming the methodology of the Retail Prices Index* (link).

[16] This approach is aligned with the approach taken by other regulators. See Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex,* ¶¶3.56 – 3.57 (link) and Ofwat (2024), *PR24 Draft determinations: Aligning risk and return – Allowed return appendix,* Table 27 (link).

[17] The gap between CPIH and CPI inflation has historically been small (and much smaller than the gap between RPI inflation and either CPIH or CPI inflation). See ONS, *Inflation and price indices* (link).

2.16   As part of the lessons learnt document, the CAA has indicated plans to transition away from RPI to CPI or CPIH for H8.[18] We discuss this further in Section 3. We present an RPI-deflated value for our H8 early view in Section 2, and a CPI-deflated value for the H8 early view in Section 4, to allow for comparison with the H7 determinations on both measures.[19]

B. Risk-free rate

2.17   The risk-free rate is one of the parameters used to estimate the cost of equity in the CAPM. It is the return that an investor would expect to earn on a riskless asset. Although such an asset does not exist in practice, regulators tend to use inflation-linked government debt, such as index-linked gilts (**"ILGs"**),[20] as a proxy for a riskless asset.[21]

2.18   Regulators consider a variety of issues when estimating the risk-free rate.[22] A novel development during the H7 process was the inclusion of an explicit convenience yield.[23] We discuss this further below and in Section 3.

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[18]   CAA (2024), *Setting future price controls – lessons learnt from the review of approach*, ¶8.11 (link).

[19]   Table 2-15 shows estimated WACC parameters in RPI terms, while Table 4-1 shows estimated WACC parameters in both RPI terms and CPI/CPIH terms.

[20]   ILGs have semi-annual coupon payments that rise in line with inflation and adjust the principal repayment to take account of accrued inflation since the gilt was first issued.

[21]   UK Regulators Network ("**UKRN**") (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, pages 12 – 15 (link).

[22]   For more information, see UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, pages 12 – 15 (link).

[23]   A key tenet of the CAPM is that all market participants can borrow and lend at the risk-free rate. At the time of setting H7, there was a concern from regulators such as the CMA that the risk-free rate implied by ILGs was not consistent with the CAPM due to ILGs having special properties such as liquidity. This could depress the yield on ILGs below the risk-free rate implied by the CAPM. Therefore, a convenience yield was added to the yield on ILGs to reflect this. See CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, ¶9.90 – 9.108 (link), and see UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, page 12 (link).

CAA H7 Determination

2.19   The CAA, guided by the CMA's Final Determination for Ofwat's PR19 price control, used ILGs with a maturity of 20 years as a proxy for estimating the risk-free rate, as it considered that "HAL's asset lives, and investment decisions are similarly [to water companies] long dated".[24]

2.20   The CAA used a one-month trailing average to estimate the yield on ILGs.[25] At the Final Decision cut-off date of 17 November 2022, this resulted in an estimate of 0.30%. This served as a lower bound of the CAA's risk-free rate range.

2.21   In line with the CMA's PR19 determination, which found that ILGs may underestimate the risk-free rate,[26] the CAA included a convenience yield uplift to the observed yield on ILGs. The convenience yield was estimated to be the average of:

   (1) the spread between the one-month trailing average yield of the 20-year nominal gilt and the iBoxx £ Non-Gilts AAA-rated 10+ years index; and

   (2) the spread between the one-month trailing average yield of the 12.5-year nominal gilt and the iBoxx £ Non-Gilts AAA-rated 10-15 years index.[27]

2.22   In the H7 final decision, the convenience yield was estimated to be 57 basis points ("**bps**"), resulting in a risk-free rate estimate of 0.87%.[28]

2.23   The CAA's range for the risk-free rate for H7 was 0.30% to 0.87%. The CAA chose to take the midpoint of its range, 0.59%, for H7.[29]

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[24]   CAA (2021), *Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward*, Appendix J ¶¶84 – 85 (link).

[25]   CAA (2022), *H7 Final Proposals*, *Section 3: Financial issues and implementation*, ¶9.249 (link).

[26]   CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, ¶¶9.90 – 9.108 (link).

[27]   CAA (2022), *H7 Final Proposals*, *Section 3: Financial issues and implementation*, ¶¶9.246 – 9.248 (link).

[28]   i.e., 0.30% + 0.57%.

[29]   The CAA's risk-free rate estimate was not challenged by stakeholders, and hence not discussed by the CMA. See CMA (2023), *H7 Heathrow Airport Licence Modification Appeals: Final Determinations* (link).

Updated evidence

2.24   Replicating the CAA's approach using market data as at 31 July 2024 results in a risk-free rate estimate of 1.29%. We compare the market data underlying the estimate in H7 and the H8 early view in Table 2-2 below.

Table 2-2: H7 Final Decision and H8 early view of the risk-free rate estimate

Component	Guide	H7	H8 early view *Based on H7 methodology using updated data*
Yield on 20-year ILGs	A	0.30%	1.22%
Convenience yield (10+ years)	B	0.43%	0.06%
Convenience yield (10-15 years)	C	0.71%	0.23%
Average convenience yield	D = (B + C)/2	0.57%	0.15%
Yield on 20-year ILGs + average convenience yield	E = A + D	0.87%	1.37%
Risk-free rate (RPI-deflated)	**F = (A + E)/2**	**0.59%**	**1.29%**

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.6 (link), FTI analysis

Note: The cut-off date for the H7 analysis was 17 November 2022[30]. For the H8 early view, we use a cut-off date of 31 July 2024.

2.25   The increase in the risk-free rate reflects the rise in interest rates since H7. This has more than offset the estimated fall in the convenience yield.

C. Betas and gearing

2.26   A key parameter in the CAPM is equity beta, which reflects a share or stock's exposure to systematic risk.[31] The higher the equity beta, the greater the exposure to systematic risk and the higher the expected return required by investors. Equity beta is a function of several variables such as macroeconomic factors (the stage of the business cycle of the economy), financial risk, and operating leverage.

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[30]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, ¶9.41 (link)

[31]   Under the CAPM, investors are only rewarded for the degree of systematic risk they are exposed to as this risk is not diversifiable by holding a basket of securities.

2.27   When estimating equity beta, economists, regulators, and market practitioners typically follow a four-step process:[32]

(1) Estimate 'raw' equity betas;

(2) Estimate debt betas (which reflect the sensitivity of debt returns to systematic risk);

(3) De-lever equity and debt beta estimates into an asset beta, as both equity and debt beta are impacted by the gearing[33] of the company in question;

(4) Re-lever the asset beta at the gearing representative of the "average, efficiently-run, company, given the characteristics of the price control", referred to as 'notional gearing'.[34]

2.28   Practitioners and regulators consider several factors, such as the pool of comparator companies, the estimation window and the averaging period when estimating the raw equity beta (in step 1 above).[35]

2.29   For the remainder of this section, we focus on the CAA's asset beta estimate as the equity beta set for H7 is derived from the selection of the asset beta.

CAA H7 Determination

2.30   The Covid-19 pandemic resulted in a sharp increase in the perceived systematic risks faced by airports. This was reflected in the significant increase in asset betas of listed airports as shown below in Figure 2-1.

2.31   As HAL is not listed, it is not possible to directly observe the impact of the pandemic on HAL's asset beta via capital markets evidence. Therefore, the impact on HAL's systematic risk must be inferred from the impact on listed comparator airports' share prices.

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[32]   For more information, see FTI Consulting (2022), *Early view of water sector betas for PR24*, report for Ofwat (link).

[33]   The 'actual gearing' is the amount of debt financing as a proportion of the combined value of the company's debt and equity.

[34]   For more information, see UKRN (2023), *Guidance for regulators on the methodology for setting the cost of capital*, page 33 (link).

[35]   For more information, see FTI Consulting (2022), *Early view of water sector betas for PR24*, report for Ofwat, ¶4.2 (link).

2.32   The following chart illustrates 2-year asset betas for four comparator airports which were adopted in setting the beta for H7:

- Aena SA (**"AENA"**), the owner and operator of 46 airports and two heliports in Spain, including Madrid-Barajas, Barcelona-El Prat, and 23 international airports, including London Luton.[36]

- Groupe ADP SA (**"ADP"**) manages and operates 26 airports internationally, including Charles de Gaulle Airport and other Parisian airports.[37]

- Fraport AG (**"FRA"**) operates Frankfurt Airport and holds interests in 30 airports internationally.[38]

- Flughafen Zürich AG (**"FHZN"**), the operator of Zurich Airport, operates eight other airports internationally.[39]

Figure 2-1: 2-year asset betas between 2017 and 31 March 2022
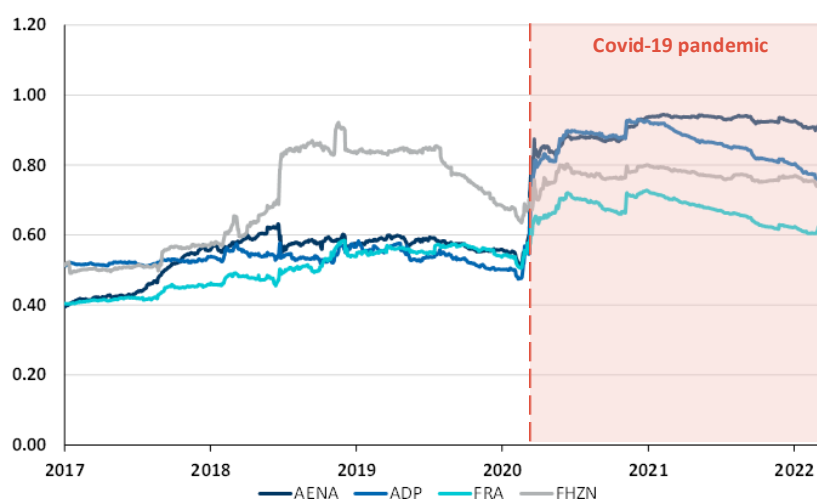
Source: FTI analysis.
Note: The raw equity betas for the comparators have been de-levered using a debt beta of 0.075 (midpoint of the CAA's H7 range).[40]

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[36]   Aena (2024), *Fact Sheet* ([link]).

[37]   Groupe ADP (2024), *About us* ([link]) and *Airport Network* ([link]).

[38]   Fraport Group (2024), *About us* ([link]).

[39]   Flughafen Zürich AG (2024), *Our portrait* ([link]).

[40]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, ¶9.90 ([link]).

2.33   The CAA followed a three-step approach for determining the asset beta for H7:[41]

(1) Estimate a pre-pandemic asset beta.

(2) Estimate the impact of the pandemic on the asset beta.

(3) Estimate the impact of the traffic risk sharing mechanism ("**TRS**") introduced as part of H7.

2.34   The approach reflected the CAA's view that while data from within the Covid-19 period should not be disregarded, it should be appropriately weighted to account for the fact that such pandemics are an infrequent occurrence. It also reflected the fact that comparator airports were not subject to mechanisms similar to the TRS, and therefore an adjustment needed to be made when inferring HAL's asset beta from the listed comparators.[42]

2.35   The CAA's approach to estimating the asset beta was challenged by airlines and HAL through appeals to the CMA. In its Final Determination, the CMA assessed that the CAA was not wrong in law, in fact, or in exercise of its discretion in selecting this approach and in the various judgements it made as a part of its methodology.[43]

2.36   The CAA also made an assessment of the debt beta and the notional gearing in H7. It assumed a range of 0.05-0.10 for HAL's debt beta, in line with recommendations from its consultants.[44] The CAA continued to assume a notional gearing of 60%, as it did in the previous price control.[45]

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[41]   CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation*, ¶¶9.145 – 9.161 (link).

[42]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues,* ¶¶9.27 – 9.30 (link).

[43]   CMA (2023), *H7 Heathrow Airport Licence Modification Appeals: Final Determinations,* ¶6.158 and ¶6.246 (link).

[44]   The lower bound of the range assumes that there is no difference in debt beta between HAL and its comparators, and the upper bound reflects the view that HAL's higher gearing implies a higher debt beta relative to comparator airports. See CAA (2022), *H7 Final Proposals*, *Section 3: Financial issues and implementation*, ¶9.180 (link), and see CAA (2021), *Initial Proposals, Section 2: Financial issues,* ¶9.99 (link).

[45]   CAA (2022), *H7 Final Proposals*, *Section 3: Financial issues and implementation*, ¶¶12.22 – 12.24 (link).

Estimate of pre-pandemic asset beta

2.37   The CAA determined that the pre-pandemic asset beta was 0.50, in line with its determination in HAL's previous price control ("**Q6**").[46]

2.38   The CAA's Q6 determination was below the contemporaneous comparators' asset betas and in line with the estimates in the preceding price control (which was based on the share price of BAA plc, the listed precursor to HAL). The CAA justified this on the basis that it did not see any material changes in the risk of HAL relative to the UK economy and attributed the difference between HAL's asset beta and that of comparators to the fact that HAL had "strong demand and was operating closer to capacity" (and hence was lower risk).[47]

2.39   However, in H7, the CAA determined that the pandemic had narrowed this observed risk differential between HAL and the comparator airports, as HAL was no longer operating closer to capacity than the listed comparators.[48] On this basis, the CAA increased the asset beta range to be in line with that of listed comparators, resulting in a baseline asset beta range of 0.50-0.60.[49]

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[46]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, ¶9.45 ([link]).

[47]   CAA (2014), *Estimating the cost of capital: technical appendix for the economic regulator of Heathrow and Gatwick from April 2014*, ¶6.24 ([link]).

[48]   CAA (2022), *H7 Final Proposals, Section 3: Financial issues and implementation*, ¶9.52 ([link]).

[49]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues*, ¶9.58 ([link]).

Estimate of the impact of the pandemic on HAL's asset beta

2.40   The CAA estimated the impact of the pandemic on HAL by using evidence from the listed comparators. The CAA's approach was to:

(1) Estimate the asset beta for a broader set of comparator airports[50] using a modified OLS regression, in which a lower weight was applied to pandemic-period observations relative to pre-pandemic observations. The weight on the pandemic data reflected the assumed frequency with which pandemic-like events might occur in the future (once every 20-50 years), and their duration (17-39 months).[51] The cut-off date for the data used in the regression was 31 March 2022.[52]

(2) The asset beta calculated using the approach above was compared with the asset beta calculated by applying a weight of zero on the pandemic-period observations to obtain the impact of the pandemic on the estimated asset betas for each comparator airport.

2.41   The CAA used different durations and frequencies of future pandemic-like events to inform the bounds of its Covid-19 adjustment. Specifically, the lower bound of the Covid-19 adjustment was based on the shortest assumed duration (17 months) of future pandemic-like events with the lowest assumed frequency (once every 50 years), and the upper bound was based on the longest assumed duration (39 months) of future pandemic-like events with the highest assumed frequency (once every 20 years).

2.42   The CAA estimated the impact of the pandemic on the asset beta using its 'preferred comparator', AENA, with a cross-check using a wider comparator set. This is set out in Table 2-3 below.

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[50]   AENA, ADP, Fraport, FHZN, Vienna and Sydney.

[51]   The range of durations (17-39 months) is a function of the assumed actual length of the pandemic based on the start date and the assumed end date. In H7, Flint assumed the length of the pandemic to be 26 months (with the pandemic beginning at 1 Feb 2020, and assumed to end at 31 March 2022). The lower bound was then calculated by applying a factor of 0.67 to the assumed duration (i.e., 26 × 0.67 = 17). Similarly, a factor of 1.5 was applied for the upper bound (i.e., 26 × 1.5 = 39). See Flint (2023), *Support to the Civil Aviation Authority: NR23 Updated Beta Assessment*, page 22 (link), in which Flint carry forward their approach in H7 and describe it in further detail.

[52]   Flint (2022), *Support to the Civil Aviation Authority: H7 Updated Beta Assessment,* Section 3 (link).

Table 2-3: Breakdown of calculation of pandemic effect on HAL asset beta

		Guide	AENA	4 company
Lower bound (pandemic once in 50 years, 17-month duration)		A	0.53	0.55
Upper bound (pandemic once in 20 years, 39-month duration)		B	0.62	0.62
Zero weight on pandemic		C	0.51	0.53
Lower bound pandemic effect		A – C	**0.02**	0.02
Upper bound pandemic effect		B – C	**0.11**	0.10

Source: Flint, Support to the Civil Aviation Authority, H7 Updated Beta Assessment, Table 9 (link), and FTI analysis.
Note: Beta pandemic effect was calculated with a cut-off date of 31 March 2022. The values in the table have been rounded to the second decimal place.

2.43 This resulted in a Covid-19 adjustment of 0.02 – 0.11, which was added to the pre-pandemic range, resulting in an asset beta range of 0.52 – 0.71 for HAL.[53]

Estimating the impact of the TRS

2.44 The final adjustment to the asset beta range reflects the potential reduction in the risks faced by HAL (relative to its comparators) as a result of the TRS mechanism introduced in H7.

2.45 The CAA introduced this mechanism to mitigate HAL's exposure to the risks associated with outturn passenger numbers ("**traffic**") differing significantly from the CAA's forecast traffic when setting the price control.

2.46 Forecasts of traffic are an important component in determining HAL's aeronautical charges as HAL operates under a price cap regime.[54] Prior to the implementation of the TRS mechanism, HAL would bear all the risk in the event that outturn traffic was different from forecast levels, as it could not adjust airport charges to reflect outturn passenger numbers during the price control. This meant that if HAL's outturn passenger numbers were lower than forecast, it would be exposed to all the losses as it could not increase its price cap to offset the lower volumes and cover the revenue shortfalls.

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[53] CAA (2022), *H7 Final Proposals, Section 3: Financial issues and implementation*, ¶¶9.150 – 9.152 (link).

[54] A price cap regime caps the level the licensee(s) can charge on a per unit basis, but volume risk normally sits with the licensee.

2.47   Given the impact of the Covid-19 pandemic on passenger traffic, the TRS mechanism was designed to both:[55]

- protect HAL from significant financial losses if passenger numbers fell below expected levels (by increasing future airport charges to cover lost revenues); and

- protect airlines and passengers from excessive charges if passenger numbers exceeded forecasts by decreasing future airport charges to cover the over-recovery of revenue.

2.48   It does so by allocating traffic risk between HAL and airlines according to specific parameters. Specifically:

- in the event that outturn traffic and forecast traffic differ by up to 10% of forecast traffic for that year, 50% of the difference will be shared between HAL and airlines; and,

- in the event that outturn traffic and forecast traffic differ by more than 10% of forecast traffic for that year, 105% of the difference will be shared between HAL and airlines.

2.49   We demonstrate the impact on HAL's aeronautical revenues (i.e., passenger numbers multiplied by the maximum allowed airport charge) below.[56]

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[55]   For additional detail on the mechanism, see CAA (2023), *Economic Regulation of Heathrow Airport: H7 Final Decision Section 1: Regulatory Framework*; ¶¶2.20 – 2.23 (link).

[56]   Commercial revenues are not included as part of the TRS. We understand the impact of volumes on commercial revenues influences the calibration of the sharing factors applied as part of the TRS mechanism.

Figure 2-2: HAL outturn aeronautical revenues vs. allowed (forecast) aeronautical revenues
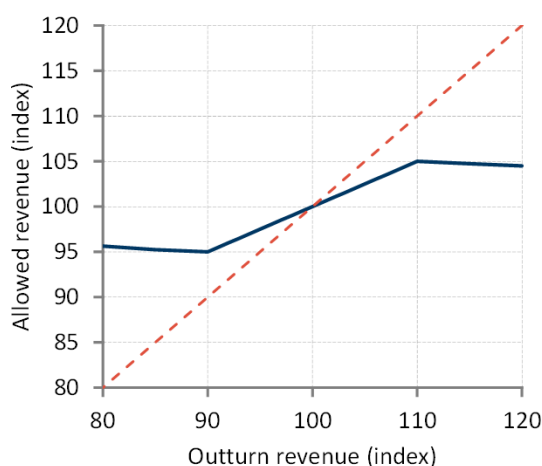
Source: FTI analysis

Note: The red dotted line illustrates indexed outturn revenue without the TRS mechanism, while the solid blue line illustrates indexed HAL revenues following the implementation of the TRS mechanism (with forecast revenues indexed at 100).

2.50   As demonstrated in the figure above, the TRS mechanism reduces HAL's exposure to traffic risk. As the listed comparators used to estimate HAL's asset beta did not have a mechanism like the TRS in their regulatory regimes, the listed comparator asset beta estimates needed to be adjusted in order to make them consistent with HAL's risk exposure.

2.51   To calculate the size of the adjustment, the CAA quantified HAL's exposure to traffic risk as the difference in the beta estimate for HAL (0.52 to 0.71) and the average beta for regulated network utilities in the water and energy sectors (0.34).[57] The difference between these estimates is 0.18 to 0.37.

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[57]   The CAA's view was that "the principal driver of the difference in asset betas between HAL (at present) and network utilities is the exposure of HAL to volume risk". See CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation*, ¶¶9.154 – 9.155 (link).

2.52   There are other differences between HAL and the regulated network sectors (such as regulatory regime, level of operating leverage, and counterparty risk). To account for this, the CAA attributed 90% of the lower bound of the difference between the beta estimates to traffic risk. Similarly, the CAA attributed 50% of the upper bound of the difference to traffic risk.[58] This implied that 0.16 to 0.19 of the asset beta reflected HAL's exposure to traffic risk.[59]

2.53   In recognition that the TRS mechanism only protects HAL from some of the traffic risk in the sector, the CAA assumed that only 50% of this traffic risk exposure was mitigated by the TRS mechanism.[60] Therefore, the CAA estimated that the TRS mechanism reduced HAL's asset beta by 0.08 to 0.09, as illustrated in Table 2-4 below.

Table 2-4: H7 TRS adjustment to post-pandemic airport asset betas

Component	Guide	Lower bound	Upper bound
HAL pre-pandemic asset beta	A	0.50	0.60
Pandemic effect uplift	B	0.02	0.11
Post-pandemic, pre-TRS asset beta	**C = A + B**	**0.52**	**0.71**
Network utility asset beta	D	0.342	0.342
Volume risk component of gap	E	90%	50%
Proportion of volume risk mitigated by TRS	F	50%	50%
TRS adjustment	**G = (C – D) × E × F**	**0.08**	**0.09**
H7 asset beta	**H = C – G**	**0.44**	**0.62**

Source: CAA (2022), H7 Final Proposals Section 3: Financial issues and implementation, ¶¶9.158 – 9.159 (link).
Note: The pre-pandemic asset beta had been estimated using data up to 28 February 2020.[61] The pandemic effect uplift had been estimated using data up to 31 March 2022.[62]

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[58]   CAA (2022), *H7 Final Proposals*, *Section 3: Financial issues and implementation*, ¶9.158 (link).

[59]   For the lower bound, 0.52 – 0.34 = 0.18; 90% of 0.18 is 0.16. For the upper bound, 0.71 – 0.34 = 0.37; 50% of 0.37 is 0.19.

[60]   CAA (2022), *H7 Final Decision*, *Section 3: Financial issues and implementation*, ¶9.85 (link).

[61]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues*, Table 9.3 (link).

[62]   Flint (2022), *Support to the Civil Aviation Authority: H7 Updated Beta Assessment*, page 24 (link).

2.54   The combination of the pre-pandemic beta and the two adjustments to reflect the impact of the pandemic effect and the implementation of the TRS mechanism resulted in an estimated asset beta range of 0.44 to 0.62 for H7.

Updated evidence

2.55   In updating the H7 methodology, we were required to make assumptions regarding the length of the pandemic in updating the asset beta and determining how to treat any post-pandemic data. Post-pandemic data likely accounts for investors' expectations regarding the likelihood and impact of a future pandemic given recent experience during the Covid-19 pandemic. Our review of post-pandemic data suggests more recent beta estimates are higher than those prior to the pandemic due to updated perceptions regarding the risks that airports may face.[63]

2.56   However, for the purposes of this update, we have treated post-pandemic data equivalently to pre-pandemic data in line with Flint's approach to estimating the asset beta for NATS (En Route) plc ("**NERL**") in the CAA's price control determination for the 2023-2027 period (**"NR23"**).[64] Flint's report for NR23 provides the latest available precedent for how to update the H7 approach following the end of the pandemic as the same approach was adopted for both price controls.

2.57   This methodology is otherwise unchanged from H7. Figure 2-3 illustrates the data that is available and the extent to which it was impacted by Covid-19.

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[63]   We discuss this further in Section 3C.

[64]   NERL provides en route air traffic services in the UK. It is regulated by the CAA. In 2020, following the appeal of the previous price control for NERL (RP3) and the onset of the Covid-19 pandemic, the CMA asked the CAA to set out a price control determination for the 2023-2027 period. The CAA engaged Flint to estimate NERL's beta as part of NR23. See CAA (2023), *Economic Regulation of NATS (En Route) plc: Final Decision for the NR23 (2023 to 2027) price control review* (link).

Figure 2-3: Daily adjusted closing share price (€) between 2017 and 2024
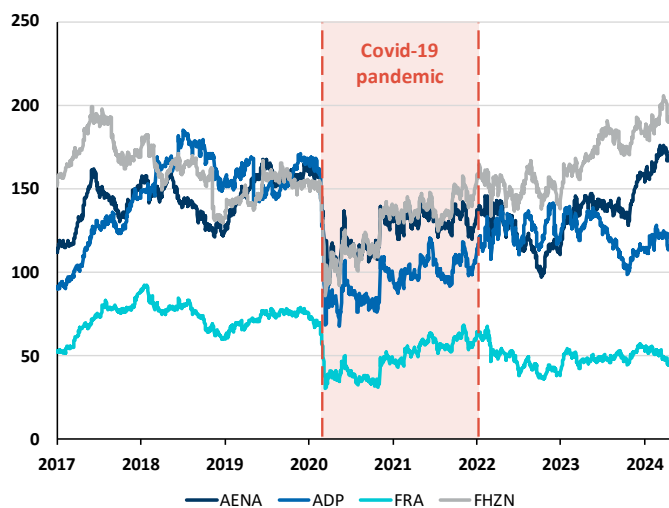
Source: S&P Capital IQ

Note: (1) The closing price is adjusted for dividends and stock splits. (2) FHZN trades in Swiss Francs ("CHF") and has been converted to Euros for ease of comparison. This conversion has been done by the data provider (S&P Capital IQ) using the spot conversion rate from CHF to EUR on each day.

2.58   To update the estimate of the asset beta, we continue to use the CAA's H7 range for the pre-pandemic asset beta (0.50 - 0.60) but update the adjustments that reflect the impact of the pandemic and the impact of the TRS mechanism.

2.59   We update the estimate for the effect of the pandemic on the HAL asset beta by:

(1)   Accounting for data up to 31 July 2024.

(2)   Assuming the pandemic period started as specified by Flint in H7 and ended in 31 December 2021[65], in line with Flint's assumption in NR23.[66]

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[65]   We conducted a sensitivity on the pandemic end date by applying a pandemic end date of 5 May 2023 (based on the date when the WHO declared that Covid-19 was no longer a 'Public Health Emergency of International Concern'). See Appendix 3.

[66]   See Flint (2023), *Support to the Civil Aviation Authority: NR23 Updated Beta Assessment*, page 21 (link).

2.60   The change in the pandemic end date represents a shift in approach from H7. In particular, while the approach in H7 considered all data post February 2020 to be 'Covid-19 affected', the NR23 approach suggests that data after December 2021 can be considered to be unaffected by Covid-19. This was based on Flint's assessment that the comparators' asset betas had reverted to pre-Covid-19 levels by December 2021, and that the data following December 2021 was no longer affected by Covid-19.[67]

2.61   Table 2-5 summarises the assumptions made in the H7 analysis and in this update.

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[67]   See Flint (2023), *Support to the Civil Aviation Authority: NR23 Updated Beta Assessment*, pages 9 – 12 (link). In addition to the change in the method for estimating the impact of Covid-19 on asset betas, Flint also updated the estimate of the 'baseline' (in this report, 'pre-pandemic') asset beta for NERL by including data from after 31 December 2021 in its estimates. In the context of H8, we do not see grounds for revising the H7 approach to estimating HAL's pre-pandemic asset beta. We note that the range for spot betas for the comparator airports with a weight of zero on pandemic data is 0.53 – 0.57, which lies within our pre-pandemic beta range of 0.5 – 0.6. This method was one of the determinants of the new baseline asset beta range for NERL in Flint's report. See Appendix 3 for an assessment based on an alternative pandemic end date.

Table 2-5: Summary of assumptions made in H7 and in our estimate of the H8 early view

	H7	H8 early view *Based on H7 methodology using updated data*
Extent of dataset		
Start date	12 February 2015	12 February 2015
End date	31 March 2022	31 July 2024
Assumed Covid-19 affected data		
Start date	1 February 2020	1 February 2020
End date	31 March 2022	31 December 2021
Assumed pandemic duration ranges		
Base case (= assumed duration of pandemic)	26 months	23 months
Lower bound (= base case × 0.67)	17 months	15 months
Upper bound (= base case × 1.5)	39 months	35 months
Assumed pandemic frequency ranges		
Lower bound	1 in 50 years	1 in 50 years
Upper bound	1 in 20 years	1 in 20 years

Source: Flint, Support to the Civil Aviation Authority: H7 Updated Beta Assessment, Table 5 and Table 6 (link); Flint, Support to the Civil Aviation Authority: NR23 Updated Beta Assessment, pages 21 – 23 (link); and FTI assumptions.

2.62 These updates suggest that the impact of the pandemic on the comparators' asset beta ranges from 0.02 to 0.09, which is a narrower range than that estimated at H7.

2.63   Similarly, we have calculated the impact of the TRS mechanism on the beta by accounting for the latest decisions in the water and energy sectors (PR24 DD[68] and RIIO-3 SSMD[69]). These recent regulatory announcements imply that the reduced traffic risk exposure of HAL relative to its comparators requires that its asset beta is adjusted to be 0.08 – 0.09 lower, which is consistent with the value used for H7.[70]

2.64   We summarise our updated beta estimation for HAL in Table 2-6 below.

Table 2-6: Comparison of asset beta range estimates in H7 and the H8 early view

Component	Guide	H7	H8 early view *Based on H7 methodology using updated data*
HAL pre-pandemic asset beta	A	0.50 - 0.60	0.50 - 0.60
Impact of the pandemic on comparator airports' asset betas	B	0.02 - 0.11	0.02 - 0.09
Impact of the TRS	C	(0.08) - (0.09)	(0.08) - (0.09)
Asset beta	**A + B + C**	**0.44 - 0.62**	**0.44 - 0.61**

Source: CAA (2022), H7 Final Proposals Section 3: Financial issues and implementation, Table 9.2 (link), and FTI analysis.

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[68]   Ofwat (2024), *PR24 Draft determinations: Aligning risk and return – Allowed return appendix,* Table 1 (link).

[69]   Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex*, ¶3.216 (link).

[70]   We calculate this adjustment using the difference between the pre-TRS, post-pandemic asset beta (0.52 – 0.69) and the updated average of electricity transmission and water sector (network utility) asset betas (0.338). The difference is estimated to be 0.18 – 0.36 (compared to 0.18 – 0.37 in H7). We apply the assumptions set out in the H7 methodology regarding the proportion of the difference in betas that is attributable to traffic risk (50% – 90%) and the proportion of traffic risk mitigated by the TRS (50%), as discussed in ¶¶2.51 – 2.53. This leads to a final impact of the TRS of 0.08 – 0.09, consistent with the impact in H7.

D. TMR

2.65   The TMR reflects the expected total return an investor requires for holding the 'market portfolio' (a diversified basket of securities). Within the CAPM framework, as described previously in this report, the difference between the TMR and risk-free rate represents the 'equity risk premium' ("**ERP**"),[71] i.e.,

$$ERP = TMR - RfR$$

Where ERP is the ERP, RfR is the risk-free rate and TMR is the TMR.

2.66   In the UK, regulators in recent price controls have assumed that the TMR is more stable than the ERP.[72] This is referred to as the 'stable TMR hypothesis'. Practically, this results in the ERP being determined by subtracting the risk-free rate from the TMR, while the TMR and risk-free rate are estimated directly from market data.

2.67   The UKRN guidance recommends that regulators continue to adopt the 'stable TMR' approach and should place weight on both historical ex-post[73] and ex-ante[74] approaches in estimating TMR ranges.[75]

CAA H7 Determination

2.68   For H7, the CAA adopted the midpoint of the CMA's PR19 range (5.85% in RPI-deflated terms) as its estimate of the TMR.[76] This was consistent with HAL's proposed approach.

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[71]   The ERP reflects the additional return that investors require for investing in risky assets compared to a risk-free asset, such as government bonds.

[72]   This is based on the observation that total equity returns are more stable than the excess return of equities over government bonds (a proxy for the ERP).

[73]   'Historical ex-post' approaches estimate the TMR using observed historical equity returns as a proxy for investors' current expectations.

[74]   'Historical ex-ante' approaches estimate the TMR using observed historical equity returns but include adjustments to the market data to account for historical circumstances that may not repeat.

[75]   UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, page 20 and 21 (link).

[76]   CMA (2023), *H7 Heathrow Airport Licence Modification Appeals: Final Determinations,* Table 9.6 (link).

2.69   The CAA did not make any direct adjustments to the TMR for the high level of forecast inflation in H7, as this was reflected in other methodological decisions made in determining the WACC.[77]

Updated evidence

2.70   When the TMR was set by the CMA as part of the PR19 determination and subsequently adopted by the CAA for H7, expected long-run RPI inflation was 2.9% with an expected difference between RPI and CPI of 0.9% (referred to as the 'RPI-CPI wedge').[78]

2.71   However, and as described earlier, RPI is expected to align with CPIH from 2030 onwards. This has implications for both the long-term expectations for RPI and the RPI-CPI wedge.

2.72   The change in RPI and the RPI-CPI wedge is unlikely to change investors' expected returns in nominal terms. Consequently, if we were to combine the H8 long-term measure of RPI with the H7 RPI-deflated TMR, we would be combining inconsistent inflation and TMR measures. This is likely to be downward biased in nominal terms and therefore will not be reflective of investors' expected returns in nominal terms (as demonstrated in Figure 2-4 below).

Figure 2-4: Stylised example to demonstrate the changes in nominal TMR
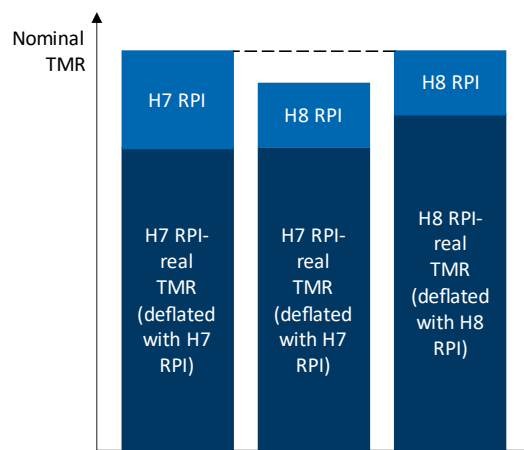
Source: FTI visualisation.

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[77]   As discussed, best-practice regulatory guidance has concluded that a stable TMR remains the appropriate approach. The CAA aligned with this consensus approach to the TMR in its determination.

[78]   CMA (2023), *H7 Heathrow Airport Licence Modification Appeals: Final Determinations* Table 7.1 (link).

2.73   The issue of a changing RPI definition has previously been handled by regulators through the use of a 'formula effect'.[79] We adopt a similar approach in adjusting the H7 TMR to ensure consistency with the H8 long-term expected RPI:

- take the CMA's CPI-deflated TMR value of 6.81% — calculated assuming a RPI-CPIH wedge of 0.90% at the time of the determination;

- update this estimate using our projected H8 RPI-CPI wedge of 0.05% (as calculated using the methodology employed by Ofgem for the RIIO-3 SSMD, and as explained below); and

- deflate the CPI-deflated estimate of the TMR using this wedge to calculate the RPI-deflated TMR of 6.75%.

2.74   The RPI-CPIH wedge for H8 was calculated using the geometric mean of the difference between the forecast RPI and CPI over the 20 years following the start of the H8 period.[80]

2.75   As OBR estimates for RPI are not available beyond 2028, we have assumed the same inflation profile as in Table 2-1. This results in a RPI-CPI wedge of 0.05% as indicated in the table below.

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[79]   The 'formula effect' refers to the impact of the change in computation of the RPI in 2010 and how it affects the comparison between RPI-deflated returns pre-2010 to RPI-deflated returns after 2010. Ofgem estimated a formula effect of 40 bp for Windows 1 and 2 of the Interconnector Decisions for the Cap and Floor regime, i.e., it reduced the RPI-deflated historical returns by 40 bp to reflect the change in RPI definition. See Ofgem (2021), *Interconnector Cap and Floor Regime Handbook*, Table 13 (referred to as a 'fixed RPI adjustment') (link).

[80]   The averaging period of 20-years aligns with the typical investment horizon in the sector.

Table 2-7: RPI and CPI forecasts as used to calculate the RPI-CPI wedge

Metric	20-year average forecast RPI	20-year average forecast CPI	Implied wedge
Guide	*A = GA (1 + RPI/100) - 1*	*B = GA (1 + CPI/100) - 1*	*(1+A)/(1+B) - 1*
2027	2.12%	1.98%	0.14%
2028	2.09%	2.00%	0.09%
2029	2.04%	2.00%	0.04%
2030	2.00%	2.00%	0.00%
2031	2.00%	2.00%	0.00%
GA of Implied Wedges			0.05%

Source: OBR (2024), March 2024 Economic and fiscal outlook – charts and tables: Annex A, Sheet TA.1 (link); and FTI analysis.
Note: GA indicates the use of geometric averages.

2.76 This approach results in an implied RPI-deflated TMR estimate of 6.75%.

E. Cost of embedded debt

2.77 Embedded debt refers to the existing debt prior to the start of the price control (i.e., by 31 December 2021, in the case of H7). Regulators include an allowance to cover the interest cost associated with this debt.

2.78 When setting the cost of embedded debt, regulators typically consider a range of factors such as the choice of a benchmark index, the averaging period and the characteristics of the debt.[81]

CAA H7 Determination

2.79 In H7, the CAA estimated the cost of fixed-rate and index-linked embedded debt separately, and we discuss each approach in turn below.

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[81] UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, pages 31 – 32 (link).

Fixed-rate debt

2.80   The CAA estimated the real cost of fixed-rate embedded debt by:[82]

- First, calculating a long-term average (from August 2008 to December 2021) of the average market yields on the iBoxx £ Non-Financials A-rated and BBB-rated indices as the benchmark. This averaging period was selected to reflect the actual issuance profile for HAL's existing Class A debt.[83]

- Second, adding a HAL-specific premium of 8 bps based on the observed actual spreads of HAL's Class A bonds over the relevant indices. The CAA only included Class A debt in the calculation of this premium as it considered this class of debt the most relevant for the notional company.

- Finally, deflating the resulting nominal yield using the in-period forecast RPI over the H7 period based on the March 2022 OBR Economic and Fiscal Outlook.

2.81   We present these values in Table 2-8 below.

Table 2-8: Final determination of the cost of fixed-rate embedded debt for H7

Metric	2022	2023	2024	2025	2026	Average
Nominal yield based on iBoxx data	4.14%	4.14%	4.14%	4.14%	4.14%	4.14%
HAL-specific premium	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%
RPI forecast	11.60%	10.70%	1.50%	(0.40%)	1.00%	4.88%
Real cost of fixed-rate embedded debt	(6.61%)	(5.85%)	2.68%	4.64%	3.19%	(0.39%)

Source: CAA (2022), H7 Final Proposals Section 3: Financial issues and implementation, Table 9.7 ([link]).

Note: (1) The averages above are simple averages. For the weighted averages, please see Appendix 2.

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[82]   CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation*, ¶¶9.306 – 9.308 ([link]).

[83]   CAA considered HAL's Class A debt as the most suitable approximation for the notional entity. See CAA (2021), H7 Initial Proposals, Section 2: Financial issues, ¶9.158 ([link]).

Index-linked debt

2.82   The CAA estimated the real cost of index-linked embedded debt by:

- using the same nominal cost of debt as for fixed-rate debt (including the HAL-specific premium); and

- deflating the resulting nominal yield using an estimate of historical long-term RPI inflation expectations of 2.73%, as calculated by the CAA.

2.83   The CAA initially included an index-linked premium of 15 bps in its estimate of the cost of embedded index-linked debt, but this was rescinded following the CMA appeal.[84]

2.84   We present the final H7 values in Table 2-9 below.

Table 2-9: Final determination of the cost of index-linked embedded debt for H7

Metric	Guide	Average over period
Nominal yield based on iBoxx data	A	4.14%
HAL-specific premium	B	0.08%
CAA measure of long-term RPI	C	2.73%
Real cost of index-linked embedded debt	D = (1+ (A+B)) / (1+C) − 1	1.45%

Source: CAA (2022), H7 Final Proposals Section 3: Financial issues and implementation, Table 9.8 (link).

2.85   The CAA assumed a 30% weighting on index-linked debt and a 70% weighting on fixed-rate debt in its calculations to determine the cost of allowed embedded debt during the H7 price control period.

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[84]   CMA (2023), *H7 Heathrow Airport Licence Modification Appeals: Final Determinations*, ¶¶7.305 – 7.306 (link).

Updated evidence

2.86 Setting the cost of debt for H8 is likely to be an involved process which includes considering the notional company's expected issuance over H8 and its existing debt portfolio. For the purpose of updating the estimated cost of embedded debt, we have updated the iBoxx indices and inflation indices, and have assumed the issuance profile for H8 follows the CAA's assumptions for issuance over the H7 period. This is a stylised approach and therefore it is likely the approach taken, and value set by the CAA for H8, will differ due to factors such as changes in market conditions and the notional company's actual issuance over H7.[85]

2.87 Our calculation of the nominal embedded cost of debt, based on our stylised approach is set out in Table 2-10 below.

Table 2-10: Estimation of the nominal cost of embedded debt for H8

Metric	Guide	Estimate
Nominal cost of embedded debt in H7 (incl. premium)	A	4.22%
Weight of embedded debt in final year of H7	B	76%
Nominal cost of new debt in H7	C	5.93%
Weight of new debt in final year of H7	D = (1 − B)	24%
Nominal cost of embedded debt in H8 (incl. premium)	E = A × B + C × D	4.64%

Source: FTI analysis. [A] sourced from CAA's WACC calculator ('Cost of Debt' sheet, average of cells F6 and F11), and [C] is the sum of the average yield on the iBoxx £ Non-Financials A and BBB 10+ year indices in July 2024 and the HAL-specific premium.

2.88 We deflate this estimate of the nominal cost of embedded debt using the inflation forecast for each year in the period in order to estimate the real cost of embedded debt.[86]

2.89 We compare our update to the value set out for H7 below.

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[85] We understand that the CAA is developing a mechanism to track the notional company's forecast issuance over future price controls.

[86] For more information regarding this approach, see ¶2.80 and Table 2-8,

Table 2-11: Comparison of updated H8 cost of embedded debt to H7 estimate

Metric	H7 Determination	H8 early view *Based on H7 methodology using updated data*
Real cost of embedded fixed-rate debt	(0.80%)	2.00%
Real cost of embedded index-linked debt	1.45%	1.87%
Real cost of embedded debt	(0.12%)	1.96%

Source: FTI analysis.

Note: (1) The values above represent the weighted average, based on the H7 issuance profile, across the entire period.[87] The CAA calculates the real cost of embedded debt in each year and calculates a weighted average on the basis of the new debt issuance profile (which impacts the weight of embedded debt in each year of the period). (2) We have presented H8 estimates in RPI-deflated terms for ease of comparison with the parameters as set in H7. However, we do not consider this as an appropriate basis for comparison given the expected change in RPI definition from 2030 (partway through H8).[88]

2.90   Our estimate for the cost of embedded debt is 1.96%. This is 208 bps higher than the H7 value. This is driven by changes in inflation forecasts and increases in real interest rates.[89]

F. Cost of new debt

2.91   The process and considerations for evaluating the cost of new debt are similar to those for estimating the cost of embedded debt, and therefore regulators often adopt the same benchmark and characteristics for new and embedded debt but change the averaging period of the index yields. The estimated cost of new debt normally uses a shorter average of the index yield to reflect that more recent data is relevant for new debt whereas the opposite is true for embedded debt.

2.92   We discuss the approach adopted by the CAA to estimate the cost of new debt below.

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[87]   The CAA presented simple averages in the H7 final decision, therefore the figures presented in this table (which utilise weighted averages) will not match what the CAA previously presented and the figures in Table 2-8, and in Table 2-9.

[88]   We present the CPI-equivalent values for these parameters in Section 3.

[89]   We discuss the impact of inflation and interest rates on these parameters in greater detail in Appendix 2.

CAA H7 Determination

2.93   For H7, the CAA estimated the cost of fixed-rate and index-linked new debt separately.

2.94   In order to reflect the uncertainty in setting the cost of new debt for a five-year period, the CAA introduced a cost of new debt mechanism which adjusts the cost of new debt allowance to reflect outturn interest rates and inflation. The CAA will ex-post reflect any differences between the allowance and the outturn data by adjusting the opening RAB for H8.

Fixed-rate debt

2.95   The CAA estimated the real cost of fixed-rate new debt by:[90]

- estimating the average yield on HAL's Class A bonds for 2022, and from 2023 onwards, calculating a short-term average of the observed yields on the iBoxx £ Non-Financials BBB-rated indices as the benchmark;[91]

- adding a new issue premium of 15 bps for 2022,[92] and from 2023 onwards, also including a HAL-specific premium of 11 bps resulting in a total premium of 26 bps;[93]

- deflating the resulting nominal yield using the in-period forecast RPI over the H7 period based on the March 2022 OBR Economic and Fiscal Outlook.

2.96   We present these values in Table 2-12 below.

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[90]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, Table 9.4 (link).

[91]   The CAA's decisions on the averaging period and use of benchmark indices were based on the average tenor and credit rating of HAL's existing debt profile.

[92]   The HAL-specific premium of 11 bps is not included in estimating the uplift for 2022 as it is already implicitly included in the yield on HAL's Class A bonds.

[93]   Calculated using the weighted average spread of HAL's bonds over the average yield of iBoxx £ Non-Financials A and BBB-rated 10+ year indices.

Table 2-12: Final determination of the cost of new fixed-rate debt for H7

Metric	2022	2023	2024	2025	2026	Average
Nominal cost of new fixed-rate debt	4.24%	5.71%	5.71%	5.71%	5.71%	5.42%
HAL-specific premium	0.15%	0.26%	0.26%	0.26%	0.26%	0.24%
RPI	11.60%	10.70%	1.50%	(0.40%)	1.00%	4.88%
Real cost of new fixed-rate debt	(6.46%)	(4.27%)	4.41%	6.40%	4.93%	1.00%

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.4 (link).

Note: (1) The averages above are simple averages. For the weighted averages, please see Appendix 2.

Index-linked debt

2.97 The CAA estimated the real cost of index-linked new debt by:[94]

- adopting the same nominal cost of index-linked new debt as for fixed-rate new debt (including the new issue and HAL-specific premia); and

- deflating the resulting nominal yield using an estimate of long-term, forward-looking inflation as calculated by the CAA.

2.98 As for embedded debt, the CAA had initially included an index-linked premium of 15 bps in the estimate of the real cost of new index-linked debt, but this was removed following the CMA appeal.

2.99 We present these values in Table 2-13 below.

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[94] CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, Table 9.5 (link).

Table 2-13: Final determination of the cost of new index-linked debt for H7

Metric	2022	2023	2024	2025	2026	Average
Nominal cost of new fixed-rate debt	4.24%	5.71%	5.71%	5.71%	5.71%	5.42%
HAL-specific premium	0.15%	0.26%	0.26%	0.26%	0.26%	0.24%
Long-term inflation assumption	2.84%	2.36%	1.93%	1.95%	2.07%	2.23%
Real cost of new index-linked debt (cumulative)	1.50%	2.86%	3.47%	3.73%	3.75%	3.06%

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.5 (link)

Note: (1) The averages above are simple averages. For the weighted averages, please see Appendix 2. (2) The calculation of the cumulative real cost of new index-linked debt accounts for the cost of new index-linked debt issued in previous years. The calculation takes the weighted average of the cost of new index-linked debt in each prior year (including the year to which the calculation relates), weighted by the new debt raised in each year as a proportion of total new debt raised up to that point in the price control.

Updated evidence

2.100   We have updated the iBoxx indices and inflation forecasts as of 31 July 2024 to reach an updated cost of new debt estimate of 3.65%. This is a decrease of 52 bps from H7 and is driven by changes in interest rates and inflation forecasts.[95]

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[95]   We discuss the impact of inflation and interest rates on these parameters in Appendix 2.

Table 2-14: Comparison of H8 estimated cost of new debt to H7 estimate

Metric	H7 Determination	H8 early view *Based on H7 methodology using updated data*
Real cost of new fixed-rate debt	4.43%	3.63%
Real cost of new index-linked debt	3.58%	3.72%
Real cost of new debt	4.17%	3.65%

Source: FTI analysis.

Note: (1) The values above represent the weighted average metric, based on the H7 issuance profile, across the entire period. (2) We have presented H8 estimates in RPI-deflated terms for ease of comparison with the parameters as set in H7. However, we do not consider this as an appropriate basis for comparison given the expected change in RPI definition from 2030 (partway through H8).[96]

G. Issuance and liquidity costs

2.101 Issuance and liquidity costs are additional costs linked to issuing debt, beyond the costs of servicing the debt such as interest costs. Issuance costs are one-time transaction costs, such as advisor fees, incurred at the time of issuing debt. Liquidity costs refer to costs associated with maintaining committed facilities used to repay the bond principal when due and to fund capital expenditures.[97]

CAA H7 Determination

2.102 In H7, the CAA determined issuance costs for the notional company using third-party evidence on network utilities. In particular, it used evidence from Europe Economics which estimated issuance costs for water companies between 1993 and 2007, with an estimated range of 3 to 5 bps. The CAA used the midpoint, 4 bps, as the allowance.[98]

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[96] We present the CPI/CPIH-equivalent values for these parameters in Section 3.

[97] CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation,* ¶9.355 (link).

[98] CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation,* ¶¶9.365 – 9.367 (link).

2.103   To calculate liquidity costs, the CAA conducted its own assessment, which resulted in liquidity costs of 7 bps.[99]

2.104   The CAA also provided HAL with an allowance to cover the cost of cash balances accumulated during the pandemic period to meet liquidity requirements. The rationale for the additional allowance was that the CAA considered it plausible that the notional company may have issued additional term debt and retained cash proceeds as a liquidity buffer over any period characterised by significant uncertainty (such as the pandemic). To account for this, the CAA included an allowance for debt service costs during the pandemic period, which amounted to 14 bps.

2.105   Overall, the issuance and liquidity costs allowance totalled 25 bps, which consisted of:[100]

- 4 bps for issuance costs;

- 7 bps for liquidity costs; and

- 14 bps for the pandemic liquidity cost allowance.

Updated evidence

2.106   At the time of preparing this report, there was insufficient information regarding the issuance and liquidity costs that HAL would incur in H8. We would expect these costs to be updated following the review of HAL's H8 business plan, which is expected as the H8 process progresses.

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[99]   For further detail on how the CAA estimated liquidity costs for the notional company, see CAA (2022), *H7 Final Proposals Section 3: Financial issues and implementation*, ¶¶9.368 – 9.379 (link).

[100]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, ¶¶9.187 – 9.190 (link).

2.107   For example, we would expect the pandemic liquidity cost allowance to be revisited based on whether HAL is still required to hold significant cash balances as part of normal business operations. We have observed that other regulators (both Ofwat and Ofgem) include similar allowances (referred to as liquidity and cost of carry) as part of recent determinations[101] and have not linked these to the impact of the pandemic. Updating this estimate requires a careful consideration of HAL's cash requirements during H8 and the cost associated with maintaining any cash balances.

2.108   Therefore, for the purposes of this report, given the nascent nature of the H8 process, we assume the same allowance from H7 of 25 bps in our update, which is added onto the cost of debt estimate.[102]

H. Implied WACC for H8 using the H7 methodology

2.109   We present the cumulative impact of our update to the H7 methodology reflecting latest market evidence and the implied WACC for H8 in Table 2-15 below.

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[101]   See Ofwat (2024), *PR24 Draft determinations: Aligning risk and return – Allowed return appendix*, p.81-82 (link) and Ofgem (2022), *RIIO-ED2 Final Determinations Finance Annex*, Table 5 (link).

[102]   CAA (2023), *H7 Final Decision Section 3: Financial issues and implementation*, ¶¶9.187 – 9.190 (link).

Table 2-15: WACC in H7 and in H8 update

Component	H7 Final Decision		H8 early view *Based on H7 methodology using updated data*	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	0.59%	0.59%	1.29%	1.29%
TMR	5.85%	5.85%	6.75%	6.75%
ERP	5.26%	5.26%	5.46%	5.46%
Asset beta	0.62	0.44	0.61	0.44
Debt beta	0.05	0.1	0.05	0.1
Equity beta	1.47	0.95	1.44	0.94
Post-tax cost of equity	8.32%	5.59%	9.14%	6.43%
Cost of new debt	4.17%	4.17%	3.65%	3.65%
Cost of embedded debt	(0.12%)	(0.12%)	1.96%	1.96%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	0.62%	0.62%	2.41%	2.41%
Vanilla WACC (RPI-deflated)	**3.70%**	**2.61%**	**5.10%**	**4.02%**
Midpoint (RPI-deflated)		**3.16%**		**4.56%**

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.6 (link); CAA (2024), Economic regulation of Heathrow airport: H7 final issues, ¶2.15 (link); FTI analysis.

Note: We have presented H8 estimates in RPI-deflated terms for ease of comparison with the parameters as set in H7. However, we do not consider this as an appropriate basis for comparison given the expected change in RPI definition from 2030 (partway through H8).[103]

2.110   As set out above, the midpoint of our estimated H8 RPI-deflated WACC range is c. 140 bps higher than the midpoint of the H7 RPI-deflated WACC range.

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[103]   We present the CPI-equivalent values for these parameters in Section 3.

2.111   Of this, c. 90% of the difference (c. 130 bps), is due to changes in expected
inflation (both the stabilisation of inflation expectations relative to the position in
2022 and the change in how RPI is calculated from 2030). The remaining portion
of the change in the WACC estimate is largely due to our assumption that HAL's
cost of embedded debt will increase because the new debt issued in H7 will be
more expensive than HAL's existing debt.[104]

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[104]   We discuss the impact of inflation and interest rates on these parameters in Appendix 2.

3.   Potential updates to the CAA's WACC methodology for H8

3.1   As discussed previously, the methodological decisions made by the CAA for H7 aimed to ensure accuracy and predictability in a time of significant uncertainty regarding both the operations of airports and capital market evidence.

3.2   Although there is ongoing uncertainty regarding the geopolitical context that the H8 determinations will be made in, present day conditions are similar to those observed prior to the pandemic, i.e., relatively stable capital market conditions and HAL operating at close to capacity. Therefore, it is relevant to consider the appropriateness of the H7 methodology within the H8 context.

3.3   Additionally, we are now able to better understand the impact of the pandemic on the aviation sector, with the CAA and stakeholders having access to more post-pandemic data.

3.4   In this section, we discuss potential considerations relating to updating, revising, or maintaining the current WACC calculation methodology for H8, based on our experience in similar matters and financial theory where relevant.

3.5   At this early stage in the H8 process, these considerations are primarily intended to provide grounds for discussion and consultation with stakeholders and should not be interpreted as the intended direction of travel for the H8 WACC methodology. It is also not intended to reflect an exhaustive list of issues — the CAA and other stakeholders might seek to explore other pertinent issues as well.

A. Framework for reviewing potential methodological updates

3.6   Based on our review of the H7 methodology, there is only one update which is required, which relates to inflation.

3.7   As part of the CAA's lessons learnt review of H7 and NR23, the CAA signalled that it would be transitioning from RPI to CPI or CPIH for the next round of price controls (H8 and NR28).[105] This change will impact several aspects of the price control including RAB indexation, cost of capital methodology and setting cost allowances. Even if the CAA had not proposed to change the basis for inflation away from RPI, changes to the CAA's approach to reflecting inflation in its cost of capital methodology would be required due to the planned alignment of RPI with CPIH from 2030.

3.8   Furthermore, given that the CMA found broadly in favour of the CAA's methodological choices during the H7 appeal, there are no other updates that can be classified as essential. However, we discuss potential updates to the CAA's methodology for H8 which may merit discussion amongst interested stakeholders (we classify these recommendations as 'discretionary').

3.9   The potential updates are summarised in Figure 3-1 below.

Figure 3-1: Classification of potential updates to the H7 methodology

Source: FTI analysis.

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[105]   CAA (2024), *Setting future price controls – lessons learnt from the review of approach*, ¶1.33 (link).

3.10 We assess all discretionary updates against five assessment criteria (broadly designed with reference to the CAA's statutory duties[106]), which are:

- **Accuracy,** which assesses the impact of the update on the precision of parameter estimation;

- **Regulatory precedent,** which reviews whether there is relevant and valid precedent for the proposed change from decisions made by other GB economic regulators;

- **Limit wider price control impacts,** which considers the impact of the update on other related aspects of the price controls, and therefore the incentives and risk-reward balance of the determination;[107]

- **Statistical robustness,** which, where possible and relevant, assesses whether the recommendation uses best practice in the interpretation of statistical data (it may not be possible to assess this for all suggestions); and

- **Practicality of implementation**, which assesses the trade-off of the potential benefits which may be derived from implementing the recommendation and the ease of implementing it.

3.11 Each criterion is evaluated on a binary basis, in that each criterion is deemed as fulfilled or not fulfilled. In cases where a clear determination cannot be made, no positive or negative designation is assigned.

3.12 We have carried out a preliminary assessment against these criteria, based on our expertise and experience of regulatory decision-making. We understand that the CAA and stakeholders will consider the potential discretionary updates further as part of the development of the H8 price control.

3.13 We discuss each update and our assessment of it in turn below.

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[106] The Civil Aviation Act 2012 states the CAA has a primary duty to further the interests of users of air transport services (where appropriate promoting competition). In performing these duties, it must have regard to a range of factors, including securing the financeability of licence holders and promoting economy and efficiency ([link](#)).

[107] If the recommendation requires no update or a minor update to the wider price control, we consider it to meet this criterion.

B. Required updates to the methodology

3.14   As discussed previously, the CAA's proposed transition from RPI to CPI or CPIH necessitates changes to the H7 cost of capital methodology. The CAA is yet to decide on whether it will move to CPI or CPIH. The choice of inflation basis does not materially impact the conclusions or analysis in this report, as regulators often assume CPI- and CPIH-deflated values are equivalent.[108]

3.15   The transition to either CPI or CPIH would affect the risk-free rate, the TMR, and the cost of debt. Other economic regulators (Ofgem, Ofwat and Ofcom) have transitioned from RPI to CPI or CPIH over previous price controls and we draw on these precedents where relevant and useful.

3.16   We discuss our estimates for each of these parameters in turn below.

Risk-free rate

3.17   The CAA calculated the RPI-deflated risk-free rate for H7 to be 0.59%. We estimate that following the same methodology would result in an estimate of 1.29% using a cut-off date of 31 July 2024.

3.18   A key measure of the risk-free rate used by the CAA at H7 was the yield on index-linked gilts, which are currently indexed to RPI. Therefore, these yields need to be converted to CPI or CPIH until RPI is aligned with CPIH from 2030.

3.19   Regulators normally convert RPI-deflated values to CPI or CPIH using a RPI-CPI or RPI-CPIH wedge.[109] As described earlier, we estimate the RPI-CPI or RPI-CPIH wedge to be 0.05%.

3.20   The convenience yield approach used by the CAA for H7 is not impacted by the change in inflation.[110]

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[108]   See footnote 17 and 123.

[109]   See ¶¶2.70 – 2.76.

[110]   This is because the convenience yield is estimated by comparing the nominal yield on bonds which already capture inflation expectations.

3.21   Therefore, this would imply a CPI/CPIH-deflated risk-free rate of 1.35% for the H8 early view. A similar conversion can be used for H7. Utilising the contemporaneous RPI-CPI/RPI-CPIH wedge assumed by the CMA for the PR19 redetermination[111], 0.90%,[112] implies a CPI/CPIH-deflated risk-free rate of 1.49% for H7.

3.22   We demonstrate the comparison between these estimates in Table 3-1 below.

Table 3-1: Impact of switch to CPI-deflated on H7 and H8 early view risk-free rate

Component	Guide	H7	H8 early view *Based on H7 methodology using updated data*
Risk-free rate (RPI-deflated)	F (see Table 2-2)	0.59%	1.29%
RPI-CPIH wedge	G	0.90%	0.05%
Risk-free rate (CPI-deflated)	H= (1 + F) × (1 + G) − 1	**1.49%**	**1.35%**

Source: FTI analysis.

Note: The cut-off date for the H7 analysis was 17 November 2022. For the H8 early view, we use a cut-off date of 31 July 2024.[113]

TMR

3.23   Similarly, the TMR must be updated to be in CPI/CPIH-deflated terms due to the change in the inflation basis for H8.

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[111]   During the previous round of price controls (PR19 and RIIO-2), regulators such as Ofwat, Ofgem and the CMA determined the RPI-CPIH wedge by comparing the RPI and CPI forecasts for the last projected year of available information. For both datasets, the last projected year of available information was prior to the convergence of RPI and CPIH (i.e., before 2030). As a result, the RPI-CPIH wedge was likely to be upwardly-biased relative to a methodology that relies on more than a decade of data where there is no difference between the two measures. Regulators have updated their approaches to estimate the RPI-CPIH wedge in their latest decisions (PR24 DD and RIIO-3 SSMD). However, to enable comparison between H7 and other regulatory decisions (PR19 and RIIO-2) on a CPI/CPIH-basis, we adopt contemporaneous assumptions for the RPI-CPI/CPIH wedge.

[112]   CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, ¶9.35 (link).

[113]   CAA (2023), *H7 Final Decision, Section 3: Financial issues and implementation*, ¶9.41 (link).

3.24   As discussed in Section 2, the CAA adopted the CMA's PR19 TMR for H7 (5.85% in RPI-deflated terms, 6.81% in CPIH-deflated terms).[114] The CMA's approach to setting the TMR was based on using historical RPI-deflated and CPI-deflated returns,[115] likely due to Ofwat adopting a split indexation of the regulatory capital value ("**RCV**") between RPI and CPIH in PR19.

3.25   Since then, other regulators (Ofgem, Ofwat and Ofcom) have focused on historical CPI-deflated returns only when setting the CPIH-deflated TMR.[116] This is consistent with UKRN guidance.[117]

3.26   Notwithstanding this methodological change, the H7 CPIH-deflated value is within the ranges specified by the UKRN, Ofwat in the recent PR24 determinations and Ofgem in the recent RIIO-3 SSMD, as shown in Figure 3-2 below.

Figure 3-2: Illustration of H7 TMR in the context of PR24, RIIO-3 SSMD, and UKRN TMR ranges, in CPI/CPIH-deflated terms
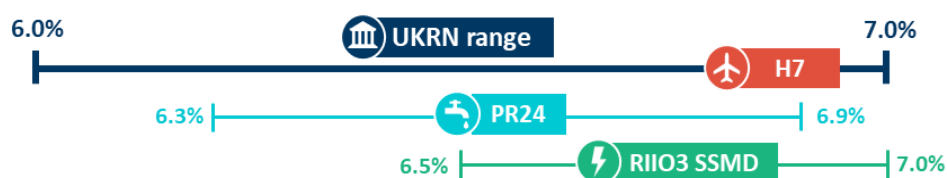
Source: UKRN (2018), Estimating the cost of capital for implementation of price controls by UK Regulators, page E-125 (link); Ofwat (2024), PR24 Draft determinations: Aligning risk and return: Allowed return appendix, Table 1 (link); Ofgem (2024), RIIO-3 Sector Specific Methodology Decision – Finance Annex, Table 6 (link); and FTI analysis.

3.27   We use the H7 CPIH-deflated TMR of 6.81% as our early view of the H8 TMR. However, the CAA will likely need to reconsider whether this estimate is still appropriate drawing on latest market evidence and regulatory precedent.

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[114]   CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, Table 7 (link).

[115]   CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, ¶9.397 (link).

[116]   See Ofwat (2024), *PR24 Draft determinations: Aligning risk and return: Allowed return appendix*, page 29 (link); Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex,* ¶3.109 (link); and Ofcom (2021), *2021 WFTMR: Annexes 1-26*, Table A20.1 (link).

[117]   UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, page 20 (link).

3.28   With this in mind, we have adopted a TMR range based on recent regulatory precedent from PR24 and RIIO-3 (i.e., 6.30% to 7.00%) for our range with discretionary updates included.[118] This range draws on both ex-ante and ex-post approaches in estimating TMR using only CPI-deflated returns,[119] and uses the Barclays Equity Gilt Study as well as data provided by Dimson, Marsh and Staunton.[120] The CAA will have access to updated precedents when developing the H8 TMR range e.g., PR24 Final Determination (due in December 2024)[121] and RIIO-3 Draft (due in Q2/Q3 2025) or Final Determination (due in Q4 2025)[122] depending on when H8 is finalised.

3.29   We have not undertaken a detailed TMR assessment as the purpose of this report is to provide an indicative range. The CAA may adopt a different range or pick a different point estimate for H8 depending on considerations such as its duties and wider aspects of the price control.

Cost of debt

3.30   As with the risk-free rate and TMR, the cost of debt has to be converted from being RPI-deflated to CPI/CPIH-deflated. In order to calculate this accurately, we would have to undertake an in-depth review of HAL's current debt book and its forecast debt issuance along with how this reconciles with the notional company assumed by the CAA.

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[118]   See Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex,* Table 6 (link).

[119]   See ¶2.67 in Section 2 where ex-post and ex-ante approaches are described.

[120]   Ofwat uses the midpoint of the TMR implied by the Barclays Equity Gilt Study and the TMR implied by the Dimson, March and Staunton dataset to estimate the ex-ante TMR for the UK. See Ofwat (2024), *PR24 Draft determinations: Aligning risk and return: Allowed return appendix*, Table 4 and Table 5 (link). The Barclays Equity Gilt Study data source is not publicly available. For a discussion of the Barclays data, see Barclays (2023), *2023 Equity Gilt Study* (link), and for a discussion of the Dimson, Marsh and Staunton data, see Credit Suisse Research Institute (2023), *Credit Suisse Global Investment Returns Yearbook 2023 Summary Edition* (link).

[121]   See Ofwat (2024), *2024 Price Review* (link).

[122]   See Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Overview Document*, Table 4 (link).

3.31   This is beyond the scope of this report, which is designed to give an early view of the cost of capital for H8. Therefore, for the time being, we have taken our indicative H8 value, which is RPI-deflated, and adjusted using our RPI-CPI/CPIH wedge of 0.05% to yield a CPI/CPIH-deflated value. The results of this calculation are shown in Table 3-2.

Table 3-2: Switch from RPI-deflated to CPI/CPIH-deflated cost of debt

Component	Guide	RPI-deflated	CPI/CPIH-deflated
Cost of embedded debt	A	1.96%	2.02%
Cost of new debt	B	3.65%	3.71%
Proportion of embedded debt	C	88.39%	88.39%
Proportion of new debt	D	11.61%	11.61%
Issuance and liquidity costs	E	0.25%	0.25%
Cost of debt	F = (A × C) + (B × D) + E	**2.41%**	**2.46%**

Source: FTI analysis.

3.32   As shown above, the CPI/CPIH-deflated cost of debt for H8 is estimated to be 2.46%.

3.33   Additionally, the transition to a CPI/CPIH-only price control may result in a mismatch between the indexation of the RAB and HAL's index-linked debt, which is indexed to RPI. This is referred to as 'basis risk'.

3.34   This could result in a mismatch over the first three years of the price control (i.e., prior to RPI converging with CPIH in 2030) as HAL's debt allowance is calculated in CPI/CPIH-terms whereas a portion of its debt must be serviced in RPI terms. This difference should reduce substantially from 2030 onwards (once RPI converges to CPIH).[123]

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[123]   A small discrepancy may continue to exist following the convergence of RPI to CPIH if the CAA chooses to index the price control to CPI as CPI and CPIH are not fully aligned. See ¶2.9 in Section 2 where CPI and CPIH are defined. However, regulators have historically considered that CPI and CPIH are equivalent ex-ante as they have, in the past, been consistent in the long-run. See Ofgem (2018), *RIIO-2 Sector Specific Methodology Decision – Finance Annex*, Figure 1 (link). For data showing consistency of CPIH with CPI, see ONS, *Inflation and price indices* (link).

3.35   Regulators have adopted different approaches to account for this. For instance, Ofgem applied a 5 bps uplift to the cost of debt in RIIO-2 to account for the observed basis risk as presented in evidence by licensees and Ofgem's own analysis.[124] However, Ofgem will review the need for an equivalent basis risk uplift for RIIO-3, including consideration of whether or not licensees appropriately hedged for this risk.[125]

3.36   Conversely, Ofwat has opted to not include any adjustment for basis risk as it found that in consecutive 5-year periods since 1997, companies would have on average benefited under the inflation arrangements set under PR24 (and that gains/ losses have generally been modest), therefore negating the need for an uplift.[126]

3.37   The decision on whether or not to include this uplift will likely be a matter of judgement (e.g., whether the licensee can manage this risk effectively without requiring a further uplift) and detailed modelling of the extent of the risk created by this mismatch for the notional company. Recent evidence from Ofwat regarding this mismatch, as well as the ability of licensees' ability to hedge this risk combined with well-documented plans to converge RPI to CPIH, may indicate that there is no requirement to include a basis risk uplift in H8.

3.38   For the purposes of our indicative estimate, we have not included a 'basis risk' uplift to the cost of debt.

C. 'Discretionary' recommendations for H8 methodology

3.39   In this sub-section, we highlight recommendations for the H7 methodology which are not essential or unavoidable, but merit consideration and consultation. In assessing each potential refinement to the H7 methodology, we assess these against the five criteria set out earlier.

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[124]   Ofgem (2022), *RIIO-ED2 Final Determinations Finance Annex*, ¶¶2.40 – 2.44 (link).

[125]   Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex*, ¶¶2.83 – 2.84 (link).

[126]   Ofwat has tested whether there is an overall bias in favour of customers or investors arising due to differences in the inflation figures used (RPI or CPIH) and due to differences in out-turn inflation and long-term forecasts. See Ofwat (2024), *PR24 draft determinations: Aligning risk and return appendix*, pages 18 – 20 (link).

3.40   We group the possible changes into the following categories, and discuss them in turn below:

- inflation (relating to cost of debt);

- risk-free rate;

- beta estimation methodology;

- TMR;

- cost of debt; and

- use of cross-checks.

Inflation (relating to cost of debt)

3.41   As described previously, the CAA used a mixture of in-period and long-term inflation to deflate the cost of debt allowance. The CAA's justification for using the in-period inflation forecasts was that inflation was expected to deviate materially from its long-term level over the course of H7 (given the unprecedented circumstances following the Covid-19 pandemic). Therefore using long-term inflation would risk HAL's ability to recover its efficiently incurred nominal costs of embedded debt.[127]

3.42   In-period inflation can be more volatile than the long-term inflation forecasts which are typically used by other regulators, and therefore may introduce volatility in the deflated cost of debt estimates. There may be instances, such as in H7, where introducing this volatility is necessary to reflect market conditions.

3.43   Conversely, other mechanisms can be implemented to address any concerns regarding HAL's ability to meet its cost of capital due to outturn inflation differing from forecast inflation (discussed in Appendix 1).

3.44   Additionally, UKRN guidance is to use "medium term forecasts or a long-term assumption (e.g. the Bank of England inflation target) to deflate" with the aim of creating "predictability and stability when attracting finance that may span several control periods".[128]

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[127]   CAA (2021), *H7 Initial Proposals, Section 2: Financial issues,* ¶¶9.116 – 9.118 (link).

[128]   UKRN (2023), *UKRN guidance for regulators on the methodology for setting the cost of capital*, page 33 (link).

3.45   Longer-term measures of inflation may also be more relevant for investors in long-lived assets such as HAL. These investors are likely to have an investment horizon of more than five to ten years and therefore are less focused on short-term inflation forecasts when investing. The use of longer-term measures of inflation also reduces the number of parameters the CAA needs to specify when setting the cost of capital, therefore increasing the practicality of using longer-term inflation measures.

3.46   Given the above, it could be worthwhile for the CAA to consider the relative merits of switching from using within-period inflation forecasts to long-term measures of inflation in the next price control.

3.47   We have assessed the use of longer-term inflation measures via the five-criteria framework, as shown in Table 3-3 below and consider it to achieve a high score.

Table 3-3: Assessment of using longer-term inflation measures

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✓	✓ ?	✓	**4 or 5/5**

Source: FTI analysis.

Risk-free rate

3.48   We discuss two potential recommendations to the current risk-free rate estimation methodology in H7. These are:

- indexation of the risk-free rate; and

- the removal of the convenience yield uplift.

3.49   We discuss these changes in turn below.

Indexation of the risk-free rate

3.50   When setting the risk-free rate, the CAA has to take an explicit view on expected interest rates during the price control. For H7, the CAA used the latest values available for index-linked gilts and AAA corporate bonds to set the risk-free rate for the whole price control.[129] This approach assumes that interest rates will remain broadly constant over the price control.

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[129]   See Section 2B.

3.51   Forecasting interest rates is difficult, and some regulators have used forward rates[130] to predict interest rates. However, forward rates have proven to be relatively poor predictors of future interest rates.[131] Therefore, the CAA and other regulators have considered present-day rates, often calculated using spot or short-term historical averages, to be the best predictor of future interest rates.

3.52   This approach exposes HAL to interest rate risk. This can be substantial as illustrated by the increase in interest rates between 2021 and 2023 of 500 bps (the Bank of England base rate was 0.25% in December 2021 and 5.25% in December 2023).[132]

3.53   In order to address the potential for interest rate risk, some regulators have adopted risk-free rate indexation[133] e.g., Ofgem for RIIO-2.[134] This removes forecast errors and ensures there are no windfall gains or losses if outturn interest rates are different to those assumed by the regulator when determining the price control.

3.54   However, other regulators have chosen not to adopt risk-free rate indexation. For example, Ofwat has, so far, chosen not to introduce risk-free rate indexation in PR24. Ofwat reasons that though risk-free rate indexation can increase forecast accuracy, it also increases the uncertainty of revenues (impacting investors, who value stable revenues) and could increase the volatility of bills (impacting customers).[135]

3.55   Implementing risk-free rate indexation would require upfront calibration and ongoing monitoring and implementation reducing its practicality. However, it can be implemented alongside the CAA's cost of new debt indexation mechanism which reduces the resource required to implement and maintain this mechanism.

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130   Forward rates, as defined by the Bank of England, are "the interest rates for future periods that are implicitly incorporated within today's spot interest rates for loans of different maturities." See Bank of England (2024), *Yield curve terminology and concepts* (link).

131   See CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations*, ¶¶9.228 – 9.234 (link) for more information.

132   Bank of England (2024), *Interest rates and Bank Rate* (link).

133   Risk-free rate indexation involves updating the risk-free rate assumption for each year of the price control based on a particular index or measure e.g., movement in gilt-yields.

134   Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex*, ¶¶3.77 – 3.80 (link).

135   See analysis done by PwC for Ofwat: PwC (2021), *Cost of equity indexation: Evaluating the case for indexation at PR24 and beyond*, page 4 (link).

3.56   The CAA would need to balance these considerations when deciding whether to implement risk-free indexation.

3.57   We have assessed the introduction of risk-free rate indexation via the five-criteria framework, as shown in Table 3-4 below.

Table 3-4: Assessment of introduction of risk-free rate indexation mechanism

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✗	✓	?	3 or 4/5

Source: FTI analysis.

Consideration of the convenience yield uplift added to the risk-free rate in H7

3.58   As explained in Section 2, the H7 methodology includes a convenience yield uplift to the risk-free rate. Our update of the H7 methodology estimates that the convenience yield has reduced from 57 bps to 15 bps.

3.59   The presence of a convenience yield has been debated at length during other price controls. Analysis by Ofwat has suggested that small differences between AAA bonds and nominal gilts rates (below 26 bps) could be driven by factors other than convenience yield, such as default and liquidity risk.[136]

3.60   Another consideration is whether the CAA should use convenience yield estimates obtained from a AAA bond index which better matches the investment horizon assumed by the CAA. This would mean relying solely on the iBoxx £ Non-Gilts AAA 10+ years index (estimated convenience yield of 6 bps) instead of a mix of the iBoxx £ Non-Gilts AAA 10+ years and 10-15 years indices (estimated convenience yield of 23 bps[137]).

3.61   The CAA could therefore consider either removing the convenience yield entirely or estimating it based only on the iBoxx £ Non-Gilts AAA 10+ years index, as required based on its review of the contemporaneous market data when estimating the H8 decision.

3.62   Both options reduce the number of parameters the CAA would need to estimate for H8, which suggests that this is a practical change for the CAA as it reduces the CAA's resource requirements.

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[136]   Ofwat (2024), *PR24 Draft determinations: Aligning risk and return: Allowed return appendix*, page 12 (link).

[137]   See Section 2B.

3.63   We have assessed the impact of changing approaches regarding the estimation or inclusion of the convenience yield uplift via the five-criteria framework, as shown in Table 3-5 below.

Table 3-5: Assessment of changing approach to convenience yield uplift

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✓	✓	✓	5/5

Source: FTI analysis.

Asset beta estimation

3.64   We have reviewed the asset beta estimation methodology for H7, as summarised in Section 2. In doing so, we have identified three elements of the methodology that the CAA could consider reviewing.

3.65   These relate to:

   ▪ the choice of comparators;

   ▪ the treatment of the pandemic period; and

   ▪ the adjustment for the TRS mechanism.

3.66   We discuss each in turn below.

Choice of comparators

3.67   As discussed in Section 2, HAL is not a listed entity, and its asset beta must therefore be inferred using the asset betas of airports that are considered to face risks that are comparable to those faced by HAL.

3.68 In the H7 Way Forward document, eight comparators were selected for a shortlist of potential comparators to estimate the asset beta for HAL. These were:[138]

- AENA;

- ADP;

- FRA;

- FHZN;

- Københavns Lufthavne A/S (**"KBHL"**), which operates Copenhagen Airport and Roskilde Airport;[139]

- Flughafen Wien AG (**"FLU"**), which operates the international airports in Vienna, Malta, and Košice;

- Sydney Airport Holdings (**"SYD"**), which owned and operated Sydney Airport; and,

- Auckland International Airport Limited (**"AIA"**), which owns and operates Auckland Airport.[140]

3.69 In the Initial Proposals, this list was reduced to six comparators, with the most weight being placed on AENA, some weight placed on ADP, FRA, and FHZN, and limited weight on SYD and FLU. The CAA's advisors, Flint, suggested that KBHL and AIA equity betas could not be estimated reliably, and therefore the CAA did not place any weight on them.[141] The CAA also noted that FLU was much smaller than HAL, had a limited float, and had a "less statistically robust" asset beta relative to other airport groups.[142]

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[138] CAA (2021), *Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward*, ¶50 (link).

[139] Københavns Lufthavne A/S (2024), *Annual Report 2023,* page 12 (link).

[140] Auckland International Airport Ltd. (2022), *About* (link).

[141] Flint (2021), *Support to the Civil Aviation Authority: Estimating Heathrow's beta post-COVID-19*, Section 4.1 (link).

[142] CAA (2021), *H7 Initial Proposals Section 2: Financial issues,* ¶¶9.39 – 9.49 (link).

3.70 Our assessment of KBHL and AIA broadly concurs with that of Flint and the CAA in H7. KBHL has a low free float which impacts the ability to reliably and accurately estimate its equity betas.[143] Meanwhile, AIA consists of c. 7% of its reference index, NZX, which is likely to impact its equity beta estimate due to the cointegration between movements in the market and AIA's share price.[144] In addition, SYD is no longer listed, and therefore cannot be used as a comparator.

3.71 With respect to FLU, while it may have merited some weight at H7, more recently its asset beta has dropped below zero (see Figure 3-3). This is highly unusual for an airport asset and inconsistent with the values observed for all other comparators. The rationale behind this observed outcome is also not clear. Given this anomaly, we propose to exclude FLU from the comparator set for H8 until the rationale behind this observation can be fully understood and resolved.

Figure 3-3: FLU asset beta (2017 to 2024)
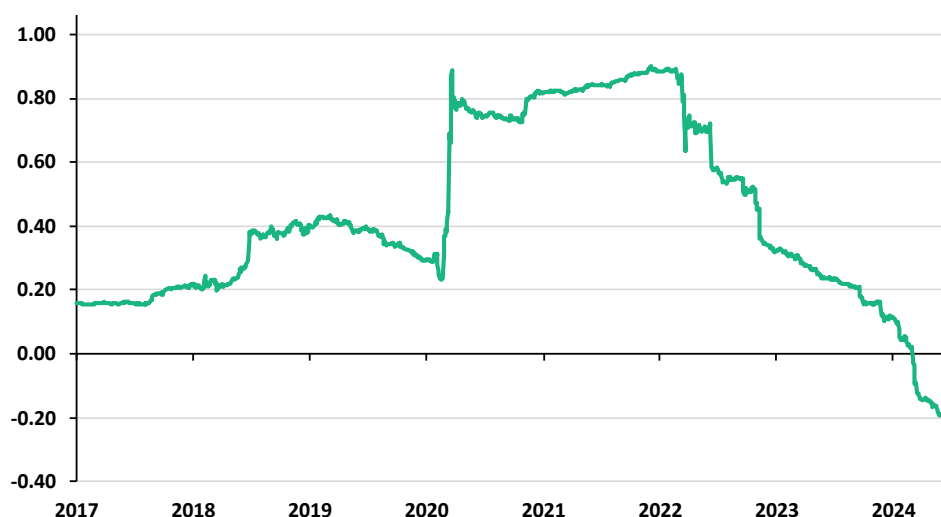
Source: FTI analysis.
Note: The raw equity betas for FLU has been de-levered using a debt beta of 0.075 (midpoint of the CAA's H7 range).

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[143] KBHL has a free float of c. 1%. See Københavns Lufthavne A/S (2024), *Investor Relations, Ownership and rating* (link).

[144] As of 16 October 2024, the NZX had a total market capitalisation of NZD 174,807,284,393, and AIA had a market capitalisation of NZD 12,511,644,062. This results in a proportion of c. 7%. For the latest figures, see NZX (2024), *NZX Main Board (NZSX)* (link).

3.72 The remaining four airports (AENA, ADP, FRA, and FHZN) have relatively high float rates and constitute a small portion of the reference index, the STOXX Europe 600 Index.[145, 146, 147]

3.73 It was recognised in H7 that none of these airports is a perfect comparator for HAL. In particular, the CAA excluded FHZN from the H7 core comparator set because it opted to focus on airport groups which contained larger airports that more closely resemble HAL's scale and regulatory environment.

3.74 Over the last two years, Zurich Airport's operations have grown, driven by the expansion of SWISS, increased transfer traffic, and stronger international connectivity. Although it remains smaller than major hubs like Heathrow or Frankfurt, these developments suggest that FHZN may be a reasonable comparator for inferring HAL's beta.

3.75 Therefore, the CAA could consider expanding the CAA's core group of comparators from H7 to include FHZN in addition to AENA, ADP, and FRA. In Table 3-6, we present a comparison of asset betas for AENA, ADP, FRA, and FHZN as of 31 July 2024 using spot, 1-, and 2-year rolling average betas over a 2-year estimation window.

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[145] See STOXX, *STOXX® EUROPE 600 INDEX: Components* (link), for a full list of the constituents of the STOXX Europe 600 Index and their weights. AENA, ADP, and FHZN are listed as 'AENA SME' (page 3), 'ADP' (page 7), and 'FLUGHAFEN ZURICH' (page 7).

[146] FRA is not part of the STOXX Europe 600 Index. However, the STOXX Europe 600 Index still represents a good reference index for FRA, as it is representative of wider market conditions and systematic risk in Europe.

[147] The selected comparators have float rates which are as follows (as of 16 October 2024): AENA at 47%, ADP at 29%, FRA at 36%, and FHZN at 67%. This data is sourced from S&P Capital IQ.

Table 3-6: Asset betas for AENA, ADP, FRA and FHZN across averaging periods over a 2-year estimation window

Averaging period	AENA	ADP	FRA	FHZN	3-comp.	4-comp.
Spot	0.72	0.68	0.56	0.64	0.65	0.65
1-year average	0.71	0.60	0.54	0.61	0.62	0.61
2-year average	0.71	0.57	0.56	0.60	0.61	0.61

Source: FTI analysis.

Notes: (1) The raw equity betas for the comparators have been de-levered using a debt beta of 0.075 (midpoint of the CAA's H7 range). (2) '3-comp.' refers to the three-company average, using AENA, ADP, and FRA. '4-comp.' refers to an average with all four comparators. (3) The cut-off date for the estimates is 31 July 2024.

3.76 Table 3-6 illustrates that FHZN's estimated asset betas are currently consistent with those of the other core H7 comparators. Therefore, adding FHZN to the comparator set would likely give the CAA more comfort that its range for H8 is appropriate without requiring significant resource to implement.

3.77 A drawback with the comparators used to infer HAL's beta is that they contain airports which are significantly smaller, operate under a different regulatory environment and in regions with higher traffic risk than faced by HAL.

3.78 For example, HAL is not only capacity constrained but is also one of the largest hub airports in the world operating under a RAB-style regime. As a result, HAL is likely characterised by a lower level of systematic risk than that faced by the comparators. Therefore, although the beta range for H8 may be derived based on the betas of the comparators, the CAA may opt to refine its beta range and selection of a point estimate to reflect these differences. For example, for Q6, the CAA chose to set an asset beta towards the bottom end of the range of beta values implied by the listed comparators.[148]

3.79 We have assessed this potential change to the comparator set via the five-criteria framework (as shown in Table 3-7) below and consider it to fully meet all criteria.

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[148] CAA (2014), *Estimating the cost of capital: technical appendix for the economic regulation of Heathrow and Gatwick from April 2014: Notices granting the licences*, ¶¶6.22 – 6.24 ([link](#)).

Table 3-7: Assessment of comparator set

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✓	✓	✓	5/5

Source: FTI analysis.

Treatment of the pandemic period

3.80   As discussed previously, the H7 determination was made during the pandemic, which materially impacted the perception of the risks faced by airports. As a result, the short-run equity and asset betas of airports increased very quickly, which presented a challenge for setting the beta over the H7 period.

3.81   To account for this, the CAA's advisors effectively calculated a proxy for what the long-term beta estimate might be following the pandemic. This relied on attributing greater weight to the data prior to the pandemic and subsequently post-pandemic data, and lower weight to pandemic affected data points. The impact of this was to increase the estimated betas from before the pandemic to reflect the updated perception in the risks faced by airports since the pandemic began.

3.82   Since the end of the pandemic, the short-run asset beta estimates have begun to stabilise and potentially provide a more accurate indication of investor perception of the risks faced by airports following the pandemic (see Figure 3-4 below).

Figure 3-4: 1- and 2-year asset betas for AENA, ADP, FRA and FHZN, as well as an average across all comparators
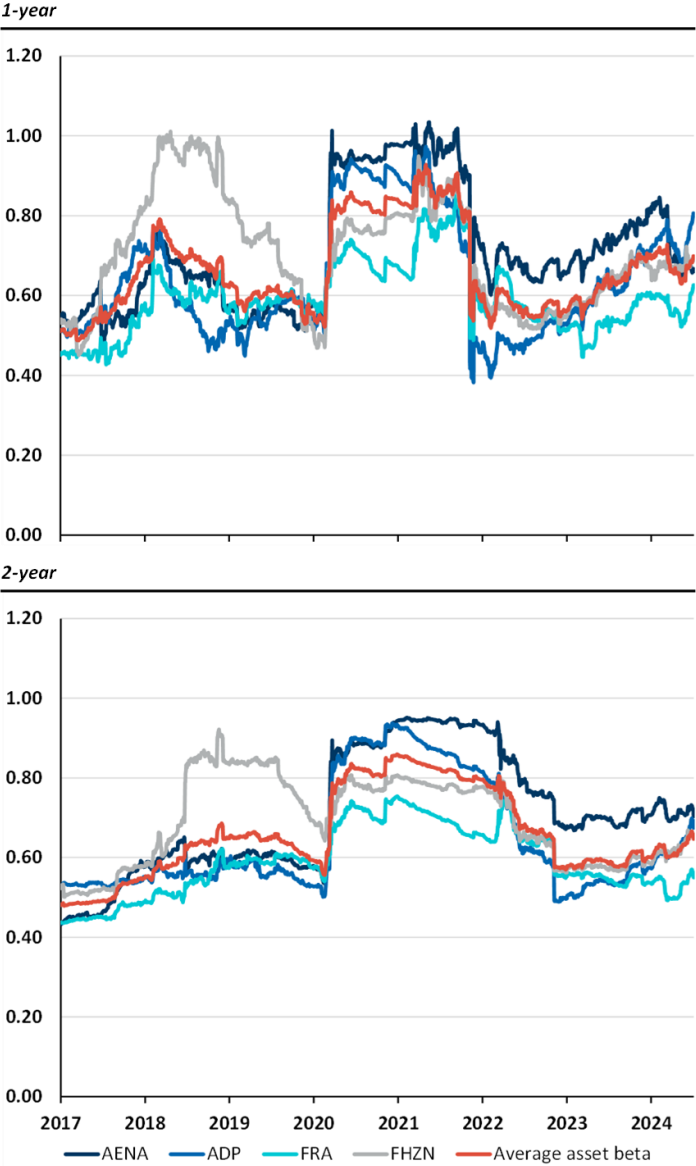
Source: FTI analysis.

Note: The raw equity betas for the comparators have been de-levered using a debt beta of 0.075 (midpoint of the CAA's H7 range).

3.83   Figure 3-4 indicates that the betas for the comparators are, on average, higher than they were prior to the pandemic, suggesting that the perceived risks faced by the airport sector have increased following the pandemic. This may provide a better proxy for how investors price pandemic-type events than a weighted estimate as used in H7 (due to lack of sufficient post-pandemic data).

3.84   In our view, the evidence in Figure 3-4 suggests that the CAA could consider an approach that does not require explicit weighting of data in order to estimate the H8 beta (pre-TRS impact). The use of simple averages of betas estimated over different estimation windows can also serve as a useful cross-check to the beta estimates calculated based on the H7 methodology.

3.85   In forming an initial view of the beta for H8, we have reviewed rolling averages of the 1- and 2-year beta combined with 9.5-year[149] beta estimates for the comparators. We have not placed weight on the 5-year beta values as the proportion of observations affected by the pandemic relative to total observations is c. 40% (for a spot 5-year beta), which is considerably above the implied proportion of pandemic data in the CAA's analysis in H7.

3.86   The use of a 9.5-year beta allows us to take a longer-term view of the risks faced by investors when investing in airports (both prior to, during and post-pandemic), with the ability to extend the estimation window to 10-years when setting H8. This places some weight on the pandemic data (and not unlike the CAA's approach at H7).[150]

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[149]   Both 1-year and 2-year betas largely exclude the pandemic period, while 9.5-year betas allow us to assess the longer-term risks faced by airports based on data prior-to, during and post-pandemic. We are currently relying on only 9.5-years of data as the long-run estimate as AENA listed on 11 February 2015, and we are unable to accurately consider all comparators for a period longer than 9.5 years. At the time that the H8 determinations will be made, the prevailing 1- and 2-year betas will completely exclude the pandemic period, and it will be possible to estimate a 10-year beta for all comparators.

[150]   The proportion of observations affected by the pandemic relative to total observations is c. 20%. The weighted approaches used by the CAA for H7 for estimating the beta had implied proportions of 16% for the high frequency, long duration scenario and 3% for the low frequency, short duration scenario.

Table 3-8: Asset betas over various estimation windows and averaging lengths

Estimation window	AENA	ADP	FRA	FHZN
1-year	0.66-0.75	0.64-0.86	0.55-0.61	0.62-0.67
2-year	0.71-0.72	0.57-0.68	0.54-0.56	0.60-0.64
9.5-year	0.70	0.69	0.60	0.67

Source: FTI analysis.

Note: (1) The raw equity betas for the comparators have been de-levered using a debt beta of 0.075 (midpoint of the CAA's H7 range). (2) The ranges for 1- and 2-year betas are based on spot, 1-, and 2-year averages. (3) The 9.5-year betas are spot betas. (4) The cut-off date for the estimates is 31 July 2024.

3.87   Based on our review of the comparator data, we are minded to recommend an initial asset beta range of 0.55 to 0.70 for H8 (before TRS impact). The upper bound of the range is with reference to the 9.5-year betas across the comparators while the lower bound is with reference to the shorter-term betas (1- and 2-year asset betas).

3.88   We have excluded the upper bound of the 1-year beta values presented in Figure 3-4 and Table 3-8 as these are sensitive to the estimation period used. For example, the upper bound of the ADP 1-year asset beta range presented in Table 3-8 would reduce to 0.80 if our cut-off date was extended by two weeks. Additionally, the majority of the comparator beta values lie in the range of 0.55 to 0.70 (as shown in Figure 3-4). Therefore, while for the time being we propose to exclude these values, this data should be reviewed when setting H8.

3.89   We have cross-checked our indicative range against our update of the H7 methodology, which indicated a range of 0.52 to 0.69.

3.90   This range is marginally higher than the H7 beta range, reflecting updated market evidence that airport betas appear to have marginally increased compared to their pre-pandemic values.

3.91   We have also assessed the use of this approach to beta estimation via the five-criteria framework, (see Table 3-9 below) and consider it to meet all five criteria.

Table 3-9: Assessment of change in treatment of pandemic period

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✓	✓	✓	5/5

Source: FTI analysis.

3.92   The CAA may choose to adopt a different methodology for H8 than we have used in our report (e.g., comparators, estimation windows, frequency and averages) based on its own judgement and stakeholder evidence received, as we have adopted a high-level selection process for these considerations given the nascent nature of the H8 process.

Recalibrating the adjustment for the TRS mechanism

3.93   In addition to the points above, the H7 methodology adjusts HAL's beta range downwards to reflect HAL's reduced exposure to traffic risk compared to the beta comparators as a result of the TRS mechanism.

3.94   This relies on judgement-based parameters such as the proportion of the difference between airport and network company betas that can be attributed to exposure to traffic risk.

3.95   In lieu of relying on judgement, these parameters can be calculated using financial modelling by comparing HAL's returns both with and without the TRS mechanism.[151] This helps to determine the extent to which the impact of traffic risk on HAL's returns is mitigated by the TRS. However, this financial modelling is likely to be an involved exercise for the CAA and stakeholders, increasing resource requirements but also likely increasing statistical robustness.

3.96   We have assessed the recalibration of the TRS adjustment via the five-criteria framework, as shown in Table 3-10 below.

Table 3-10: Assessment of recalibration of the TRS adjustment

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✗	✓	✓	✗	3/5

Source: FTI analysis.

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[151]   As described in Brealey and Myers, the key driver of beta is the variability of earnings or cash flow driven by non-diversifiable risk. Therefore, focusing on the impact on cash flows or profits is the correct approach for quantifying the impact of the TRS on HAL's beta. See Brealey, Myers and Allen (2017), *Principles of Corporate Finance: Tenth Edition,* page 222*.*

TMR

3.97 The sharp increase in interest rates since 2021 (c. 515 bps)[152] raises the issue of whether the fixed TMR approach adopted by regulators is still fit for purpose. Previous research on the TMR has found it to be 'broadly stable' but not fixed or fully stable.[153]

3.98 The fixed TMR approach can create perverse outcomes if the risk-free rate reaches a high level relative to the TMR assumed. For example, if the risk-free rate was 5.85% RPI-deflated at H7, it would have implied an ERP of zero using the H7 TMR of 5.85%, all else equal. This would likely have resulted in a cost of equity that was not sufficient for investors. We believe this issue can be identified and solved by the use of cross-checks on the cost of capital as discussed in ¶¶3.106 – 3.111.

3.99 We have reviewed other regulators' views on assuming a fixed TMR under a high interest rate environment and the evidence presented as part of recent decisions. Regulators such as Ofgem and Ofwat have decided that the stable TMR approach remains appropriate for estimating the WACC as the current evidence presented is not compelling for changing approach.[154]

3.100 One of the key reasons for retaining the existing approach is symmetry of approach. For instance, regulators do not adjust the TMR to protect consumers when interest rates are low. Therefore, adjusting the TMR to benefit investors when interest rates rise may not provide adequate protection for consumers' interests.

3.101 Additionally, if the CAA was to move away from a stable TMR approach it would be required to estimate how much TMR fluctuates with interest rates. This is resource intensive and there is no universally accepted methodology for determining the relationship between TMR and interest rates. Therefore, this would open the CAA to significant scrutiny for potentially limited or no improvement in accuracy.

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[152] The Bank of England had a Bank Rate of 0.1% in December 2021, which rose to 5.25% by August 2023 (and stayed at that level up to July 2024). This implies a rise of 515 basis points. See Bank of England (2024), *Interest rates and Bank Rate* (link).

[153] Smithers and Co Ltd (2003), *A Study into certain aspects of the cost of capital for regulated utilities in the UK* (link); and Wright and Smithers (2014), *The Cost of Equity Capital for Regulated Companies: A Review for Ofgem*, pages 13 – 16 (link).

[154] See Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex,* ¶¶3.82 – 3.85 (link) and Ofwat (2024), *PR24 Draft determinations: Aligning risk and return – Allowed return appendix*, page 22 (link).

3.102   We have assessed moving away from the stable TMR approach via the five-criteria framework, as shown in Table 3-11 below. We consider there to be a limited case for any departure from current established practice.

Table 3-11: Assessment of moving away from stable TMR approach

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✗	✗	✗	✗	✗	0/5

Source: FTI analysis.

Cost of debt

3.103   As noted earlier, HAL has not yet provided information regarding its existing cost of debt and expected issuance over H8, therefore we focus instead on the cost of debt framework and not the specific selection of the underlying parameters.

3.104   Our review of the CAA's H7 cost of debt framework suggests there was added complexity associated with the treatment of HAL's combination of index-linked and fixed-rate debt. We consider that this issue could be addressed by changing the approach to indexing HAL's RAB, which we discuss further in Appendix 1.

3.105   Although this adjustment would meet several criteria, as discussed in Appendix 1, it also affects wider aspects of the price control beyond the cost of capital, particularly with respect to financeability and charges profile. Therefore, we do not opine on this option further as our report focuses on the cost of capital for H8.

Use of cross-checks

3.106   A key drawback of the cost of equity compared to the cost of debt is that it is unobservable. This results in regulators such as the CAA using the CAPM to estimate the cost of equity. The CAPM requires the selection of several parameters. In order to reduce the probability of the CAPM estimates being too low or too high, regulators such as Ofgem and Ofwat adopt cross-checks on their CAPM estimates.

3.107 These cross-checks can help to identify situations where the selection of parameters could result in perverse or uninvestable outcomes. This is particularly relevant for a parameter such as the TMR, which is typically estimated on the basis of a long time-series of historical data, and therefore may not accurately capture prevailing market conditions, e.g., a short-term spike in interest rates. Additionally, cross-checks can help to guide regulators on the selection of the point estimate (e.g., Ofwat PR24 DDs[155]).

3.108 Our review of the H7 methodology suggests the CAA could consider the inclusion of additional cross-checks on the cost of equity for the H8 WACC. We have found the following potential cross-checks on the cost of equity:

- the use of debt-based cross-checks such as comparing the yield on HAL's class B debt to the proposed cost of equity;[156]

- ensuring a sufficient gap between the allowed cost of debt and cost of equity, estimated on the basis of models such as the "asset risk premium-debt risk premium" model;[157] and

- comparing results against the implied WACC and cost of equity from the recent sale of Heathrow.

3.109 Our view is that the use of these cross-checks could help provide more robustness to the CAA's cost of equity estimate. In particular, debt-based cross-checks are useful as the cost of debt represents a floor on the cost of equity given the riskiness of debt compared to equity.[158]

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[155] See Ofwat (2024), *PR24 Draft determinations: Aligning risk and return – Allowed return appendix*, Section 2.4 (link).

[156] Class B debt is closer in seniority to equity and therefore the yield on this debt may be a more useful cross-check on the cost of equity than the yield on Class A debt.

[157] The asset risk premium-debt risk premium model compares the unlevered risk premium (normally estimated as asset beta multiplied by ERP) and compares that to the debt risk premium (normally estimated as the cost of debt minus the expected loss, which reflects the probability the issuer of debt defaults and loss experienced by bondholders if the issuer does default). At a *minimum*, the asset risk premium must be above the debt risk premium.

[158] Debt investors receive a fixed payment and have a higher claim on the firm's cash flows in the case of default and during normal operations. This is unlike equity which normally receives variable payments and is lower priority in the order of claims. This is reflected in the return required by debt and equity investors, i.e., the cost of debt is lower than the cost of equity.

3.110   The use of these cross-checks is likely to require some judgement and upfront investment from the CAA. For example, opining on whether the gap on the cost of equity and cost of debt is "sufficient" and interpreting the data from the sale of Heathrow is likely to require careful interpretation of market data, e.g., the price paid by Heathrow is likely to have been impacted by factors other than the cost of capital e.g., traffic forecasts, capacity expansion plans and scarcity of regulated assets.

3.111   We have assessed this potential change to the use of cross-checks via the five-criteria framework, as shown in Table 3-12 below.

Table 3-12: Assessment of the increased use of cross-checks

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
?	✓	✓	?	?	2 or 5/5

Source: FTI analysis.

D. Summary

3.112   As discussed previously, the CAA's proposed transition from RPI to CPI or CPIH necessitates changes in the H7 cost of capital methodology which would affect the risk-free rate, the TMR, and the cost of debt. Other things being equal, we estimate that this would increase the WACC by 6 bps (from a midpoint of 4.56% in RPI terms to 4.62% in CPI-terms).

3.113   With regards to our assessment of the discretionary recommendations, we present WACC estimates incorporating the following potential updates in Table 3-13 below:

- Removal of the convenience yield;

- TMR range based on recent regulatory precedent; and

- Updated choice of comparators and treatment of pandemic period when estimating the asset beta.

Table 3-13: H7 and H8 early view WACC, with required and selected discretionary changes to the methodology

Component	H8 early view *Based on H7 methodology using updated data* (Inflation shift from RPI to CPIH)		H8 early view *Based on H7 methodology using updated data* (Incl. discretionary recommendations)	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	1.35%	1.35%	1.27%	1.27%
TMR	6.81%	6.81%	7.00%	6.30%
ERP	5.46%	5.46%	5.73%	5.03%
Asset beta	0.61	0.44	0.61	0.45
Debt beta	0.05	0.10	0.05	0.10
Equity beta	1.44	0.94	1.45	0.99
Post-tax cost of equity	9.21%	6.49%	9.57%	6.23%
Cost of new debt	3.71%	3.71%	3.71%	3.71%
Cost of embedded debt	2.02%	2.02%	2.02%	2.02%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	2.46%	2.46%	2.46%	2.46%
Vanilla WACC (CPI/CPIH-deflated)	**5.16%**	**4.07%**	**5.30%**	**3.97%**
Midpoint (CPI/CPIH-deflated)		4.62%		4.64%

Source: FTI analysis.

Note: Rows in blue indicate the parameters impacted by the potential discretionary updates to the methodology, while rows in green indicate the parameters for which we have proposed a range relative to the H7 methodology.

3.114 As presented above, the WACC range is wider following the implementation of our selected discretionary updates. We note that the choice of the point estimate for H8 is subject to several considerations as discussed by the CMA in the PR19 determination and therefore the CAA may not choose a point estimate in the middle of the range.[159]

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[159] CMA (2021), *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited: Summary of Final Determinations*, ¶¶86 – 87 ([link]).

4.   Conclusion

4.1   In the run up to the H7 price control, the CAA faced unprecedented circumstances of needing to estimate the WACC during the Covid-19 pandemic, which was characterised by the high volatility of global capital markets and significant uncertainty regarding the future operations of airports.

4.2   This necessitated innovative new mechanisms and methodologies to reflect the impact of the pandemic on the systematic risks faced by airports and in particular, HAL. These innovations were a cornerstone of the H7 final proposals set out by the CAA.

4.3   As part of the scope for this report, we have updated the WACC parameters based on the CAA's H7 methodology and provided an updated WACC estimate based on a cut-off date of 31 July 2024.

4.4   In addition, we have assessed the CAA's H7 methodology, its previous indication to switch inflation from RPI to CPI/CPIH, and other recent regulatory precedents in order to identify key issues pertaining to the setting the WACC for H8. Based on our findings, we have provided initial recommendations to the CAA (and stakeholders) for further considerations relating to updating, revising, or maintaining the current WACC methodology for H8.

4.5   At this early stage in the H8 process, these recommendations are primarily intended to provide grounds for discussion and consultation and should not be interpreted as the intended direction of travel for the H8 WACC methodology. It is also not intended to reflect an exhaustive list of issues and the CAA and stakeholders might seek to explore other pertinent issues as well.

A. WACC estimate for H8

4.6 Our calculation of the H8 WACC based on an update of the H7 methodology is c. 140 bps higher (as of as at 31 July 2024) than the H7 WACC in RPI-deflated terms, as set by the CAA. This difference can be attributed to the:

- 44 bps increase due to the updated estimate of the RPI-deflated TMR (resulting from the planned alignment between RPI and CPIH from 2030);

- 15 bps increase due to the changes in the interest rate environment since 2022 (impacting the risk-free rate as well as the cost of debt);

- 4 bps decrease due to the narrowing of the asset beta range using updated comparator data; and

- 85 bps increase due to the lower level of forecast inflation for the H8 period.

4.7 However, due to the planned changes in the methodology used to calculate RPI from 2030, comparisons in RPI terms may be less relevant. We therefore also compare the CAA's H7 WACC determination to our early estimate of the H8 WACC (based on an update of the H7 methodology) in CPI/CPIH terms as well in Table 4-1 below.[160]

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[160] We assume for these purposes that expected inflation on the CPI and CPIH measures is identical.

Table 4-1: H7 and H8 early view WACC

| Component	H7 Final Decision (post CMA determination)		H8 early view (31 Jul 2024) *Based on H7 methodology using updated data*	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	0.59%	0.59%	1.29%	1.29%
TMR	5.85%	5.85%	6.75%	6.75%
ERP	5.26%	5.26%	5.46%	5.46%
Asset beta	0.62	0.44	0.61	0.44
Debt beta	0.05	0.10	0.05	0.10
Equity beta	1.47	0.95	1.44	0.94
Post-tax cost of equity	8.32%	5.59%	9.14%	6.43%
Cost of new debt	4.17%	4.17%	3.65%	3.65%
Cost of embedded debt	(0.12%)	(0.12%)	1.96%	1.96%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	0.62%	0.62%	2.41%	2.41%
Vanilla WACC (RPI-deflated)	**3.70%**	**2.61%**	**5.10%**	**4.02%**
Midpoint (RPI-deflated)		**3.16%**		**4.56%**
Vanilla WACC (CPI/CPIH-deflated)[1]	**4.63%**	**3.53%**	**5.16%**	**4.07%**
Midpoint (CPI/CPIH-deflated)[1]		**4.08%**		**4.62%**

Source: CAA (2023), H7 Final Decision Section 3: Financial issues and implementation, Table 9.6 (link); CAA (2024), Economic regulation of Heathrow airport: H7 final issues, ¶2.15 (link); FTI analysis.

Note: (1) The CPI/CPIH-deflated values assume a RPI-CPI/CPIH wedge of 0.90% for H7 and 0.05% for H8, see ¶2.73 and ¶3.21 for more information.

4.8   The midpoint of the CPI-deflated H8 early view WACC is 53 bps higher than the equivalent value for H7. This is primarily a function of the increase in the cost of debt (due to the impact of both interest rates and changes in inflation forecasts). We demonstrate this in Figure 4-1 below.

Figure 4-1: Waterfall chart illustrating impact of changes in parameters, on a CPI-deflated basis
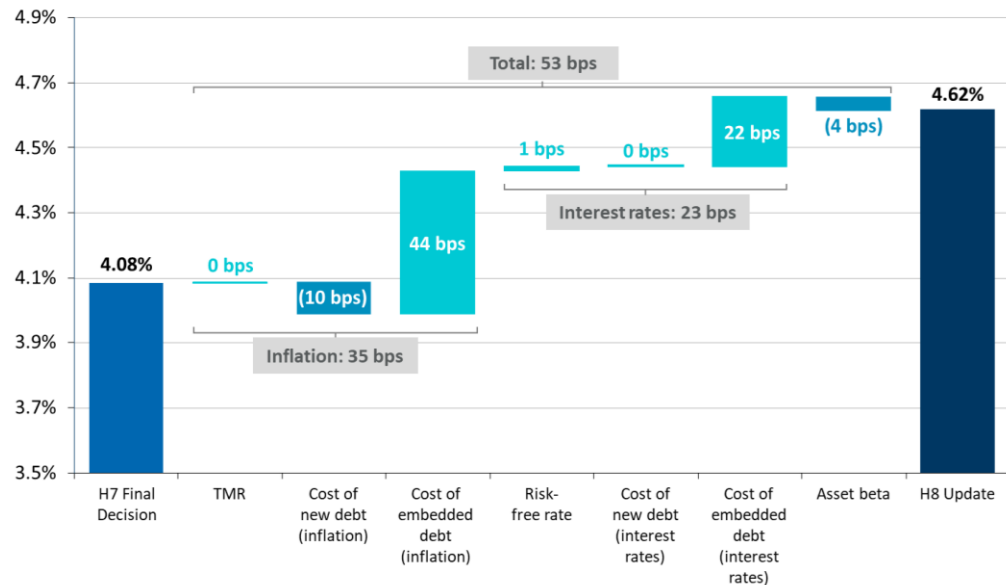
Source: FTI analysis.

B. Potential considerations relating to the CAA's H7 WACC methodology

4.9   As indicated in this report, the H8 price control is expected to be determined under a different market dynamic and context from that which prevailed at H7. Consequently, and as part of this report, we have reviewed the CAA's H7 WACC methodology, identified some key issues that are topical in the regulatory WACC debate in the UK, and provided recommendations for the CAA and stakeholders to consider further.

4.10   In particular, there is one unavoidable update pertaining to switching of the inflation index from RPI to CPI/CPIH. In addition, we have identified and discussed other key areas of the WACC methodology which merit consultation between the CAA and stakeholders in determining the most suitable WACC methodology for H8.

Essential update to the CAA's H7 WACC methodology

4.11   The CAA's proposed transition from RPI to CPI or CPIH necessitates changes in the H7 cost of capital methodology.[161]

4.12   Switching the inflation index from RPI to CPI/ CPIH for the early view of the H8 WACC estimate results in an increase of 6 bps at the midpoint from 4.56% RPI-deflated to 4.62% CPI-deflated (all else equal).

Discretionary recommendations to the CAA's H7 WACC methodology

4.13   We have considered nine other issues that may be relevant to estimating the WACC in transitioning from H7 to H8. We have carried out a preliminary and indicative assessment for each issue against five criteria (see Table 4-2 below for results).

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[161]   The CAA is yet to decide on whether it will implement CPI or CPIH. However, the future choice of inflation basis does not materially impact the conclusions or analysis in this report as regulators often assume CPI- or CPIH-deflated values are equivalent. See footnote 17 and 123 for further details.

Table 4-2: Assessment of discretionary updates to the methodology

Metric	Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality
Other inflation changes					
Long-term inflation forecasts	✓	✓	✓	✓ ?	✓
Risk-free rate					
Indexation	✓	✓	✗	✓	?
Removal of convenience yield	✓	✓	✓	✓	✓
Asset beta estimation					
Choice of comparators	✓	✓	✓	✓	✓
Treatment of pandemic period	✓	✓	✓	✓	✓
Recalibrating the adjustment for the TRS mechanism	✓	✗	✓	✓	✗
TMR					
Diverging from 'stable TMR theory'	✗	✗	✗	✗	✗
Cost of debt					
Aligning with RAB indexation	✓	✓	✗	✓	✓
Other methodological changes					
Cross-checks	?	✓	✓	?	?

Source: FTI analysis.

4.14   As indicated above, three of our nine recommendations score highly within our evaluation framework. We have further, on an indicative basis, analysed the impact of these three potential updates to the early view of the H8 WACC, as shown in Table 4-3.

Table 4-3: H8 early view WACC, with required and three selected discretionary changes to the methodology

Component	H8 early view (31 Jul 2024)		H8 early view (31 Jul 2024)	
	Based on H7 methodology using updated data		*Based on H7 methodology using updated data*	
	(Inflation shift from RPI to CPIH)		**(Incl. discretionary recommendations)**	
	High	*Low*	*High*	*Low*
Gearing	60%	60%	60%	60%
Risk-free rate	1.35%	1.35%	1.27%	1.27%
TMR	6.81%	6.81%	7.00%	6.30%
ERP	5.46%	5.46%	5.73%	5.03%
Asset beta	0.61	0.44	0.61	0.45
Debt beta	0.05	0.10	0.05	0.10
Equity beta	1.44	0.94	1.45	0.99
Post-tax cost of equity	9.21%	6.49%	9.57%	6.23%
Cost of new debt	3.71%	3.71%	3.71%	3.71%
Cost of embedded debt	2.02%	2.02%	2.02%	2.02%
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.25%	0.25%	0.25%	0.25%
Cost of debt	2.46%	2.46%	2.46%	2.46%
Vanilla WACC (CPI/CPIH-deflated)	**5.16%**	**4.07%**	**5.30%**	**3.97%**
Midpoint (CPI/CPIH-deflated)		**4.62%**		**4.64%**

Source: FTI analysis.

Note: Rows in blue indicate the parameters impacted by the potential discretionary updates to the methodology, while rows in green indicate the parameters for which we have proposed a range relative to the H7 methodology.

4.15   Specifically, implementing these updates results in a marginal increase of 2 bps to the midpoint of our early view of the CPI-deflated H8 WACC estimate (from 4.62% to 4.64%).

4.16   However, it is important to note that this is an indicative value due to the nascent nature of the H8 process. In this report we have made a number of simplifying assumptions, e.g., debt issuance over H7, with the focus of this report being to facilitate discussion with stakeholders on potential changes to the CAA's H7 methodology to ensure it is fit for purpose for H8. We expect the CAA would continue to refine its methodology and analysis ahead of finalising H8, and this will likely require a more in-depth review of the topics raised during this report.

Appendix 1 Cost of debt: RAB indexation

A1.1   In this appendix, we provide a more comprehensive description of how RAB indexation could potentially improve the CAA's methodology for setting the cost of debt for H8.

A1.2   Our review of the CAA's H7 cost of debt framework suggests there was added complexity with how to treat HAL's combination of index-linked and fixed-rate debt. We believe this issue can be addressed by changing the indexation of HAL's RAB.

A1.3   The current regulatory approach used by the CAA (and largely used by other regulators) is to fully index the RAB to inflation, implicitly assuming that the notional company is entirely financed by inflation-linked capital (both debt and equity). However, this does not reflect the CAA's assumption for the notional company's financing structure and what is commonly assumed by other regulators and adopted by regulated entities. Instead, the CAA assumes the notional company is financed through a diverse portfolio of capital that includes a mixture of fixed-rate debt, inflation-linked debt, and equity.

A1.4   This divergence between the assumption used to set the WACC and the financing structure assumed creates a 'real-nominal mismatch' for the notional company's fixed-rate debt. This mismatch arises because while the RAB is indexed to inflation, the cost of servicing fixed-rate debt remains unaffected by inflation. As a result, equity holders can benefit financially when outturn inflation is higher than expected and vice-versa when it is lower than expected.

A1.5   The recent period of elevated inflation has brought this issue to the forefront, particularly among regulators. In the energy sector, for instance, Ofgem has estimated that the excess growth of the RAB[162] due to this real-nominal mismatch amounted to approximately £3.2 billion over the course of the RIIO-1 and RIIO-2 regulatory periods.[163] Ofgem has stated that this is unlikely to be fair for consumers, as the extra remuneration from higher-than-expected inflation does not relate to consumer outcomes (e.g., quality of service) and creates the potential for excessive remuneration over the long run.[164] This raises questions over the legitimacy of the price control settlement.

A1.6   Therefore, regulators have reconsidered the appropriateness of the current approach. Ofgem has proposed to align the proportion of the RAB that is indexed to inflation in line with licensees' financial structures for RIIO-3. We demonstrate this using an example from Ofgem below (for energy companies).

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[162]   In Ofgem's regulatory framework, RAB is referred to as regulatory asset value ("**RAV**").

[163]   Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex*, ¶2.109 (link).

[164]   Ofgem (2024), *RIIO-3 Sector Specific Methodology Decision – Finance Annex*, ¶2.90 (link).

**Table A1-1: Stylised example of RAB depreciation as presented for RIIO-3**

Metric	Guide	RIIO-2	RIIO-3
Equity proportion of RAB	A = 1 - gearing *(RIIO-3 notional gearing)*	45.00%	45.00%
Index-linked debt proportion of RAB	B	55.00%	16.50%[1]
Fixed-rate debt proportion of RAB	C = 1 − B	0.00%	38.50%
Nominal WACC	D	5.84%	5.84%
Inflation assumption	E	2.00%	2.00%
RIIO-2			
Recovered through RAB depreciation	F = E	2.00%	
Recovered through allowed return	G = (1 + D)/(1 + F) − 1	3.76%	
RIIO-3			
Recovered through RAB depreciation	H = (A + B) × E		1.23%
Recovered through allowed return	I = (1 + D)/(1 + H) − 1		4.55%

Source: Ofgem (2024), RIIO-3 Sector Specific Methodology Decision, RIIO-3 SSMD Allowed Return on Debt future bill impacts, tab 'ET' column Q (link).

Note: (1) The index-linked debt proportion of the RAB for RIIO-3 is calculated using the assumption that 30% of the debt raised by the nominal company would be index-linked. Therefore 30% × 55% (representing the entire debt proportion of the RAB) would be 16.50%.

A1.7   We have reviewed the use-case of implementing a similar mechanism in H8. The impact of this change is to reduce the notional company's exposure to outturn inflation by exposing it to less downside when outturn inflation is lower than expected and less upside when outturn inflation is higher than expected. This ensures efficiently incurred interest costs are appropriately remunerated irrespective of outturn inflation, ensuring the CAA can more effectively meet its financing duty. Additionally, this change protects consumers from overpaying for services due to increases in charges not linked to consumer outcomes.

A1.8   This change is likely to increase charges in the short-term (see Figure A1-1 below) as it effectively accelerates the recovery of the RAB as less of the allowed cost of capital is recovered through indexation of the RAB. However, it will lower charges in the long-term due to lower RAB growth. This impact is NPV-neutral for the notional company.

Figure A1-1: Revenue impact of updated RAB indexation approach
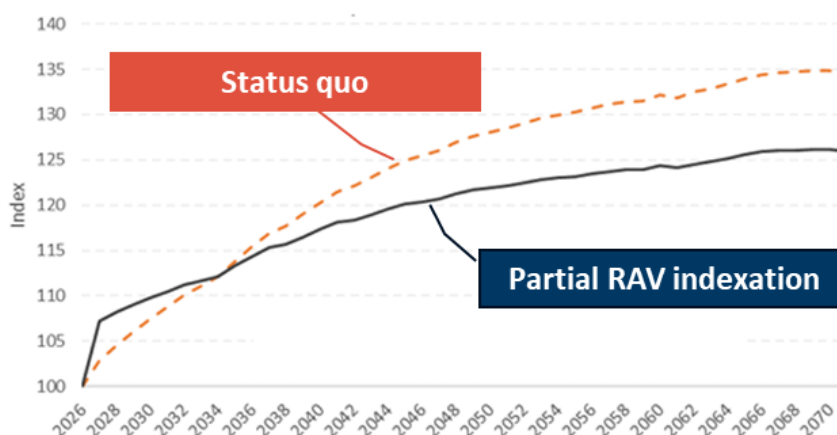
Source: Ofgem (2024), RIIO-3 Sector Specific Methodology Decision – Finance Annex, *Figure 1 (link).*

A1.9   We have assessed this potential change to the cost of debt estimation approach via the five-criteria framework, as shown in Table A1-2 below.

Table A1-2: Assessment of alignment of cost of debt indexation to RAB indexation approach

Accuracy	Regulatory precedent	Limit wider price control impact	Statistical robustness	Practicality	Overall
✓	✓	✗	✓	✓	4/5

Source: FTI analysis.

A1.10   We believe that this change would improve the accuracy of the WACC estimation as the alignment of the cost of debt indexation to the RAB indexation would more accurately reflect the financing costs that the notional company faces.

A1.11   There is some regulatory precedent for the use of this approach, as explained above. Aligning the RAB indexation to the capital structure of the notional company would also improve the statistical robustness of the wider price control as it would better align with the notional company's financing requirements with its revenue allowance.

A1.12   The practicality of implementing this change is likely high, as the steps required are the same as the current approach used by the CAA in setting the cost of debt, i.e., determining the split between fixed and index-linked debt.

Appendix 2 Cost of debt reconciliation

A2.1   In Section 2 we present our updated estimate of the cost of debt for HAL based on the CAA's H7 methodology (updated to 31 July 2024).[165]

A2.2   Specifically, we break down the impact of changes in interest rates and inflation between the cut-off date of the H7 determination and the present day.

A2.3   We illustrate this breakdown in Table A2-1 below:

(1) We start with the cost of debt allowance as determined in H7.

(2) Next, we update the iBoxx indices (which forms the basis for estimating the nominal cost of new debt) to 31 July 2024. We also update the nominal cost of embedded debt based on the nominal cost of embedded fixed-rate debt at the end of H7 but continue to use H7 inflation assumptions.

(3) Finally, we update the inflation assumptions in the calculation, to obtain the cost of debt relevant for informing the early view of the H8 WACC.

A2.4   Table A2-1 below demonstrates that the increase in the cost of debt (due to the shift in the interest rate environment) only leads to a 36 bps increase in the cost of debt. The shift in inflation assumptions accounts for 143 bps of the increase in the cost of debt, having accounted for the change in interest rates.

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[165]   See Section 2E and 2F.

Table A2-1: Breakdown of effects of changes in interest rates and inflation on cost of debt

	Guide	H7	H7 inflation and H8 interest rates	H8 early view
Proportion of fixed-rate debt	A	70%	70%	70%
Proportion of index-linked debt	B	30%	30%	30%
Embedded debt				
Nominal cost of fixed-rate debt		4.22%	4.64%	4.64%
Forecast RPI		5.32%	5.32%	2.59%
Real cost of fixed-rate debt	C (see Table 2-8)	(0.80%)	(0.40%)	2.00%
Nominal cost of index-linked debt		4.22%	4.64%	4.64%
CAA measure of long-term RPI		2.73%	2.73%	2.72%
Real cost of index-linked debt	D (see Table 2-9)	1.45%	1.86%	1.87%
Real cost of embedded debt	E = (C × A) + (D × B)	**(0.12%)**	**0.28%**	**1.96%**
Incremental change			**+40 bps**	**+168 bps**
New debt				
Nominal cost of fixed-rate debt		5.79%	5.93%	5.93%
Forecast RPI		1.54%	1.54%	2.22%
Real cost of fixed-rate debt	F (see Table 2-12)	4.43%	4.41%	3.63%
Nominal cost of index-linked debt		5.68%	5.67%	5.67%
Long-term inflation		2.05%	2.05%	2.05%
Real cost of index-linked debt	G (see Table 2-13)	3.58%	3.72%	3.72%
Real cost of new debt	H = (F × A) + (G × B)	**4.17%**	**4.20%**	**3.65%**
Incremental change			**+3 bps**	**-55 bps**
Proportion of new debt	I	11.61%	11.61%	11.61%
Issuance and liquidity costs	J	0.25%	0.25%	0.25%
Cost of debt	(E × (1 − I)) + (H × I) + J	**0.62%**	**0.98%**	**2.41%**
Incremental change			**+36 bps**	**+143 bps**

Source: CAA WACC Calculator (sheet: 'Cost of debt'), FTI analysis.

Note: (1) The values presented are weighted averages across years, weighted on the basis of the new or embedded debt in each year over the period. (2) The calculation of C, D, F and G rely on annually calculating the real cost of debt for every year in the period and then taking a weighted average – see referenced tables for further detail. (3) The nominal costs of debt include all HAL-specific adjustments, which are also updated in the second step.

Appendix 3 Impact of using an alternative pandemic end date on asset beta

A3.1   In Section 2, we present our updated estimate (as at 31 July 2024) of the asset beta for HAL based on the CAA's H7 methodology.[166]

A3.2   In this appendix, we consider the impact of assuming an updated end date for the Covid-19 pandemic (5 May 2023, as specified by the WHO) relative to the end date selected by Flint in NR23 based on the observed trends in share price data.[167]

A3.3   Table A3-1 below illustrates the updated beta estimates, assuming the same frequency and length of the pandemic as in H7 but with an updated end date for the data presumed to be impacted by the pandemic.

Table A3-1: Impact of pandemic on asset betas under various assumptions

	Guide	Early view of H8 asset beta	Early view of H8 asset beta with WHO pandemic end date
Lower bound	A	0.59	0.54
Upper bound	B	0.66	0.61
Zero weight on pandemic	C	0.57	0.52
Lower bound pandemic effect	D = A − C	0.02	0.02
Upper bound pandemic effect	E = B − C	0.09	0.09

Source: FTI analysis.

A3.4   On the basis of this assessment, we conclude that updating the pandemic end date using all currently available market data does not have a significant impact on the estimate of the pandemic effect on the comparators' betas.

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[166]   See ¶¶2.55 – 2.64.

[167]   World Health Organization (2023), *Coronavirus disease (COVID-19) pandemic* (link).