AlixPartners

Analysis of the CAA's Final Proposals

9 August 2022

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1 Executive Summary

1.1 Background

1.1.1 On 28 June 2022, the Civil Aviation Authority ("**CAA**") announced the Final Proposals ("**FP**") in respect to the economic regulation of Heathrow Airport Limited ("**HAL**") during the five-year charge control period ("**H7**") from January 2022 to December 2026.

1.1.2 AlixPartners has been asked by Virgin Atlantic Airways Limited, British Airways Plc. and Delta Air Lines, Inc. (collectively, "**the airlines**") to examine the FP and provide our independent views as economists on the CAA's analyses.

1.1.3 In particular, we have been asked to:

(a) Examine any changes that the CAA has made to the various building blocks of HAL's economic regulation since its Initial Proposals ("**IP**");

(b) Identify which changes we agree with;

(c) Identify aspects of the CAA's approach that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

1.1.4 Capitalised terms used, but not defined, in this document have the meaning ascribed to them in the FP.

1.1.5 We do not seek to comment on all aspects of the FP. Instead, we focus on the key substantive issues where we either support the CAA's proposals or have material concerns. Where we identify concerns, we seek to identify a superior alternative to the CAA's proposals. While our comments are focussed on specific aspects of the FP, we do not necessarily agree with the aspects of the FP that are not specifically addressed in this report. We also refer to changes made from the CAA's IP, since this provides important context to the FP. The FP follow the IP which were published in October 2021.

1.1.6 At the outset of our analysis, we note that HAL is subject to economic regulation by the CAA because it holds substantial market power as, amongst other things, it is the UK's largest airport and the UK's only recognised international hub. Firms with substantial market power do not face normal competitive pressure. Absent the CAA's regulation, HAL would be expected to set high prices, especially since it is capacity constrained and has limited incentives to attract traffic by lowering prices. Thus, any price control regime should prevent the exercise of market power and seek to set prices in line with efficient costs.

1.1.7 However, as noted further below, the proposed increase in charges that airlines / consumers must pay in H7 is substantial – greatly in excess of that which we see in other comparator airports and in circumstances where Heathrow is already very expensive. Heathrow's airport charges are "among the highest in the world",[1] according to the CAA, and approximatively 70% more

[1] FP, Summary, para 27.

expensive than the next most expensive large European airport.[2] The CAA cannot justify allowing such price increases in the absence of a strong evidence base.

1.1.8 This is particularly important because the regulation allows HAL to retain 100% of the difference between actual and forecasted profits where this is attributable to lower operating expenditure or higher commercial revenues. Thus, if cost allowances and offsetting commercial revenues are not set at the efficient level, then HAL can be expected to reap undeserved windfall profits. This would reduce HAL's incentives to minimise costs and have adverse effects in subsequent price control periods, since costs during H7 are likely to be used to inform the CAA's future cost assessments.

1.1.9 A challenge for the CAA is that there is substantial asymmetry in information between it and HAL. This asymmetry applies especially in relation to passenger forecasts, operating expenditure and commercial revenues. The challenge for the CAA is increased by the fact that, unlike other sectors, it does not have the benefit of close comparators against which to assess HAL's relative efficiency.

1.1.10 The CAA can mitigate the adverse effects of this information asymmetry, for example by:

(a) Requiring HAL to provide very detailed information to justify its business plan. The intensity of regulatory scrutiny should be proportional to the degree of information asymmetry.

(b) Vetting this detailed information with the help of independent experts.

(c) Letting stakeholder groups scrutinise this information, as they would then have good visibility on the underlying details and can use these to provide a robust challenge.

1.1.11 Finally, we consider that well-designed incentive-based regulation should be stable during the course of a price control period. Past regulatory decisions should typically not be re-opened unless this would improve the overall operation of the economic regulation, enhance incentives and more generally be in consumer interests.

1.1.12 With this in mind, our report considers each of the main building blocks of the H7 price controls proposed for HAL.

1.2 Passenger forecasts

1.2.1 Passenger forecasts are a crucial building block in the CAA's calculation of airport charges. The charges are calculated on a per-passenger basis and thus highly sensitive to changes in the passenger forecasts. Further, passenger traffic is a key driver of HAL's operating expenditure ("**opex**") and commercial revenues. As the aviation sector proceeds from the pandemic in H7, passenger forecasts are perhaps more important than in any previous regulatory control period and under- or overestimating the rate of traffic recovery could lead to airlines and consumers paying materially too much (or, too little) in airport charges.

1.2.2 In this context, it is essential that the CAA be in a strong position to provide robust and credible forecasts in its regulatory model, and that other stakeholders be given the information required to effectively engage in the decision-making process. However, the CAA has not produced an independent traffic forecasting model and instead relied extensively on HAL's business plan. This raises concerns as HAL stands to gain from unduly pessimistic forecasts. Furthermore, it is

[2] 'Benchmark of airport charges and taxes', SEO Amsterdam Economics, 2021. Available at: https://25cjk227xfsu3mkyfg1m9xb7-wpengine.netdna-ssl.com/wp-content/uploads/2021/03/2021-04-Benchmark-airport-charges-and-taxes-executive-summary.pdf

concerning that these models have not been made available for interested parties to consider in detail.

1.2.3 In its FP, the CAA uses HAL's forecasting model as the starting point of its approach. The CAA then makes several (modest) amendments to HAL's model, regarding its assumption on business travel, Covid demand overlays and carbon pricing. In addition, the CAA considered seven external forecasts which each cover different metrics, geographies, or time periods. Given the large divergence between HAL's and airlines' views on passenger forecasts, it seems natural to compare HAL's projections to independent external forecasts and use all available evidence. Here, the CAA has moved in the right direction since the IP by accounting to some degree for external forecasts.

1.2.4 However, we consider there are still material shortcomings with the CAA's approach to forecasting passenger volumes. Overall, the FP passenger forecasts estimates are very close to the CAA's amended HAL model. Indeed, the FP yearly passenger forecasts lie within 1 million passengers of the CAA-amended HAL's forecast in each year from 2023-2026. Only in 2022 has the CAA made an adjustment of 3 million passengers. Despite amending a few of HAL's assumptions, the reality is that the CAA still heavily relies on HAL's model.

1.2.5 To have a clearer idea of the impact of its changes, we have run the CAA's "Price Control Model"[3] for different passenger traffic projections. The CAA's model calculates the charges per passenger, based on the forecasted passenger traffic, while keeping the projections for the other building blocks constant, i.e., opex, commercial revenues, etc. We have not adjusted opex and commercial revenues impacts but we have also run the airline passenger numbers through the CEPA opex and commercial revenue models and found that the increase in commercial revenue will exceed the higher opex, and so if anything the negative impact on prices will be greater. Therefore, the CAA's approach is conservative.

Table 1.1: CAA's charge per passenger model projections, depending on the passenger traffic forecasts

FP - £m 2020, CPI-real	2022	2023	2024	2025	2026	H7 Total
HAL RBPu2 Mid model						
Passengers (m)	45.5	58.0	67.7	71.8	74.1	317.1
Profiled yield per pax	27.4	27.6	27.7	27.9	28.1	27.7
CAA-amended HAL Mid model						
Passengers (m)	52.0	67.7	76.5	80.1	81.1	357.4
Profiled yield per pax	27.4	26.0	24.7	23.4	22.2	24.7
CAA FP Mid model (risk factors adjustments + 0.87% shock)						
Passengers (m)	54.9	67.3	75.4	81.0	81.6	360.2
Profiled yield per pax	27.4	25.9	24.4	23.0	21.7	24.5

Sources: CAA Price Control Model; FP, Tables 1.4 and 1.5; AP Analysis.
Note: The profiled yields per pax are calculated by replacing the passenger volumes used as the input of the CAA price control model.

1.2.6 As shown in Table 1.1, HAL's passenger projections lead to significantly higher charges on average over the H7 period, 13% higher, than the ones the CAA suggested in its FP (£24.5 per passenger). The traffic projections based on the CAA-amended model lead to charges per pax 11% lower than

[3] CAA, 'Price Control Model' (caa-h7-pcm-v2-10-mid-pax-profiled-fp-external2.xlsm), available at: https://www.caa.co.uk/commercial-industry/airports/economic-regulation/h7/consultations/final-and-initial-proposals-for-h7-price-control/.

based on HAL's projections. However, the forecasted traffic with the CAA final risk adjustments and the negative shock does not significantly alter the calculated charges per passenger, reducing these by only 1%.

1.2.7 In our view, there are superior ways to the CAA's approach to passenger forecasts that would reduce information asymmetries and the FP's reliance on HAL's model. First, the regulator could ensure full transparency of HAL's model and allow the airlines to provide robust challenge. HAL's business does not include selling passenger forecasts, thus it is far from obvious why the disclosure of its model would cause it any commercial harm – other than to the extent that this would reduce charges per passenger at Heathrow. It would also help wider industry stakeholders to understand and test why the model predicts such gradual convergence towards Heathrow's capacity.

1.2.8 Second, we recommend that the CAA reassesses its 2022 passenger volumes projections based on the recent actual 2022 volumes, that predict a much higher recovery rate in June 2022 than in the first few months of 2022.

1.2.9 Third, the CAA can rely on external forecasts as a base model, as these are not subject to similar under-forecasting incentives as for HAL. Relying on the ACI and IATA independent traffic forecasts would generate charges per passenger that would be 5% lower than in the FP on average over the H7 period (£23.2 v. £24.5), based on the CAA's price control model calculations.

1.2.10 We further understand that the CAA has applied an annual shock factor its traffic forecasts to reflect the incidence of non-pandemic shocks. To the extent that HAL used historical data for its estimates, it is important to consider whether these estimates already implicitly account for the impact of these shocks. It is also important to consider whether passengers delayed their travel until the end of the shock period, which would allow HAL to recapture the lost traffic. Lastly, any asymmetric adjustments to passenger forecasts should account for the TRS, which will dampen the magnitude of asymmetric shocks going forward.

1.3 Traffic risk sharing mechanism

1.3.1 In previous regulatory periods, HAL was exposed to all traffic-related risk, which resulted in significant cycles in HAL's actual and regulatory return on RAB and contributed to its high WACC relative to other UK utilities. Due to the uncertain rate of recovery from the pandemic, the CAA has decided to introduce a Traffic Risk Sharing ("**TRS**") scheme for H7.

1.3.2 In particular, the CAA proposes a mechanism to share the risk arising from deviations from forecasted revenues. The amount of risk to be shared each year is calculated as: 50% of any difference up to 10% of forecasted revenues, and 105% of any difference above 10% of forecasted revenues.

1.3.3 However, positive deviations in traffic will generally have limited benefit for airlines and consumers due to HAL's capacity constraints, particularly as underlying traffic demand recovers. Thus, the upside scenario of the TRS mechanism does not accurately reflect the impact of positive traffic deviations. Under this mechanism, HAL would be protected from negative traffic deviations with little incentive to promote traffic growth. To address these issues, the CAA could instead implement asymmetric risk sharing (e.g., a 60/40 sharing agreement) to counteract the currently proposed asymmetry between HAL's and airlines' traffic risk exposure.

1.3.4 Further, the CAA's choice of a 105% "outer band" risk sharing is calculated to protect HAL from most of the EBITDA impact during periods with low traffic. Depending on the realisation of actual opex and commercial revenues, we consider that this mechanism may leave HAL with limited incentives to promote greater traffic, or even a negative incentive to constrain traffic. Although deviations beyond 10% are considered a rare event, miscalibrations of the outer band could have severe consequences on HAL's incentives to promote traffic recovery. Thus, we consider that the CAA should drop the use of an outer band.

1.4 Opex

1.4.1 The CAA seeks to provide an allowance for HAL's opex to ensure HAL's ability to cover its everyday costs of operating Heathrow airport, while also incentivising HAL to run the airport efficiently and minimise its costs.

1.4.2 In the IP, the CAA provided a range for HAL's H7 opex allowance that consisted of weighted averages between forecasts by HAL and an independent expert, CTA. Since the IP, the CAA has asked CTA to revise its forecast based on new information provided by HAL. In response, CTA increased its opex forecast from £5,215 million to £5,797 million (2020 CPI prices) for H7. This increase is driven by two factors. First, CTA has increased its opex assumptions across all categories in response to the new information provided by HAL. In particular, it now assumes higher staff requirements during HAL's security transformation, higher utility costs, and higher insurance costs. Second, the FP opex estimate is based on a higher passenger forecast than during the IP. The CAA then adopted CTA's revised forecast.

1.4.3 It is sensible for the CAA to adopt CTA's forecast instead of calculating a weighted average that relies on HAL's own business model. Given the substantial information asymmetry between HAL and the CAA, combined with the fact that HAL retains 100% of any cost savings, the use of a weighted average would provide HAL with additional incentives to overstate its opex estimate and earn windfall profits.

1.4.4 However, there are still fundamental issues with the CAA's assessment of HAL's opex forecasts. First, HAL appears to have provided limited detail or justification for its costs, and thus CTA's opex assessment is likely to both lack precision and overstate efficient costs. Second, the CAA has relied on selective information provided by HAL to justify certain cost increases, which it has then asked CTA to apply to produce a revised estimate. There has been no real opportunity for the airlines to provide customer led challenge, which would require disclosure of the underlying data and methodology. Thus, HAL is effectively rewarded for providing poor quality information in an environment where it reaps 100% of the benefits from any cost reductions below forecast.

1.5 Commercial revenues

1.5.1 The CAA further provides an allowance for HAL's commercial revenues, which is deducted from HAL's overall revenue requirement to ensure that the airport charges are no higher than necessary.

1.5.2 Similar to its opex forecast, the CAA initially provided a range for HAL's H7 commercial revenue allowance in the IP that consisted of weighted averages between forecasts by HAL and CTA. Since the IP, the CAA has asked CTA to revise its forecast based on new information provided by HAL. In response, CTA lowered its forecast of commercial revenues (excluding cargo) since the IP from £4,608 million to £4,204 million (2020 CPI prices) over H7. Again, this revision is driven by two factors. First, CTA decreased its revenues assumptions across all categories in response to new

information provided by HAL. In particular, the CAA estimates lower terminal drop-off charges, lower retail revenues, and uses a lower "management stretch" assumption. Second, the FP estimate is based on a higher passenger forecast than the IP. The CAA then adopted CTA's revised forecast.

1.5.3 As with opex, it is sensible for the CAA to adopt CTA's revised forecast instead of calculating a weighted average between HAL's and CTA's revised estimates, however, there also remain fundamental issues. First, the CAA accepted HAL's views on the impact of tax changes on retail revenues. However, we would expect retailers to adopt mitigating strategies to preserve profits, e.g., by renegotiating lower wholesale prices. Second, the CAA has set a modest 1% management stretch target, which is at the low end of what HAL was able to achieve historically. CTA conducted a detailed econometric analysis and found that the management stretch target could reasonably lie in the range of 1-2%. In addition, the CAA removed certain revenue categories from the management stretch target which might be outside of HAL's control, lessening the overall need for HAL's to enhance revenues even further. In light of this, the CAA's approach to adopt the bottom of CTA's range is flawed. We consider it would be prudent and in the interest of consumers to choose a higher, yet still achievable target. If the CAA decided to lower its management stretch target despite the results of CTA's econometric analysis, one possible approach would be to at least choose the mid-point of CTA's revised range. That is, the CAA should consider a management stretch target between 1.5% and 2% instead of the minimum 1% assumption.

1.6 Capex

1.6.1 For H7 the CAA is introducing an incentive regime to promote cost efficiency by HAL in its capital expenditure ("**capex**"). This takes the form of a symmetrical 25% sharing of cost over- or underruns relative to a capex baseline.

1.6.2 In our view, the CAA should set a higher capex sharing factors for two reasons. First, the CAA has calculated that even a 30% overspend – which it considers "highly unlikely" as the H7 capex plan is smaller and less complex and HAL's forecasting is "generally good" – would only result in a c. 0.6% reduction in HAL's Return on Regulatory Equity ("**RORE**"). The CAA rightly describes this as a "relatively modest" downside risk. Accordingly, in our view, the incentive sharing rate for overspend should be 50%.

1.6.3 Second, the fact that HAL has never faced *ex ante* capex incentives is highly relevant, but for different reasons than considered by the CAA. This is a very different scenario to water/sewerage and energy networks, which have had *ex ante* capex incentives for a long time. Accordingly, we would expect there to be material scope for HAL to improve its delivery of capex projects.

1.6.4 This latter point leads to the question of whether rates should be symmetric as regards both over- and underspend. The CMA, on investigating PR19 in the water sector, concluded that a degree of asymmetry was appropriate for the disputing companies – 55% incentive for overspend and 45% for underspend against regulatory allowances, reflecting issues with the quality of the information they provided. Accordingly, at G3 it would be wholly appropriate to incentivise HAL to submit high quality information on capex costs as it would otherwise face a less favourable sharing rate as regards the proportion of cost savings that it is allowed to retain. HAL retaining 40% of cost savings (i.e., 10 percentage points lower than the sharing of overspends) if capex plan quality is not high would seem entirely reasonable and retain a sensible balance as to overall incentives.

1.7 Cost of capital

1.7.1 The CAA has followed the accepted methodology of the Capital Asset Pricing Model ("**CAPM**") to determine the cost of equity. This model is used by all UK economic regulators and the CMA. Furthermore, the CAA has used generic parameters and assumptions consistent with recent regulatory and CMA decisions.

1.7.2 Compared to the IP, the CAA has significantly corrected its methodology in the FP to estimate HAL's asset beta. Whilst the CAA maintains a starting point of the asset betas of other major airports (asset beta range of 0.52 to 0.71), it now adopts a methodology for computing the impact of the TRS by assuming a convergence towards the observed average asset beta for the England and Wales water companies and Great Britain energy networks (asset beta of 0.342). This is a reasonable approach given the number of relevant similarities between HAL and the other UK regulated entities:

(a) First, the water and energy networks are regulated on 5-year price controls, providing returns on a RAB indexed on UK inflation – so that it maintains value in real terms;

(b) Second, both HAL and the water and energy networks operate under output and service quality incentives regimes with bonus and penalty payments.

(c) Third, there are structural similarities in the cost structures between HAL and the other UK regulated companies.

(d) Fourth, the England and Wales water companies and Great Britain energy networks carry relatively low volume risk. This would be the same as HAL were the TRS calibrated to pass all the risk onto airlines, suggesting that some adjustment would be appropriate to allow for how the TRS will operate in practice (discussed further below).

1.7.3 Whilst generally agreeing with the CAA's revised methodology to calculate HAL's asset beta, we have material concerns with how the CAA has calibrated its methodology in relation to the adjustments made to the asset beta to allow for the TRS, which is new to H7. We support an alternative calibration that recognises that, other than traffic risk, HAL exhibits virtually the same degree of risk as other regulated network industries. This substantially reduces the top end estimate of the range for HAL's asset beta.

1.7.4 On cost of debt, the CAA has correctly reduced the look-back period for calculating the benchmark for HAL's embedded cost of debt to 13.5 years, so as to mirror the actual tenor/structure of HAL's debt. We do, however, have continuing concerns over whether the CAA's FP use of a 13.5 lookback period is sufficiently shortened and, on the basis of data provided in the FP, believe that a 10 year lookback period is appropriate.

1.7.5 On WACC, the CAA decided in its FP to choose the mid-point of a range of potential estimates that it provided in the IP. We agree with the CAA's concern about the impact of high inflation on the TMR. We also understand the UKRN's concerns on ensuring high investment incentives over lower consumer prices. However, over H7 it is clear that affordable prices are the principal concern as the aviation sector recovers from the pandemic. We also believe that the CAA failed to take account of the fact that aiming down within the range of WACC estimates will compensate for information asymmetries that exist between HAL and the CAA in terms of passenger forecasts, opex, and commercial revenues (should the forecasts remain as in FP). If these issues are not addressed by the CAA, then there is a clear case for aiming down within the WACC range.

1.8 Regulated asset base

1.8.1 The Regulated Asset Base ("**RAB**") captures the value of HAL's investments and capital spend and constitutes an important component of the CAA's economic regulation of HAL.

1.8.2 In its IP, the CAA decided to adjust the RAB by £300 million to reflect HAL's recent capital spend commitments. The CAA retained this RAB adjustment as part of its FP and rejected HAL's requests for any further RAB adjustment.

1.8.3 We consider that further RAB adjustments are likely to result in price increases for passengers.

1.8.4 In relation to the £300 million adjustment, we consider that any such adjustment must be contingent on the delivery of the planned capital spend (for which the adjustment was granted) to provide HAL with appropriate incentives. Hence, the CAA should adjust HAL's RAB if it fails to deliver on the specific investment commitments.

1.9 Outcome based regulation

1.9.1 To ensure service quality at Heathrow, the CAA defines a set of outcome-based incentives for HAL. This approach should provide a framework that quantifies whether HAL meets certain quality standards and guarantees a positive consumer experience.

1.9.2 The CAA proposes both survey-based and operational targets, combined with financial and reputational incentives, as well as rebates that HAL must pay if it fails to meet the targets. As part of its FP, the CAA suggests reclassifying some of these measures from financial to reputational incentives and removing targets if little evidence was submitted to support them, or if they are outside of HAL's control. However, a number of issues remain as regards the FP.

1.9.3 First, the CAA's approach to target setting relies heavily on HAL's proposals. The CAA also commissioned an independent expert, Arcadis, to propose appropriate targets for most of its incentives. The CAA should adopt the mid-point of Arcadis' recommended range, or otherwise justify why a more cautious approach, i.e., using the lower bound, would be justified.

1.9.4 Second, the CAA should aim to design its targets and penalties/bonuses to incentivise performance improvement from HAL. In its FP, several targets are set at the previous price control level or below. This approach does not align with HAL's commitment to maintain or increase service quality related to the RAB. This is particularly true for the bonuses HAL would receive for meeting its target on security queues times, which would be easily achievable based on Arcadis' analysis.

1.9.5 Third, we consider that the CAA should set its targets on a granular basis to the extent possible. This would reinforce HAL's incentives to avoid a poor customer experience or low passenger traffic. We consider it is reasonable to set targets on a daily or per-flight basis, as a per-passenger basis might be too costly to implement.

1.9.6 Fourth, we consider that a mid-term review will support the CAA's continuous improvement objective. As well as collecting more data, this review would allow the CAA to solve several issues left unaddressed in its FP, including carbon pricing measures, new measures targets or the appropriate granularity level to use as the basis of several targets.

1.9.7 Finally, we find concerning that the CAA assumes that HAL will necessarily be well placed to act in the best interests of customers. HAL has substantial market power and this consequently

reduces its incentives to offer high service quality (particularly where this enables HAL to reduce costs), which further justifies the regulatory role of the CAA in the first place.

2 Introduction

2.1 AlixPartners' instructions

2.1.1 AlixPartners has been asked by Virgin Atlantic Airways, British Airways and Delta Air Lines to provide our independent views as economists on the CAA's FP for the economic regulation of HAL during the H7 charge control period.

2.1.2 In doing this, we also refer to changes made from the CAA's IP, since this provides important context to the FP.

2.2 Scope of this report

2.2.1 We do not seek to comment on all aspects of the FP. Instead, this report focuses on the key substantive issues where we either support the CAA's proposals or identify aspects of the CAA's approach that raise material concerns due to clear shortcomings. Where we identified such shortcomings, we seek to identify a superior alternative to the CAA's proposals. Whilst our comments are focussed on specific aspects of the FP, our report covers the main building blocks of the H7 process, and the key determinants of the overall price controls proposed for HAL.

2.3 The key principles of incentive based economic regulation

2.3.1 Before commenting on the FP, it is helpful to perhaps set out some general principles as regards the issues that well designed, incentive based economic regulation seeks to address, since this informs our comments. These points should be entirely uncontroversial.

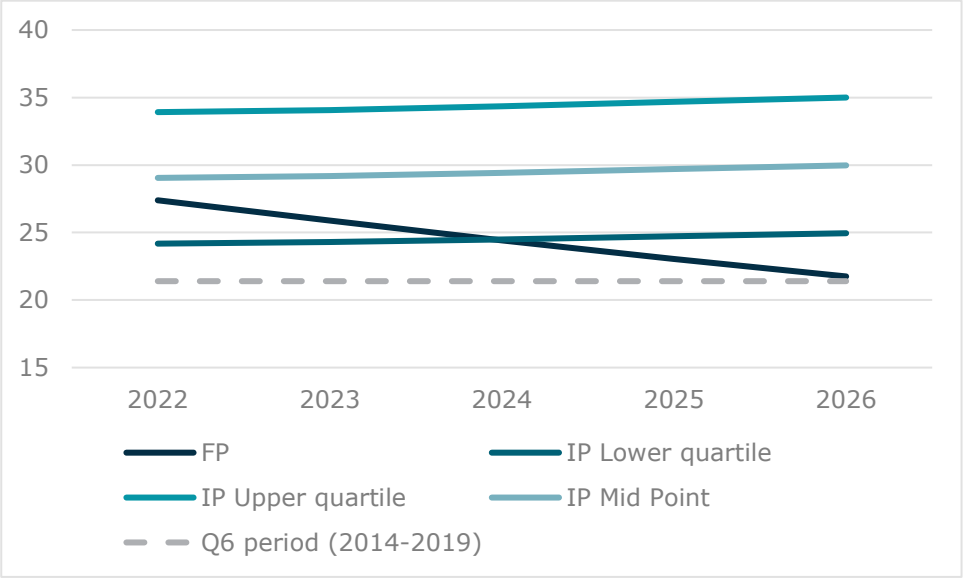
2.3.2 The first point is that HAL is subject to economic regulation because it has been held to possess substantial market power as the UK's and London's largest airport and its international hub status, and one that is generally capacity constrained, thus further limiting its incentives to cut prices to attract traffic. Accordingly, absent economic regulation, HAL would be expected to set high prices, leading to a loss of allocative efficiency, which is maximised where prices are in line with efficient costs. Indeed, even with economic regulation, HAL's charges are substantially higher than charges at other major European capital cities, being approximatively 70% more expensive than the next most expensive large European airport.[4] The CAA acknowledges that "HAL's airport charges are among the highest in the world, and left unconstrained, its market power has the potential to damage the interests of consumers".[5]

2.3.3 The overall outcome of the FP is that the CAA is proposing a very large increase in HAL's charges per passenger, particularly reflecting its conclusions as to passenger forecasts at Heathrow, and HAL's operating expenditure and offsetting commercial revenues. This is also in the context that HAL has been substantially de-risked as a business through the operation of a new traffic risk sharing mechanism, and it retains 100% of the benefit of any savings in costs or increases in commercial revenues. The magnitude of the price increases associated with the FP is shown below.

[4] SEO Amsterdam Economics, 'Benchmark of airport charges and taxes', 2021, available at: https://25cjk227xfsu3mkyfg1m9xb7-wpengine.netdna-ssl.com/wp-content/uploads/2021/03/2021-04-Benchmark-airport-charges-and-taxes-executive-summary.pdf

[5] FP, Summary, para 27.

Figure 2.1: Profiled yield per pax (£ 2020, CPI-real)



Sources: IP, Table 11.2, para 9-10; FP, Table 3; AP Analysis.
Note: The average Q6 price cap is derived from the IP paras 9-10, stating that £34.40 represents a real increase in airport charges of around 60%, and £24.50 would represent a real increase of about 15%.[6]

2.3.4 Compared to the Q6 price control period, the FP's average charge per passenger represents a 14.5% real increase. These price increases are, by any measure, substantial – and there ought to be a compelling body of evidence to justify imposing such an increase given the CAA's primary duty to further consumers' interests. These price increases are also being proposed in the context that in contrast to the global airline industry, HAL's shareholders, as noted in the IP,[7] did not make any new equity injection into HAL during the Covid-19 pandemic.

2.3.5 The second important point is firms with substantial market power do not face normal competitive pressure to minimise their costs, and thereby maximise productive efficiency. To quote Hicks, "the best of all monopoly profits is a quiet life", with the importance of competition as a driver of efficiency being emphasised by the CMA's report on this subject, entitled "Productivity and Competition."[8]

2.3.6 Accordingly, key features of any price control regime are that it should i) prevent the exercise of market power and seek to set prices in line with efficient costs, and ii) minimise costs - and in HAL's case also maximise its offsetting commercial revenues. This is particularly important in a regulatory environment where HAL retains 100% of the benefit from any cost savings or commercial revenue increases – if cost allowances and offsetting commercial revenues are not set at the efficient level, then HAL can be expected to reap undeserved windfall profits and/or to have reduced incentives to minimise costs. A failure to minimise costs during H7 will also have adverse effects in subsequent price control periods, since costs during H7 are likely to be used to inform the CAA's cost assessments in H8. For example, in its FP, the CAA considers HAL's cost in 2019 as the "base level" for its assessment of HAL's cost efficiency.[9]

6 IP, Summary, paras 9-10.
7 IP, 'Financial Issues', para 8.12.
8 CMA, 'Productivity and Competition – A Summary of the Evidence', 9 July 2015.
9 See, e.g.: FP, Section 2, para 4.11.

2.3.7 A further driver of price controls – particularly given the capital-intensive nature of regulated businesses such as HAL – is the regulated company's cost of capital. Unsurprisingly, this issue has been covered extensively by all of the sectoral regulators and has been considered by the CMA, and thus it would be sensible to consider these determinations in assessing HAL's cost of capital. This is particularly the case as other European airport groups operate a range of airports, including small airports, airports outside Europe, and airports that focus more on leisure passengers.[10] In this regard, it is important that proper allowance is given to how the CAA's proposed traffic risk sharing mechanism reduces the volume related risks faced by HAL (which vary with the state of the economy), and thus reduces its costs of equity. Similarly, it is important that allowances for cost of debt are based on appropriate benchmarks for HAL's debt taking account of its maturity profile.

2.3.8 A challenge for regulators is that there is a substantial asymmetry of information between them and the regulated company. In HAL's case, this particularly applies in relation to passenger forecasts (where HAL has refused requests from CAA to share its forecasting model(s) with the airlines), operating expenditure and offsetting commercial revenues. This asymmetry is unchecked by industry benchmarking comparisons, in contrast to the extensive benchmarking that occurs in relation to UK water/sewerage networks and electricity/gas distribution networks.

2.3.9 There are, in essence, three strategies that can be adopted in combination to reduce (but not eliminate) the adverse effects of this information asymmetry:

(a) To require the regulated company to provide very detailed information, so as to justify in detail its business plan and financial proposals. This could, inter alia, involve detailed bottom-up costing analyses, evidence of benchmarking and market testing, comprehensive technical analysis on all material cost/revenue drivers, engineering cost justification plans for all material expenditures, descriptions of "business as usual" cost minimisation strategies and so on. The intensity of regulatory scrutiny should be proportional to the degree of information asymmetry (i.e. the greater the asymmetry, the greater the scrutiny), and the commercial context (e.g. the extent of the costs increases being sought).

(b) For this detailed information to then be vetted and assessed by independent consultants with relevant expertise. Such expertise can be highly valuable due to the technical nature of the assessments required, and regulators are not in the day-to-day business of doing this work reflecting that they are instead regulators with wider duties and price controls are periodic. However, high-level information as regards the regulated entity is difficult to assess or challenge objectively – in short, our experience is that the devil is in the detail.

(c) For this overall body of information to be tested and scrutinised by industry stakeholders, who would then have good visibility on all of the underlying detail and can use their expertise to objectively provide robust challenge.

2.3.10 A final feature of a well-designed, incentive based regulatory regime is that the regime should be stable during the course of a price control regime and previous regulatory decisions should typically not be re-opened unless this would improve economic efficiency and the overall operation of the system of economic regulation. For example, there may be particular uncertainties around some element of the price controls that would warrant a mid-term review (as proposed by the

[10] This is extensively discussed in the IP, Chapter 9, and expert reports by Flint Global.

CAA for "continuous improvement" on the OBR regime), or more generally a material change in circumstances that would warrant review, but these should be subject to a high threshold.

2.3.11 This does not mean that the system of regulation should not evolve over time, but the system of price control involves a specific allocation of risk between regulated companies and their customers over the course of a price control period.

3 Passenger forecasts

3.1 Introduction

3.1.1 As part of the FP, the CAA acknowledges that passenger forecasting is a crucial part of airport charges calculations, on its own and as part of the other building blocks price control calculations:

> "The number of passengers using Heathrow airport is of central importance to the overall economics of the airport and the passenger forecast we make is a key driver of our calculation of the level of airport charges. It is also an important driver of our forecasts of operating costs, capital expenditure and commercial revenues, each of which is affected by the number of passengers that use the airport." [11]

3.1.2 Given its central role, we consider that using the best available evidence to inform passenger forecasts is essential. In this section, we describe and offer comments on the overall approach adopted by the CAA to the determination of passenger forecasts, and then discuss CAA's methodological changes regarding the passenger traffic forecast since the IPs were published.

3.1.3 This remainder of this section is divided into five parts:

(a) Section 3.2 summarises our high-level concerns about the overall regulatory process adopted by the CAA in relation to the passenger forecasts.

(b) Section 3.3 summarises the evidence and source updates that occurred during the Consultation phase following the CAA's IP. More specifically, the section describes how HAL updated its forecasting model and the airlines' forecast based on Eurocontrol's model.

(c) Section 3.4 summarises the changes from the CAA's IP. The CAA amended several assumptions used in the model HAL submitted, related to the recovery of business travel, Covid demand overlays and carbon pricing. It also considered a range of external forecasts to benchmark the CAA-amended HAL forecast, and adjusted its projections to account for wider industry risks, namely staffing issues, inflation, energy prices and household expenditure.

(d) Section 3.5 identifies the changes that we support. The CAA's approach to challenge several assumptions in HAL's model is sensible, as is its commissioning of reports by independent expert consultants. Nonetheless, we consider that the CAA's changes are too minimal to provide a robust forecasting methodology.

(e) Section 3.6 identifies the changes that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon. The CAA still over-relies on HAL's forecasting model. It likely under-forecasts the 2022 traffic when comparing to the passenger volumes recorded in the first half of the year. It only places minimal and arbitrary weight on the external forecasts provided by independent expert institutions. We also challenge the CAA's use of asymmetric shock adjustments. Finally, this section provides an alternative approach to robustly estimate passenger traffic over the H7 period, based on independent expert evidence.

[11] FP, Section 1, para 1.1.

3.2 Comments on the CAA's overall approach to passenger forecasts

3.2.1 The CAA clearly recognises the crucial role that passenger forecasts play in the determination of landing charges for Heathrow Airport. If anything, as the aviation sector proceeds following the pandemic, the impact of passenger forecasts is even more crucial than in most regulatory control periods. This is because were the CAA to materially underestimate (or overestimate) the rate of recovery in passenger traffic this could lead to airlines and consumers paying materially too much (or, too little) in airport charges compared to the costs incurred by HAL. In addition to the powerful direct impact that a change in passenger numbers has on the landing charge on a per-passenger basis, changes in passengers can also have an important impact on commercial revenues for example due to increased spending on retail offerings and car parks. While they can also lead to higher costs, given economies of scale at airports it would be expected that this would lead to lower operating costs, on a per-passenger basis.

3.2.2 In this context, it is essential that the CAA be in a strong position to provide robust and credible forecasts in its regulatory model, and that other stakeholders be given the information required to effectively engage in the decision-making process.

3.2.3 However, in this regard, the process does not provide confidence that the most robust passenger forecasts are feeding into the price control. This is due to the following:

(a) The CAA, in its discussion of passenger forecasts in the FP, has not produced an independent traffic forecasting model but has instead relied extensively on HAL's business plan. This raises a material concern in the context where HAL stands to gain from very conservative (or unduly pessimistic) forecasts.

(b) Furthermore, given the central position that HAL's traffic forecasting model plays within the process for determining traffic forecasts (and by extension the whole of the H7 charge control), it is very concerning that these models have not been made available for interested parties to consider in detail.

3.2.4 This is in spite of the fact that HAL's pessimistic forecasts may be contrasted with those of various other industry participants.

3.3 Changes during the Consultation phase following the CAA's IP

3.3.1 As part of the IP consultation phase, HAL provided a Revised Business Plan Second Update ("**HAL RBPu2**"), using more up-to-date underlying figures,[12] relaxed travel restrictions assumptions,[13] an updated carbon pricing assumption[14] and a reduced shock factor.[15]

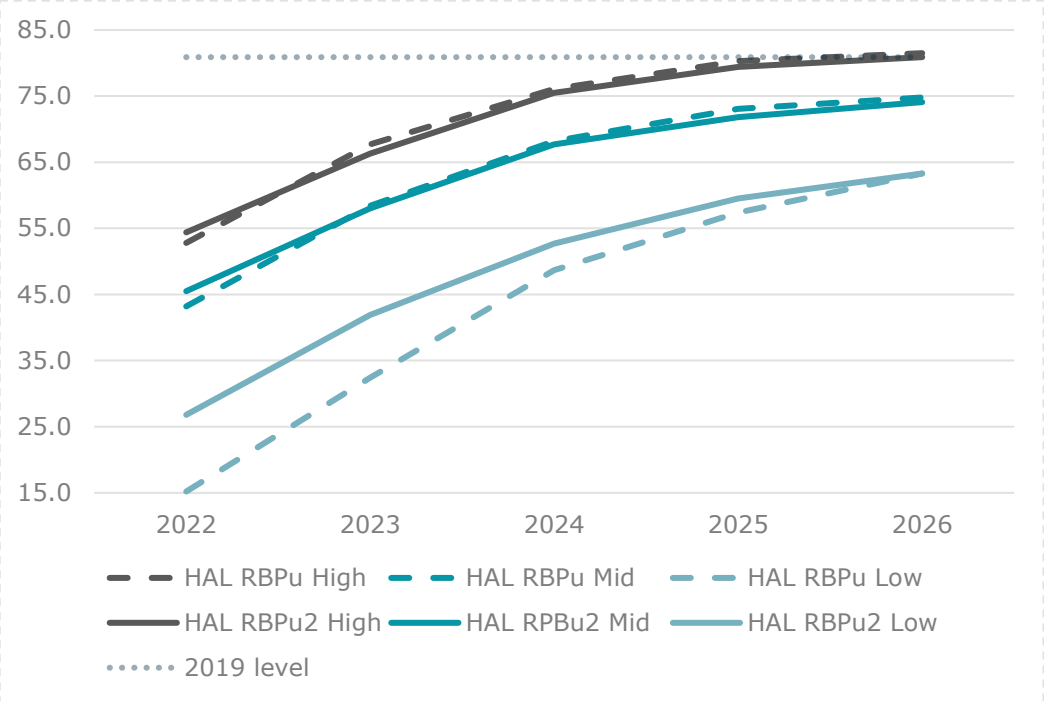
[12] HAL RBPu2 model uses "more recent data and updated modelling of demand according to level of covid-19 related travel restrictions", as well as "refreshed econometric assumptions, including the use of the latest Oxford Economics forecast" (FP, Section 1, para 1.27).

[13] HAL RBPu2 model uses "refreshed assumptions regarding such travel restrictions and the pace of recovery" (FP, Section 1, para 1.27).

[14] HAL RBPu2 model uses "updated carbon price assumption (sourced from BEIS), which now reflects the social cost of carbon where previously this was based on a reduced carbon price" (FP, Section 1, para 1.27).

[15] HAL RBPu2 model uses "a reduction in the shock factor from 1.46% to 0.87% based on an updated estimate which also excludes pandemic risk from the shock factor calculation, in line with the CAA's methodology on the asymmetric risk allowance in Initial Proposals" (FP, Section 1, para 1.27).

Figure 3.1: HAL's Model - RBPu v. RBPu2, Passengers (m)



Sources: FP, Table 1.1 and 1.2; AP Analysis.

3.3.2 As highlighted in Figure 3.1, the revisions to HAL's model between the IP and FP do not lead to substantial changes for the Mid and High Scenarios, albeit the Low scenario has been adjusted as it was based on excessively pessimistic travel restrictions assumptions, leading to predicting unrealistically low levels for the early years of the H7 period. Only the high scenarios predict recovery to 2019 levels within the H7 period, and only by 2026.

3.3.3 The CAA also considered airline projections provided during the Consultation phase. The airlines forecast used internal scheduling and booking data, as well as the UK flights growth rates estimated by Eurocontrol, and adjusting for Heathrow's capacity constraints. This forecast predicts recovery to 2019 passenger levels by 2024.

3.3.4 The CAA commissioned some further analyses from independent experts to feed in the assumptions used in its model. In particular, the CAA asked Skylark to produce an independent report on business travel trends,[16] in order to allow the CAA to assess the robustness of HAL's model assumptions on business travel.

3.3.5 The CAA used these updated sources and new evidence to forecast passenger traffic as part of the FP.

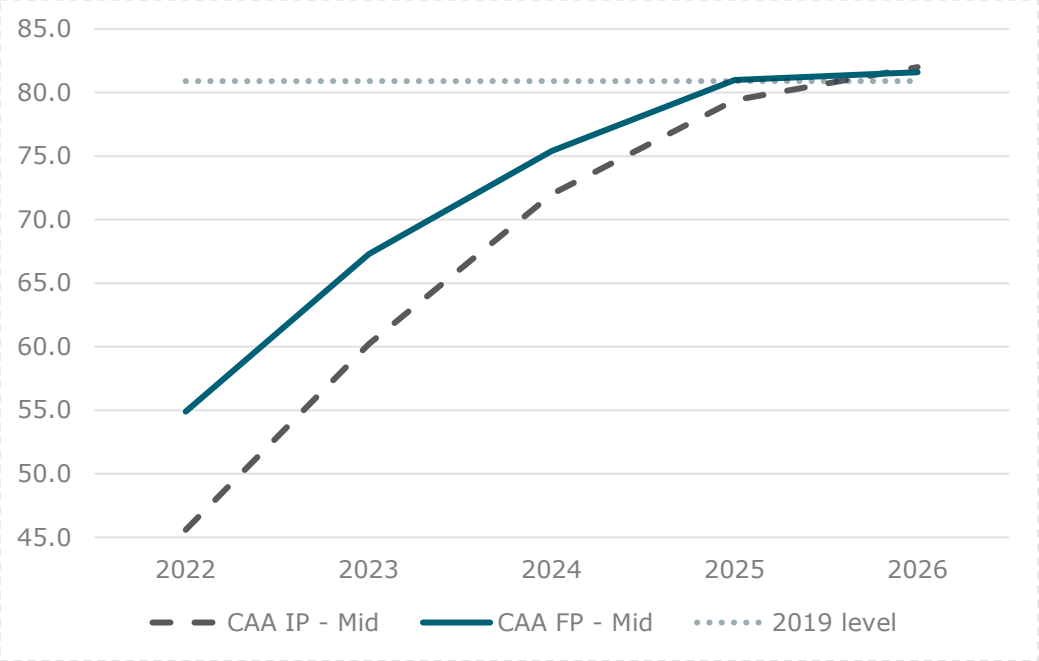
3.4 Changes from the CAA's IP

3.4.1 As part of its FP, the CAA implemented a series of methodological changes, and considered updated evidence submitted during the Consultation phase. The CAA amended specific assumptions of HAL's model, considered a wider range of external forecasts and adjusted its forecasted figures to account for independent forecasts and industry risks.

[16] Skylark, 'Business Travel trends', March 2022.

3.4.2 In the FP, the CAA predicted that passenger traffic will recover to its 2019 levels by 2025, as opposed to 2026 in the IP. This is shown in Figure 3.2 below.

Figure 3.2: CAA passengers forecasts – IP v. FP, Passengers (m)



Sources: FP, Table 1.1 and 1.6; AP Analysis.

3.4.3 As set out above, the CAA expected higher flows of passengers at the beginning of the H7 period than in its IP. Both set of proposals predict that the number of passengers will converge towards 82 million in 2026, due to Heathrow's capacity constraints. Having outlined the CAA's main changes and its views on third party forecasts that have been prepared in the ordinary course of their business, the next sub-section considers the specific amendments the CAA made to HAL's forecasting model to derive the passenger numbers in its FP.

Amendments to HAL's forecasting model

3.4.4 First, the CAA has continued to place an important weight on HAL's model. However, the CAA modified a set of assumptions in HAL's model compared to the ones used in HAL's RBPu2 model. In particular, the CAA adopted a more optimistic assumption than HAL regarding the permanent drop of business travel post-Covid and that this reduction will not affect average fares.[17] This view is based on the Skylark report,[18] providing supporting evidence on the business travel trends and likely impact on fares.

3.4.5 Second, the CAA rejected HAL's amended assumption regarding Covid demand overlays, which are meant to capture the further impact of Covid via additional economic effects or changes in airline fleets.[19] The CAA noted that HAL's assumption had inconsistent implications in the demand

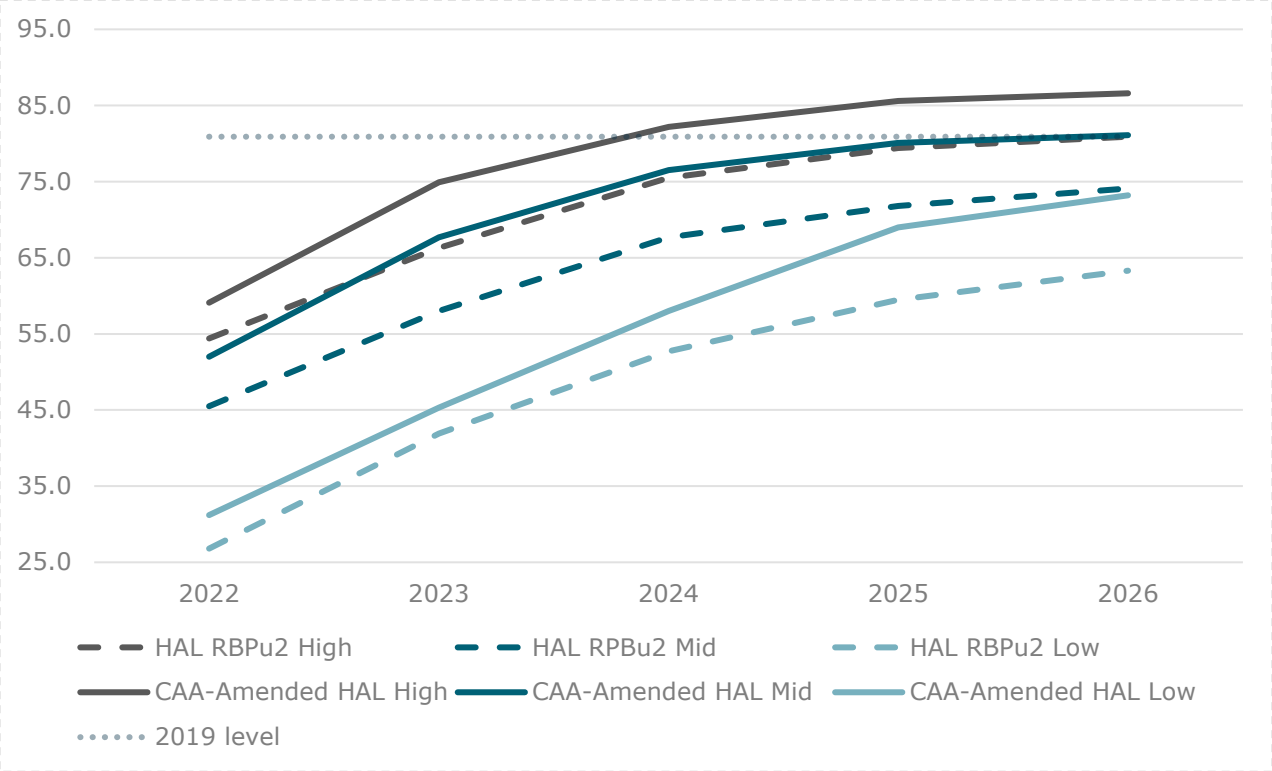
[17] FP, Section 1, para 1.46.
[18] FP, Section 1, para 1.45.
[19] FP, Section 1, para 1.50.

model and the Travel Restrictions Model ("**TRM**").[20,21] For this reason, the CAA considered "that it was more appropriate to use the covid demand overlays which had been in the HAL model for Initial Proposals".[22]

3.4.6 Third, the CAA discussed HAL's updated approach regarding the impact of carbon pricing on fares and overall demand, as part of its RBPu2 model. The CAA proposed to maintain "the same increases to fares as a result of increased costs to airlines that we previously used for Initial Proposals".[23]

3.4.7 As reported on Figure 3.3, CAA's amendments to HAL's model led to an increase of approximatively 40 million passengers over the H7 period in the 'Mid' scenario.

Figure 3.3: HAL RBPu2 v. CAA-amended HAL passenger forecasts, Passengers (m)



Sources: FP, Table 1.4; AP Analysis.

3.4.8 Hence, CAA's changes on business travel and Covid demand overlays provide forecasts that are materially higher than HAL's RBPu2 model. Nonetheless, despite relaxing some of HAL's pessimistic assumptions, the CAA's adjusted mid-scenario still predicts recovery to 2019 levels only by 2026.

20 The TRM amends HAL's Supply Model "in line with expectations around the duration and severity of covid-19 related travel restrictions by geographic market. This is complemented by demand overlays in response to the impact of the covid-19 pandemic in the Demand Model" (IP, Section 2, para 2.17).

21 FP, Section 1, para 1.50.

22 FP, Section 1, para 1.52.

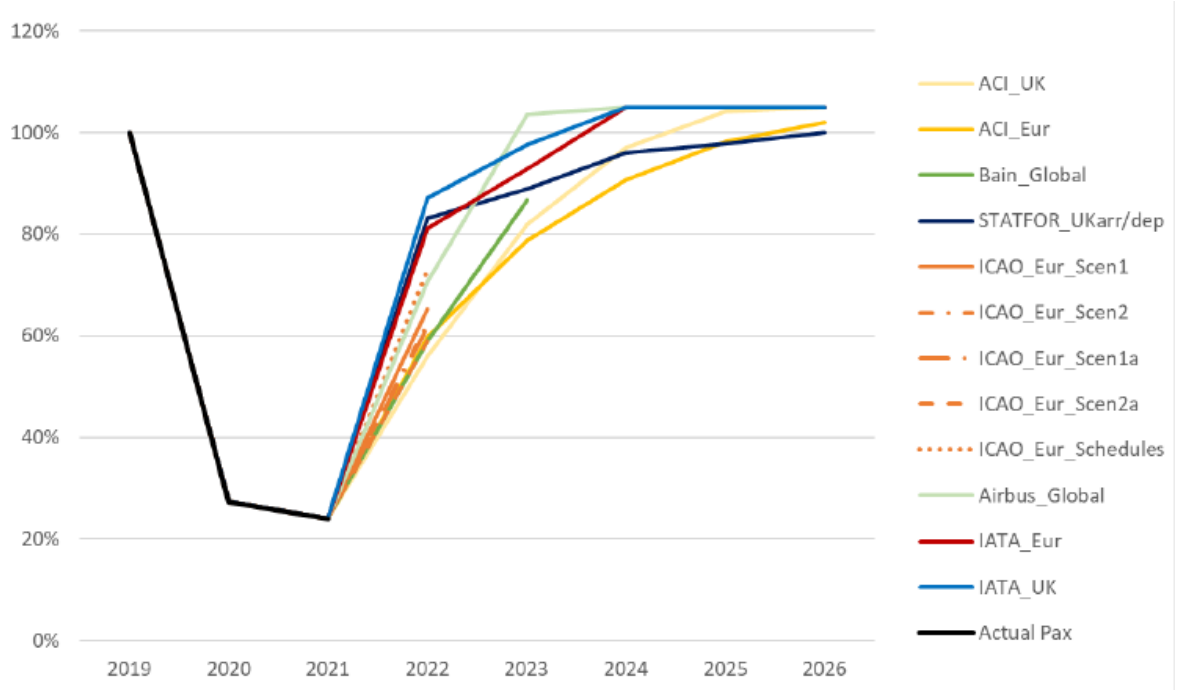
23 FP, Section 1, para 1.49.

Accounting for external forecasts

3.4.9 In the FP, the CAA stated that is also considered a set of seven external forecasts.[24] This approach should, in theory, provide multiple perspectives. It offers a complete view as the CAA considers forecasts from "airports (ACI), airlines (IATA/TE), airspace (Eurocontrol), aircraft manufacturers (Airbus and Boeing) and global aviation organisations (ICAO)".[25] It also provides forecasts for multiple metrics (passengers, flights, RPKs[26]), various geographical areas (Heathrow, UK, Europe, World), time periods (full H7 v. partial coverage) and granularity levels (daily, monthly, etc.).[27]

3.4.10 The CAA stated that it used the seven forecasts to predict passenger traffic at Heathrow over the H7 period, standardised in proportion of the 2019 levels and adjusted to be Heathrow-specific. Following this approach, the external forecasts provided a wide range of passenger traffic over the H7 period, as reported on Figure 3.4.

Figure 3.4: External forecasts for Heathrow passengers (in proportion of 2019 volumes)



Source: FP, Figure 1.3.

3.4.11 These forecasts provided a wide range of predictions: Airbus predicts recovery to 2019 levels by 2023, while ACI Europe and Eurocontrol predict recovery by 2026. Accordingly, various external, third-party forecasts, with different predictions, were available to the CAA. The different underlying metrics, geographic coverages and lengths of forecast provided a set of criteria for the CAA to assess their accuracy in predicting Heathrow passenger traffic over the H7 period.[28]

[24] FP, Table 1.3.
[25] FP, Section 1, para 1.36.
[26] RPKs refers to Revenue Passenger Kilometres, a composite measure of number of passenger and distance flown (FP, Section 1, footnote 11).
[27] FP, Section 1, para 1.36.
[28] FP, Section 1, para 1.37.

CAA Final Proposals projected passenger traffic

3.4.12 The CAA compared its amended HAL's forecast with the airlines model, as well as the external forecasts projections, to understand whether its baseline falls within the wider industry views. The CAA then qualitatively discussed how its baseline model compared to these forecasts, and adjusted to account for its own assessment of industry risk factors.

3.4.13 For 2022, the CAA derived "a likely lower bound"[29] and "a likely upper bound", based on IATA and airlines forecasted figures. The CAA then concluded that the appropriate forecast for 2022 is the midpoint between these two bounds, i.e. 68% of the 2019 passenger level.

3.4.14 The CAA then discussed the likely risk factors for 2023-2026, namely industry staffing shortages, consumer expenditure, energy prices, fuel costs and the Russian invasion of Ukraine. Based on this narrative, the CAA considered that it is "appropriate to allow for a modest reduction in passenger numbers 2023 to 2024 (largely reflecting economic pressures) and a modest increase 2025 to 2026 (reflecting the longer-term resilience of passenger traffic at Heathrow airport)".[30]

3.4.15 The CAA then artificially applied these 'adjustments' to the CAA-amended HAL model and derived its final passenger traffic estimates, as reported on Table 3.2. The CAA stated that it "used [its] regulatory judgement to apply further adjustments to reflect the extent of these in the passenger forecast for Final Proposals".[31] The shocked passenger numbers[32] are discussed in Section 3.4.

Table 3.1: Summary of CAA forecast synthesis process, H7

Forecast	2022	2023	2024	2025	2026	H7
CAA-Amended HAL Mid (unshocked)	52.4	68.3	77.1	80.8	81.8	360.5
Adjustment	**3.0**	**-0.4**	**-1.1**	**0.9**	**0.5**	**2.9**
CAA FP Mid (unshocked)	55.4	67.9	76.0	81.7	82.3	363.4
CAA FP Mid (shocked)	54.9	67.3	75.4	81.0	81.6	360.2

Source: FP, Table 1.5.

3.4.16 These adjustments allowed the baseline model to match the midpoint of the lower and upper bounds the CAA defines in its qualitative assessment of the risk factors. This approach predicted a recovery to 2019 levels by 2025.

3.5 CAA adjustments that enhanced accuracy of the passenger forecasts

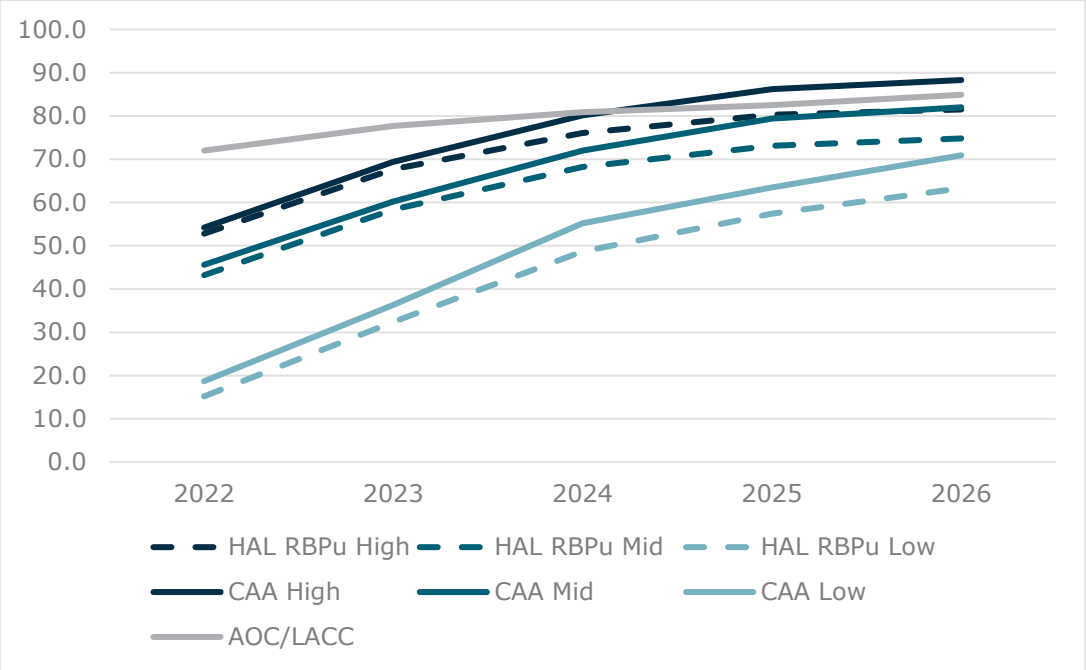
3.5.1 The CAA's updated approach implemented several improvements and produced projections more closely aligned with the industry's expectations.

29 FP, Section 1, para 1.66.
30 FP, Section 1, para 1.76.
31 FP, Section 1, para 1.61.
32 The CAA introduces a negative demand shock of 0.87% to the adjusted traffic estimates, which it states is "consistent with the updated estimate HAL applied to its RBP Update 2 forecasts" (FP, Section 1, para 1.77). This negative passenger demand shock aims to capture "difficult-to-predict non-economic shocks (such as major volcanic eruptions, terrorism events, wars) to air travel".

3.5.2 First, as part of the Consultation period following the IP, the airlines highly criticised the CAA's "overreliance on using HAL's forecast models".[33]

3.5.3 Even though the CAA still used HAL as its baseline model,[34] after amending a few assumptions, the departure from HAL's predictions was larger than in the IP. As such, the CAA FP projections were (somewhat) less inconsistent with the various perspectives of the different stakeholders.

Figure 3.5: Deviation from HAL's model in the IP, Passengers (m)

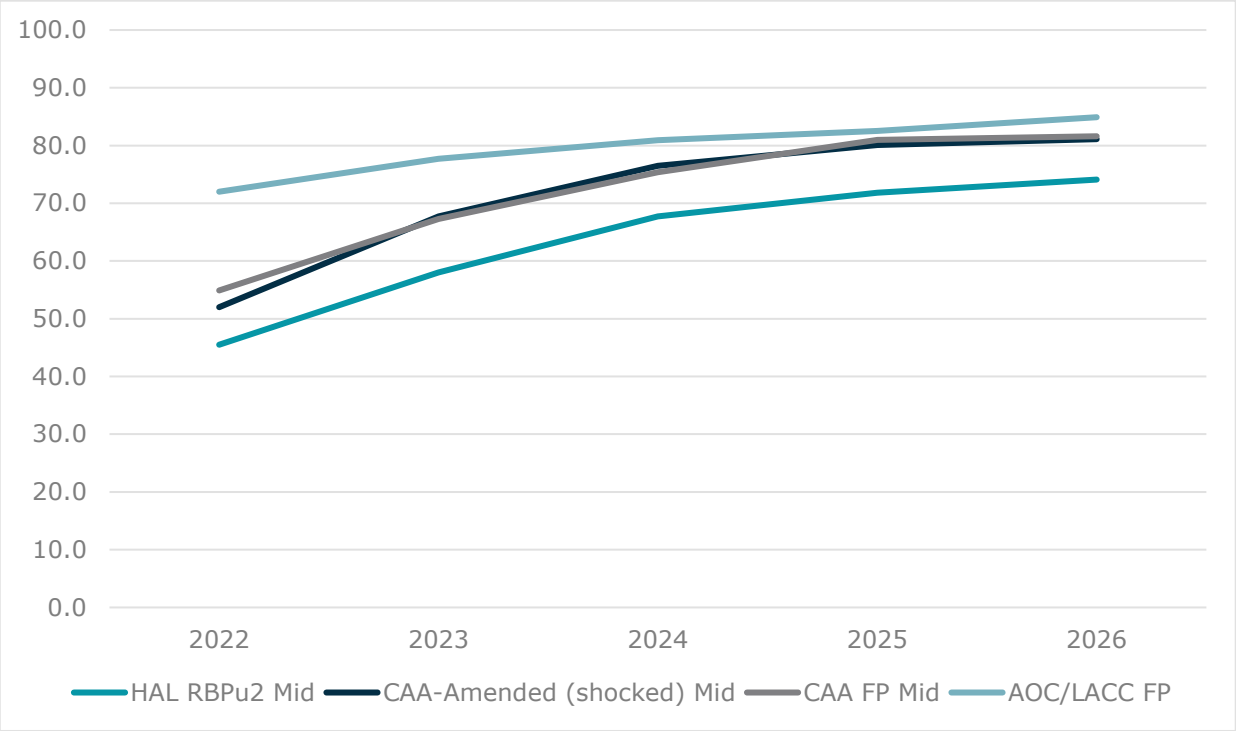


Sources: FP, Figure 1.1 and Table 1.2.

[33] FP, Section 1, para 1.9.

[34] FP, Section 1, para 1.67.

Figure 3.6: Deviation from HAL's model in the FP, Passengers (m)



Sources: FP, Tables 1.2, 1.4 and 1.5.

3.5.4 Comparing Figure 3.5 and Figure 3.6 shows how the CAA deviated from HAL's predictions significantly more in the FP than the IP. In the IP, the CAA's Mid scenario predicted 22 million more passengers than HAL's model over the H7 period. In the FP, the CAA baseline model predicted 40 million more passengers than HAL's model over the H7 period, and 43 million once accounting for the CAA's ad hoc adjustments that it states reflect external forecasts and industry risks.

3.5.5 The divergence across passenger traffic forecast also has a material impact on the calculated charges per passenger. We have run the CAA's "Price Control Model"[35] for different passenger traffic projections to assess how sensitive the model is to the different forecasts. The CAA's model calculates the charges per passenger, based on the forecasted passenger traffic, while keeping the projections for the other building blocks constant, i.e., opex, commercial revenues, etc. We have not adjusted opex and commercial revenues impacts but we have also run the airline passenger numbers through the CEPA opex and commercial revenue models and found that the increase in commercial revenue will exceed the higher opex, and so if anything the negative impact on prices will be greater. Therefore, this approach is conservative.

Table 3.2: CAA's charge per passenger model projections, for different passenger traffic forecasts

FP - £m 2020, CPI-real	2022	2023	2024	2025	2026	H7 Total
HAL RBPu2 Mid model						
Passengers (m)	45.5	58.0	67.7	71.8	74.1	317.1
Profiled yield per pax	27.4	27.6	27.7	27.9	28.1	27.7

35 CAA, 'Price Control Model' (caa-h7-pcm-v2-10-mid-pax-profiled-fp-external2.xlsm), available at: https://www.caa.co.uk/commercial-industry/airports/economic-regulation/h7/consultations/final-and-initial-proposals-for-h7-price-control/

CAA-amended HAL Mid model						
Passengers (m)	52.0	67.7	76.5	80.1	81.1	357.4
Profiled yield per pax	27.4	26.0	24.7	23.4	22.2	24.7
CAA FP Mid model (adjustments + 0.87% shock)						
Passengers (m)	54.9	67.3	75.4	81.0	81.6	360.2
Profiled yield per pax	27.4	25.9	24.4	23.0	21.7	24.5
Airlines model						
Passengers (m)	72.0	77.7	80.9	82.5	84.9	398.0
Profiled yield per pax	27.4	24.3	21.5	19.0	16.9	22.8

Sources: CAA Price Control Model; FP, Tables 1.2, 1.4 and 1.5; AP Analysis.

Note: The profiled yields per pax are calculated by replacing the passenger volumes used as the input of the CAA price control model.

3.5.6 As shown in Table 3.2, HAL's passengers projections lead to significantly higher charges on average over the H7 period, 13% higher, than the ones the CAA suggested in its FP. The traffic projections based on the CAA-amended model lead to charges per passenger 11% lower than based on HAL's projections. However, the forecasted traffic with the CAA final adjustments and the negative shock does not significantly alter the calculated charges per passenger, reducing them by only 1%.

3.5.7 Hence, we note that the CAA's updated approach allowed for some deviation from HAL's model, in contrast to its greater reliance on HAL's model in the IP, but with only minimal adjustments. These adjustments are reflected in the implied charges per passenger calculated by the CAA's price control model. The paragraphs below further assess whether these deviations from HAL RBPu2 model are sensible.

3.5.8 Second, we agree with all of the CAA's amendments to HAL's RBPu2 forecasting model. The Skylark report assessing the robustness of the CAA IP approach highlighted a number of shortcomings in HAL's modelling assumptions. Skylark indicated that "Skylark believes there is little empirical evidence to support a permanent shift in business behaviour based on the supporting evidence provided".[36] Based on this recommendation, the CAA commissioned a report to Skylark to exclusively explore the trends in business travel. The CAA published the Skylark report, as part of the FP, which concluded that:

> "Although the majority of business travel will recover following the Covid-19 pandemic, there will be a long-term, permanent reduction in the volume and demand. The adoption of new technologies and changing trends in willingness to travel will lead to reducing business travel activities that are deemed to be less essential and more replaceable by technology. However, this shift is unlikely to produce a material change to average airline fares." [37]

3.5.9 More specifically, Skylark considered that airlines can modify the cabin layouts to optimise the shift in business demand, by incorporating "fewer business seats in exchange for more premium economy".[38] Skylark adds that: "This transition is likely to help ensure that average fares in each cabin are kept competitive over the long-term".[39]

36 Skylark, 'CAA H7 Forecast Review', Final Report, October 2021, p 6.

37 Skylark, 'Business Travel trends', March 2022, p v.

38 Skylark, 'Business Travel trends', March 2022, p iv.

39 Skylark, 'Business Travel trends', March 2022, p iv.

3.5.10 Accordingly, the Skylark report supported the CAA's challenge to HAL's assumption regarding a potential fare increase following the permanent drop in business travel, due to "a combination of competitive constraints (particularly for short-haul traffic) and the structural inertia of network airlines, in addition to little evidence of material changes to fare structure following previous industry shocks".[40]

3.5.11 In addition, the Skylark report also stated that Heathrow is likely to recover more quickly than other London and UK airports:

> "London Heathrow is likely to undergo a stronger recovery of business passenger volume and demand than other London and UK airports due to the particular characteristics of the airport. In the longer term, the proportion of business travel at LHR will be lower than pre-pandemic levels, as at other UK airports." [41]

3.5.12 Therefore, the magnitude of the long-term reduction in business travel is likely to be lower than HAL's projections. This justifies the CAA's amendment of HAL's assumption. We consider this leads to a more robust estimate, in line with independent expert evidence.

3.5.13 Moreover, we agree with the CAA's suggestion to return to its assumption used in its IP relating to the impact of carbon pricing on fares. Indeed, capturing the social cost of carbon emissions will likely overestimate the increase in fares. The social cost of carbon is not fully internalised by airlines and the fare increase will only reflect a proportion of the social cost. Therefore, we consider that a more moderate fares increase assumption to reflect carbon pricing is appropriate.

3.5.14 Finally, we welcome the CAA's inclusion of evidence from independent forecasts to derive the final passenger traffic projections.

3.5.15 As the CAA noted, there is "a significant divergence between the views of HAL and airlines on passenger forecasts".[42] In this context, it seems natural to compare HAL's projections to independent external forecasts. Using all evidence available is the most robust approach to robustly estimate passenger traffic. This approach also provides complementary information that HAL's model fails to capture on its own. The multiple sources provide different perspectives, i.e. "airports (ACI), airlines (IATA/TE10), airspace (Eurocontrol), aircraft manufacturers (Airbus and Boeing) and global aviation organisations (ICAO)".[43]

3.5.16 These independent estimates also rely on diverse metrics: passengers, flights and RPKs, with different geographical coverage (Heathrow, UK, Europe, World) and granularity levels (monthly, annual, time intervals greater than one year).[44] Given the abundance of available public sources, we consider the CAA has moved in the right direction by accounting to some degree for external forecasts in its results.

3.5.17 Even though we expect some divergences between forecasts with different geographical coverage, we consider that taking into account these various projections provide some useful insight regarding the recovery from Covid across different European airports or across the world. Hence,

40 Skylark, 'Business Travel trends', March 2022, p iv.
41 Skylark, 'Business Travel trends', March 2022, p v.
42 FP, Section 1, para 1.32.
43 FP, Section 1, para 1.36.
44 FP, Section 1, para 1.37.

we find it sensible to consider European and worldwide forecasts, even if more weight is placed on the UK-specific ones.

3.5.18 We also welcome the CAA's approach to consider the airlines' forecast. The airlines have a strong incentive to accurately forecast passenger traffic. They also have actual volumes and future booking data, that place them in a strong position to predict future passenger traffic. Therefore, we consider that the CAA's approach to place weight on the forecast data provided by airlines is correct.

3.5.19 Considering all possible evidence, covering multiple perspectives and methodologies, is the most robust approach and a step in right direction from the CAA. We also note that external forecasts are constantly updated, and so the CAA must rely on the latest forecast releases in their final decision.

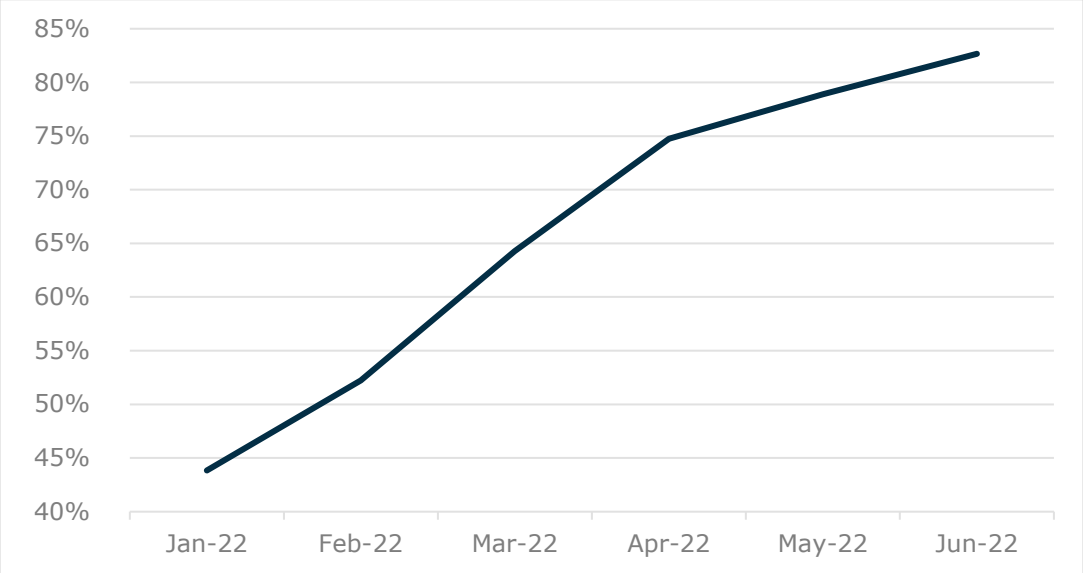
3.6 Aspects of the CAA's approach that raise concerns

3.6.1 In the previous section we identified the changes the CAA undertook compared to its IP approach that we consider improve the robustness of the passenger traffic forecast. However, we consider there are still material shortcomings with the CAA's approach in the FP to forecasting the passenger volumes over the H7 period.

Actual 2022 volumes suggests that the CAA under-forecasts the full year

3.6.2 The actual volumes recorded in the first half of 2022 provide some useful insight to forecast the rest of the year. As shown in Figure 3.7, Heathrow was still recovering from the impact of the pandemic in the first few months of 2022.

Figure 3.7: Month-to-month Heathrow volumes comparison (2019 v 2022)



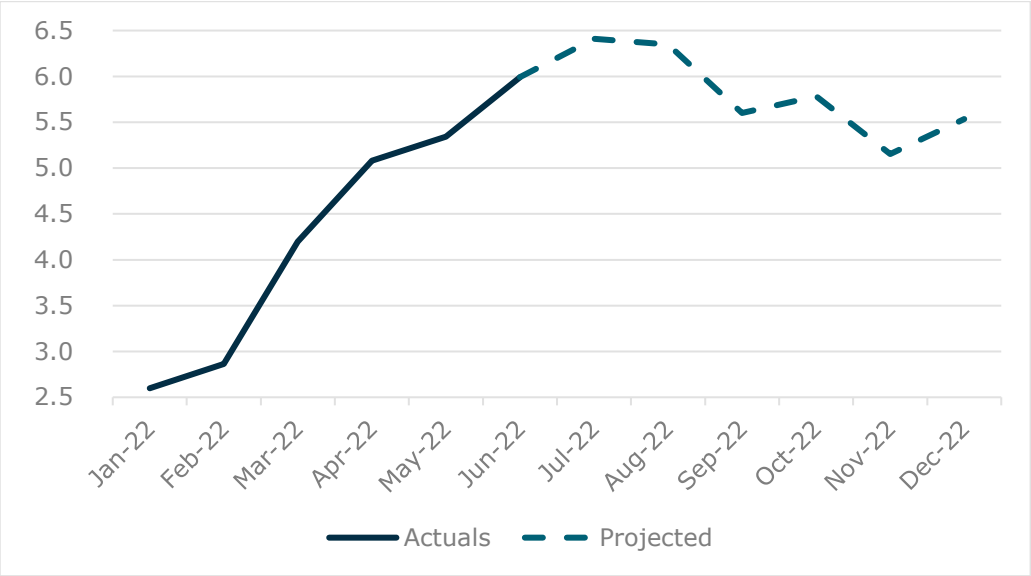
Source: HAL, 'Heathrow Traffic Statistics', available at: https://www.heathrow.com/company/investor-centre/reports/traffic-statistics.

3.6.3 Indeed, January 2022 volumes represent only 44% of the passenger traffic in January 2019. However, this month-to-month ratio kept consistently increasing over the first half of the year,

and reached 83% in June. Hence, we consider that this trend is likely to continue and the second half of the year will be much closer to the 2019 levels.

3.6.4 Therefore, when forecasting the passenger traffic for the rest of 2022, it is more sensible to consider that passenger traffic will be near the June recovery rate, i.e., 83%, rather than the one observed since January 2022. Because we expect the recovery rate to keep progressing, this approach is conservative. As further discussed below, we also consider that HAL-imposed capacity limits should be left out of account.

Figure 3.8: Projecting 2022 traffic based on the June 2022-to-June 2019 recovery rate, Passengers (m)



Sources: HAL, 'Heathrow Traffic Statistics', available at: https://www.heathrow.com/company/investor-centre/reports/traffic-statistics; AP analysis.

3.6.5 As shown in Figure 3.8, assuming that passenger traffic will reach 83% of its level at the same month in 2019 for the second half of 2022 leads to significantly higher projections than the CAA's ones for 2022, 61 million v 55 million.

3.6.6 Therefore, this conservative approach shows that the CAA's forecasting model likely underestimates passenger traffic, at least for 2022.

The CAA's overreliance on HAL's forecasting model

3.6.7 Despite some amendments to HAL's model relative to its IP, in our view, the CAA still excessively relied on HAL's projections. Indeed, the CAA considered its HAL amended model as its baseline model.[45] Therefore, the final CAA Mid scenarios estimates are very close to the CAA-amended HAL's model. The final CAA forecast differs only by 1 million passengers in all H7 years, except in 2022, when an adjustment of 3 million passengers is made. Accordingly, except for modifying a few of HAL's assumptions, the reality is that the CAA still heavily relied on HAL's model, as highlighted in Figure 36 above.

[45] FP, Section 1, para 1.67.

3.6.8 As set out in Section 2.3, there are real risks in relying heavily on figures provided by a regulated company. In particular, HAL has obvious incentives to underestimate its future demand so as to increase per passenger charges. Indeed, this is illustrated well by the material gap between HAL's forecasts and those arrived at by the CAA making even limited (and wholly reasonable) changes to HAL's model.

3.6.9 It is clearly welcome that aspects of HAL's model have been considered by independent consultants. However, the extent of such challenge is limited as forecasting future demand involves many assumptions. This is apparent from the Skylark report, which on multiple occasions uses words describing a set of assumptions as 'optimistic' or 'pessimistic'.[46] Accordingly, the perspective and incentives of the forecaster could then easily influence the passenger traffic predictions, by adopting different assumptions regarding the state of the world, industry risks, the impact/magnitude of a negative event, etc.

3.6.10 One way HAL can distort the forecasts from its model is through artificially limiting the capacity that it considers to be available at Heathrow. Indeed, despite very optimistic assumptions and a rapid recovery to the 2019 levels, any forecast will be constrained by Heathrow's capacity. If HAL is currently failing to make sufficient capacity available, as seen by the cancellations and restrictions currently being imposed on airlines and their passengers by HAL, it is important that the regulatory forecast assumes, from the start of H7, HAL has resources to open and operate all capacity that an efficient operator would have available from Heathrow's two runways and four terminals. We do not consider that it would be appropriate for passenger forecasts to be reduced to account for any decisions by HAL to limit capacity due to staffing or other resourcing difficulties within its control.

3.6.11 In our view, there are superior ways to reduce the extent of information asymmetries as regards passenger forecasts and to reduce the CAA's reliance on HAL, compared to the approach adopted by the CAA. First, the regulator could ensure that there is full transparency of the model used by HAL to estimate future demand. In particular, the airlines would be well placed to provide robust review and challenge of HAL's model. Indeed, absent this transparency and associated examination of the HAL model by other parties, the CAA is being denied an important source of information. This option is available to HAL and the CAA. HAL is not in the business of selling its demand forecasts, and it is far from obvious why the disclosure of its model would cause it any commercial harm – other than to the extent that well-founded criticism of its assumptions would result in a reduction in charges per passenger at Heathrow.

3.6.12 Second, the regulator can use alternative sources estimating future demand in the industry. These independent forecasts are not subject to similar incentives to bias their forecasts. A superior approach would thus be to start from independent, third-party forecasts and then consider the mid-point consensus from these forecasts. It is opaque as to how the CAA has in fact used third party forecasts, since there is no mapping from the actual forecasts to the passenger numbers set out in the FP, and their influence would appear to be very limited (see further the next sub-section).

3.6.13 Therefore, we strongly encourage the CAA to:

(a) promote transparency in its approach and allow for wider stakeholder review of HAL's forecasting model by publishing HAL's model; and

[46] FP, Section 1, para 1.82.

(b) reconsider the weight it places on HAL's model and use the independent forecasts as the starting point of its analysis. As set out in the next sub-section, it is clear that the CAA has, in fact, given limited weight to alternative independent forecasts.

Gradual convergence of the HAL's model towards its capacity

3.6.14 We note that HAL's RBPu2 model forecasted traffic gradually to converge towards the airport's capacity. Indeed, HAL projections envisage traffic growth of 6% between 2024 and 2025, and by 3% the following year, while the projected traffic grows by more than 15% in the early years of the H7 period.[47] However, no explanation is given as to why passenger volumes at HAL would converge to the capacity level in such a gradual way. Allowing wider industry shareholders to review HAL's model would allow to understand and possibly challenge the factors driving this gradual convergence of HAL's projections towards Heathrow's capacity.

3.6.15 Because the CAA's projections are largely based on HAL's model, this point also applies to the CAA's model. The CAA's further adjustments to HAL's model further reinforce this point. The CAA's final Mid-scenario projections only grow by 1% between 2025-2026.

3.6.16 However, no explanation is given as to why passenger traffic should not continue to rise at a relatively steady rate, as opposed to rising at a very gradual rate before approaching the maximum capacity available at Heathrow. We consider that to the extent this may be driven by an inability of HAL to serve underlying demand at the airport, it would be wrong to artificially limit the passenger forecasts below the level of underlying demand for passengers using the airport. It is the role of the regulator to ensure that HAL is properly incentivised to anticipate and deliver the resources necessary to meet expected demand. While the CAA's lack of transparency prevents parties from reviewing, understanding and challenging the underlying dynamic driving traffic forecasts, we consider that airlines and passengers should not be penalised through higher charges if Heathrow fails to provide sufficient capacity to meet demand for travel within the limits of the existing infrastructure.

Limited use of alternative independent forecasts or the airlines projections

3.6.17 The CAA states that it has "explored a broad range of external forecasts for potential use in our synthesised forecast".[48] Hence, we would expect the CAA to have attached considerable weight to these independent forecasts, and indeed used them as the starting point of its analysis.

3.6.18 However, the CAA final traffic estimates give very little weight to the external forecasts. As noted above, the CAA applied some manual adjustments to the projections from the amended HAL RBPu2. We understand that these adjustments are the only way the CAA accounts for the external forecasts. As highlighted on Figure 3.6 and Table 3.2, these adjustments lead to only negligible changes in the final CAA forecast.

3.6.19 Over the H7 period, these manual adjustments increase the number of passengers by 3 million, i.e. only 1% of the total number of passengers over H7 that the CAA-amended HAL model predicts.

3.6.20 Moreover, most of the manual, *ad hoc* adjustments made by the CAA reflect its perception as to industry risks rather than accounting for the external forecasts. The CAA only mentions the external forecasts when forecasting the 2022 volumes. The CAA simply states that the amended

[47] FP, Section 1, Table 1.2.

[48] FP, Section 1, para 1.35.

RBPu2 model projections are within the range of the external forecasts,[49] but this does not appear to be the case as regards the most relevant forecasts, as shown on Figure 3.7 below. The CAA adds that based on IATA and airlines bookings data, "62% of 2019 levels was a likely lower bound for the forecast for the whole of 2022".[50] The CAA then derives a likely upper bound based on the amended HAL model. Finally, the manual adjustments also consider a series of industry risks, "qualitatively", namely those associated with: inflation, fuel prices, the Ukraine invasion, recruiting challenges and Covid-19.[51]

3.6.21 For 2023-2026, the CAA also mentions that the amended HAL model projections again fall within the external forecasts range,[52] before assessing the industry risks. However, this time the CAA does not derive lower/upper bounds based on the independent forecasts, and proposes consensus ranges.

3.6.22 Therefore, the external forecasts lead to a small change in the CAA projections, and only in 2022 and only marginally in that year. Accordingly, there is no indication that CAA placed any (non-trivial) weight on the independent forecasts to derive its final estimates. Moreover, as discussed below, the CAA appears to make arbitrary adjustments to account for the industry risks, which do not appear to be based on any expert forecasts, as discussed in the next sub-section.

3.6.23 Similarly, we note that the CAA, in practice, gives little weight to the airlines' forecast, and only uses it to benchmark the CAA baseline model. However, the airlines have a strong incentive to accurately forecast passenger traffic. Inaccurate forecasts would cause misalignments between the airlines' strategy and the actual volumes in the future, that could reduce revenues or increase costs. Moreover, they gather actual volumes and future booking data, that place them in the best position to predict future passenger traffic. Therefore, we have material concern with the CAA's limited use of the airlines' forecast, as well as the independent external ones.

Arbitrary adjustments to account for the industry risks

3.6.24 As previously mentioned, the CAA deviates from its baseline amended HAL's model, only to reflect on the industry risks, and marginally to account for external forecasts, with a series of small *ad hoc* adjustments.

3.6.25 However, the forecast updates appear to be arbitrary and unjustified, resulting from limited qualitative discussion. The CAA discusses the industry risks, asserting that it "was not practicable to quantify the expected effect of all of these developments, so [the CAA] first considered them qualitatively".[53] After assessing the impact of staffing shortages, inflation, energy prices and economic growth for 2023-2026, the CAA concludes:

> "On balance, it seems appropriate to allow for a modest reduction in passenger numbers 2023 to 2024 (largely reflecting economic pressures) and a modest increase 2025 to 2026 (reflecting the longer-term resilience of passenger traffic at Heathrow airport). These changes smooth the path of the forecast over the remainder of H7 without significantly altering the overall passenger volumes for H7." [54]

[49] FP, Section 1, para 1.61.
[50] FP, Section 1, para 1.66.
[51] FP, Section 1, para 1.68.
[52] FP, Section 1, para 1.61.
[53] FP, Section 1, para 1.68.
[54] FP, Section 1, para 1.76.

3.6.26 Hence, most of the CAA's deviations from the amended HAL RBPu2 model come from an arbitrary qualitative discussion. Therefore, the CAA final estimates are either driven by HAL's model, which are subject to HAL's incentives to under-estimate passenger volumes as described in the previous section, or by an arbitrary process, aiming to qualitatively measure factors that the CAA asserts are "not practicable to quantify", without any expert input or an appropriate model.

3.6.27 To the extent that assessing the impact of such macroeconomic factors on the passenger traffic is outside the scope expertise of the CAA we consider that the CAA should have commissioned expert input to measure the impact of the risk factors listed above. We would expect that properly developed models, including advanced econometric techniques, could inform the relationship between inflation, energy prices, household expenditure and passenger volumes. Indeed we note that both Ofgem and Ofwat have undertaken their own econometric analysis in support of RIIO and PR price determinations (albeit in the context of comparative efficiency).

Alternative approach based on independent forecasts

3.6.28 In order to provide a robust and informed forecast, the CAA must take account of all available evidence and should place greater weight on the external forecasts.

3.6.29 Even though the CAA should include as much publicly available information as possible in its assessment, some forecasts may have a few limitations. First, some forecasts predict passenger traffic at global or European level. We understand that the UK and Heathrow will likely have a different recovery trajectory than European countries or the rest of the world. Hence, we agree that more weight should be given to forecasts focusing on the UK, i.e. setting aside the ACI European Economic Forecasts, Airbus Global Market Forecasts, ICAO Economic Impact Analysis (C-19) and Bain Air Travel Forecast. In addition, the last two forecasts listed only cover 2022 and 2023, and thus provide limited insight for the full H7 period.

3.6.30 If the CAA were to adopt this approach, the CAA would then focus on forecasts predicting traffic at UK level rather than Heathrow-specific. However, Heathrow has a predominant role as the biggest UK airport, and we understand that it is accepted by the CAA and its independent consultants that Heathrow is likely to recover more quickly than other London or UK airports. The Skylark report acknowledges this as regards business travel:

> "London Heathrow is likely to undergo a stronger recovery of business passenger volume and demand than other London and UK airports due to the particular characteristics of the airport. In the longer term, the proportion of business travel at LHR will be lower than pre-pandemic levels, as at other UK airports." [55]

3.6.31 As an illustrative example, we have compared the passenger volumes at London Heathrow and London Gatwick, the two busiest airports in the UK in 2021.[56] On average, Heathrow was more utilised during the pandemic than Gatwick. From March 2020 to May 2022, Heathrow monthly volumes presented 27% of the average monthly volumes in 2019, v 19% for Gatwick.[57]

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55 Skylark, 'Business Travel trends', March 2022, p v.

56 International Airport Review, 'London Gatwick Airport, available at: https://www.internationalairportreview.com/airports/40668/london-gatwick-airport-lgw/#:~:text=Gatwick%20Airport%20(IATA%20code%3A%20LGW,in%20terms%20of%20passenger%20traffic.

57 HAL, 'Heathrow Traffic Statistics', available at: https://www.heathrow.com/company/investor-centre/reports/traffic-statistics; ACI Airport Traffic Reports.

3.6.32 This is line with the CAA's assessment that "demand at Heathrow has historically been more robust in the face of economic headwinds than that at the rest of the UK airports, helped by the pressure on airlines to protect valuable Heathrow slots".[58] This is driven by several factors, including: Heathrow's important hub role and the number of connecting flights, its location, recently made even more accessible with the Elizabeth Line and the excess demand (over capacity) it faced pre-Covid, encouraging recovery to 2019 levels.

3.6.33 Based on these factors, the CAA's statement and the Skylark report's findings on business travel, we consider that Heathrow is likely to rebound more quickly from the shocks of the Covid-19 pandemic than the other large London airports such as London Gatwick. Therefore, a forecast covering the UK is likely to underestimate HAL's passenger volumes and would be a conservative approach.

3.6.34 Moreover, the CAA expressed a concern that models forecasting flights may overstate recovery as part of its criticism of the airlines model. The CAA notes that the airlines' model is based on "numbers of flights in UK airspace, not passengers using those flights", and "flights in UK airspace were at 40% and 41% of 2019 levels respectively, while passengers at Heathrow airport were only at 27% and 24%".[59]

3.6.35 Hence, the average load factor was likely lower during the pandemic than pre-2020. This means that forecasts based on passengers and flights may differ, even if they aligned pre-Covid. However, as recovery progresses, we would expect to see load factors rise back to their previous levels and so during this period the growth in passengers will exceed the growth in flights.

3.6.36 We also note that forecasts based on RPKs might underestimate passenger traffic during the pandemic and the following recovery. For instance, in June 2022, Heathrow's short haul European traffic was running at 86% of 2019 levels, whereas long haul non-European was running at only 80%. Because RPKs are a composite measure based on passenger volumes and distance flown, forecasts based on this metrics are likely to underestimate passenger growth.

3.6.37 Therefore, we suggest using the ACI World Airport Traffic Forecasts and the Tourism Economics/ IATA forecasts, each of which focus on the UK, forecast passenger volumes and cover the full H7 period. These two forecasts would provide a complete approach by combining multiple perspectives, including "airports (ACI), airlines (IATA/TE10)".[60]

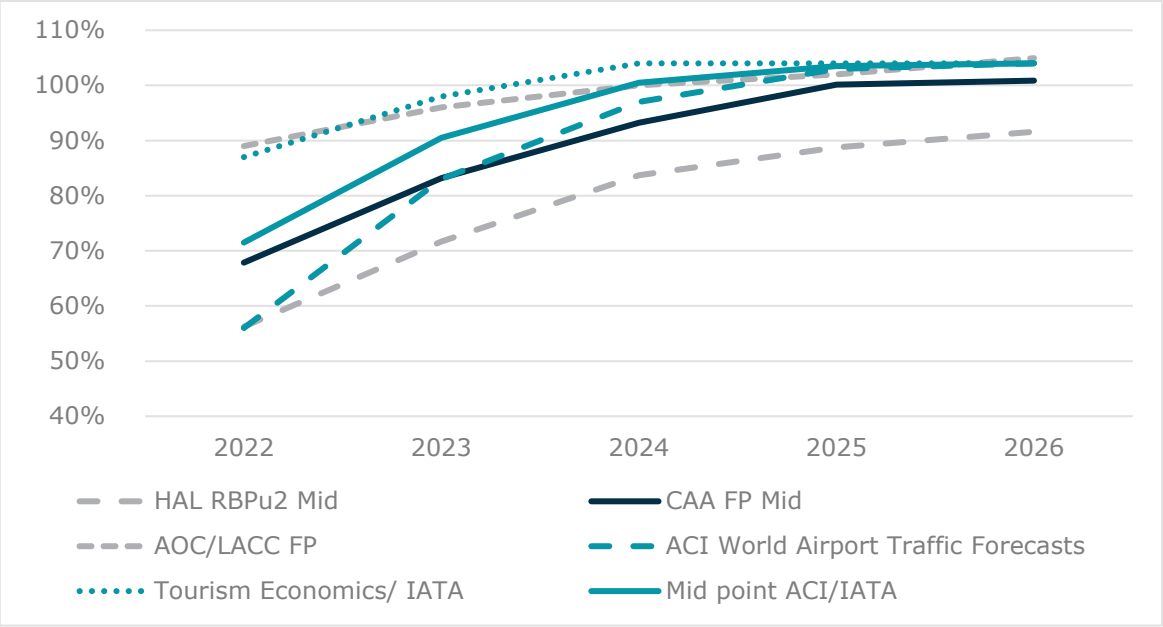
3.6.38 These forecasts are particularly helpful because of the perspective they bring. The ACI gathers extensive information allowing to produce accurate forecasts, including "vital airport and industry data, including passenger and cargo traffic, aircraft movements, rankings".[61] The ACI has a strong incentive to provide robust and accurate forecasts given its input "on global airport policy development to ensure policies and regulations reflect the interests of our members and contribute to the economic growth and sustainability of airports around the world".[62] Similarly, IATA is in a central position to produce accurate forecasts, given its access to airlines statistics. As noted before, this provides a strong incentive for IATA to produce accurate passenger projections. IATA places itself as the historical leader in the passenger forecasting industry:

58 FP, Section 1, para 1.74.
59 FP, Section 1, para 1.30.
60 FP, Section 1, para 1.36.
61 ACI, 'Data Center', available at: https://aci.aero/resources/data-center/.
62 ACI, 'Data Center', available at: https://aci.aero/resources/data-center/.

"providing reliable and accurate passenger traffic and sales data for the last 20 years".[63] Therefore, we consider these two forecasts are likely to be particularly robust and accurate, as well as addressing the CAA's objections (based on UK, passenger volumes and covering full H7 period).

3.6.39 Taking the mid-point between the ACI and IATA's predictions in each year would seem to be a robust and conservative approach, since this would be based on independent forecasts of passenger volumes at UK levels. This approach would be conservative as it would seem reasonable to assume that Heathrow is likely to recover traffic at a faster rate than the UK as a whole. This would suggest considering figures above the mid-point would be more accurate. It should also be noted that this mid-point would be below Tourism Economics/IATA figures and those of AOC/LACC. Figure 3.9 shows the results of this approach.

Figure 3.9: Mid-point IATA and ACI forecasts v. CAA FP, % of 2019 passengers volumes



Sources: FP, Figure 1.3, Tables 1.2, 1.4 and 1.5; AP analysis.
Note: The IATA and ACI forecasted series are visually read in from Figure 1.3.

3.6.40 We note that the mid-point between the ACI and IATA forecasts falls above the CAA final estimate in each year of the H7 period. Compared to this approach based on independent forecasts, the CAA's predictions based on amendments and adjustments to HAL's model seem pessimistic.

3.6.41 When assessing the IATA figures, the CAA notes that in 2022 projections would imply that "passenger numbers for the remainder of 2022 would have to be virtually at 2019 levels".[64] However, the CAA also noted that all "external forecasts pre-dated the Russian invasion of Ukraine, and the majority pre-dated the "Omicron wave" of covid-19".[65] These two factors may lead to overestimating the 2022 traffic, as the new Covid variant and the Ukraine invasion affected the passenger volumes from the early months of the year. However, the impact of these factors is expected to significantly diminish over time, and leave the later years of the H7 period

63 IATA, 'Air Passenger Traffic and Sales Data', available at: https://www.iata.org/en/services/statistics/passenger-traffic-data/.
64 FP, Section 1, para 1.65.
65 FP, Section, para 1.57.

unaffected. Hence, the IATA figures still provide valuable insight for passenger traffic over the H7 period.

3.6.42 Moreover, the possible upwards bias for 2022 is largely accounted for by the ACI's predictions, with a more pessimistic prospect for 2022. By taking the mid-point between the IATA and ACI forecasts, 2022 is the year with the closest forecast to the CAA estimate in the first half of the H7 period. Hence, considering both IATA and the ACI projections should address the CAA's observation regarding IATA's 2022 overestimation.

3.6.43 We also note that this forecasting approach might still underestimate outturn passenger numbers for 2022. As noted in the previous section, Heathrow could reach 61 million passengers in 2022, assuming that the second half of the year keeps recovering at the rate observed in June 2022 (compared to June 2019). Hence, adopting the mid-point of IATA and ACI is likely conservative for 2022.

3.6.44 This more robust approach, based on independent evidence, generates the charges per passenger shown in Table 3.3, based on the CAA's price control model.[66] The estimated charges are 5% lower on average over the H7 period.

Table 3.3: CAA charge per passenger model, CAA FP Mid v. ACI/IATA mid-point

FP - £m 2020, CPI-real	2022	2023	2024	2025	2026	H7 Total
CAA FP Mid Model						
Passengers (m)	54.9	67.3	75.4	81.0	81.6	360.2
Profiled yield per pax	27.4	25.9	24.4	23.0	21.7	24.5
ACI/IATA mid-point						
% of 2019 levels	72%	91%	101%	104%	104%	
Implied passengers[67] (m)	57.8	73.2	81.3	83.7	84.1	380.2
Profiled yield per pax	27.4	25.1	23.0	21.1	19.3	23.2

3.6.45 We strongly encourage the CAA to adopt this approach addressing the shortcomings described above. As discussed, the current methodology is flawed due to the opacity of HAL's model and HAL's incentives to use a set of pessimistic assumptions in its model. The CAA has not adopted an approach able to overcome this problem. It does not allow for any meaningful wider stakeholder review of HAL's model. It is clear, in particular, that the CAA does not use an independent set of forecasts as its starting point, but it only marginally adjusts its amended version of HAL's model with some small ad hoc adjustments.

3.6.46 Using the mid-point between the IATA and the ACI forecasts provides a complete and robust forecasting approach. It also highlights that the CAA's view is still highly pessimistic compared to more independent views of the industry.

Asymmetric shock adjustments

3.6.47 We understand that the CAA has applied an annual shock factor of 0.87% to its H7 traffic forecasts as recognition of the likely incidence of non-pandemic shocks. This raises three questions that,

66 CAA, 'Price Control Model' (caa-h7-pcm-v2-10-mid-pax-profiled-fp-external2.xlsm), available at: https://www.caa.co.uk/commercial-industry/airports/economic-regulation/h7/consultations/final-and-initial-proposals-for-h7-price-control/.

67 80.9 million passengers travelled via Heathrow in 2019 (IP, Section, para 2.8). We have multiplied the proportion of 2019 levels of the IATA/ACI midpoint forecast by the 2019 passenger traffic at Heathrow.

unfortunately, we find unanswered from the documentation on the HAL forecasting model available to us. These questions are important because the way in which the annual shock factors are estimated and applied may result in double counting bias in the forecasts – effectively meaning that the shock adjustments could be invalid.

3.6.48 Firstly, to the extent that HAL used historical data to calibrate or estimate the parameters of its forecasting models (e.g. econometric or other time series models), it is important to know whether the impact of the individual historical shocks were added back into the historical data (in the individual months or years in which they occurred) before calibration or estimation of the model took place? In other words, were the models estimated or calibrated on pre-shock historical data? If this has not been done asymmetric shock factors will have been applied to forecasts that already implicitly include the impact of these shocks, and therefore would be invalid.

3.6.49 Similarly, the CAA should be sure that the same is also not true of any external forecasts on which it has relied. If this is not clear or not known, there would be no justification for applying the asymmetric shock adjustment.

3.6.50 Secondly, even assuming that the asymmetric shock adjustment has been correctly applied as described in sections 3.3.18 and 3.3.19, we see no evidence that estimation of the quantum for the asymmetric shocks takes account of the possibility that passenger journeys were delayed until after the shock period. This will certainly be the case for a number of the meteorological shocks (e.g. snowstorms), geophysical events (e.g. ash clouds) and industrial action. HAL may argue that due to capacity constraints these journeys are permanently lost, but this will not be the case since even in a capacity constrained airport, airport terminals and aircraft load factors will have leeway to accommodate higher passenger numbers for a short period of time to recapture the lost journeys. At the very least this should be empirically tested (e.g. using econometric analysis) before the finalisation of the estimation of the shock adjustment.

3.6.51 Thirdly, we are not confident that the quantum of any asymmetric adjustment applied to the forecast takes account of the TRS – which in future will effectively dampen the magnitude of the shocks.

3.6.52 Without reassurance on each of these points, the asymmetric shock factor is invalid and will result in a downward bias to the passenger forecast.

4 Traffic Risk Sharing Mechanism

4.1 Introduction

4.1.1 In all previous regulatory periods, HAL has been exposed to all traffic risk through deviations of actual traffic from the forecast used to calculate the level and path of airport charges. This approach produced significant cycles in HAL's actual and regulatory return on RAB and contributed to its high WACC relative to other UK utilities.

4.1.2 Given the uncertain rate of recovery of the Covid-19 pandemic, the CAA has decided to introduce a Traffic Risk Sharing ("**TRS**") scheme for H7. Whilst we can generally support the principle, there are issues with its implementation which we discuss in this section.

4.1.3 Whilst in this section we concentrate on the principle and implementation of the TRS itself, it is important to note that the mechanism, along with other risk mitigation measures that form part of the FP's regulatory package, will result in a substantial reduction in HAL's overall risk and cost of capital. In Section 8.5 we explain why this is only partially addressed by the CAA's changes to HAL's cost of capital, and why the TRS, as formulated, in the FP warrants further reductions in HAL's WACC beyond that that the CAA proposes in the FP.

4.1.4 It is pertinent to note that, under the FP, the TRS will limit HAL's traffic risk to only 2.8 million (2022) to 4.1 million (2026).[68] This is in stark contrast to Q6 where HAL's traffic exposure was unlimited.

4.1.5 This Section is divided into three parts:

(a) Section 4.2 summarises the changes from the IP;

(b) Section 4.3 identifies the CAA changes that enhance the effectiveness of regulation; and

(c) Section 4.4 identifies aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

4.2 Changes from the IP

4.2.1 In the IP, the CAA proposed to account for passenger forecast uncertainty with the following TRS mechanism:

(a) Moderate risk sharing "in a central band around the passenger forecast we used to calibrate the price control. [The CAA] proposed a risk sharing factor in the range of 40 to 60 per cent. This aimed to preserve reasonably strong growth incentives for HAL, while also blunting the impact of forecasting risk";[69]

(b) Stronger risk sharing "in an outer band, which would start to apply if cumulative traffic levels in H7 turn out to be more than 10 per cent higher or lower than our forecast. We proposed a risk sharing factor in the range of 90 to 100 per cent. This was intended to

[68] 50% of the 10% band, gives a maximum exposure of 5% of annual forecast.

[69] FP, Section 1, para 2.6.

reduce HAL's exposure to the risk of extreme events significantly, while preserving some incentive to generate additional traffic".[70]

4.2.2 The CAA then suggests implementing the TRS mechanism "by adjusting HAL's RAB".[71] This approach would "reduce the risk that the mechanism would lead to very significant increases in charges at a time when airlines might still be facing the impact of lower than expected demand",[72] instead of adjusting the charges every year.

4.2.3 The CAA also rejected HAL's request to include a reopening clause in its licence.

4.2.4 In the FP, the CAA adopted a similar approach with a few changes in the TRS implementation.

4.2.5 First, the CAA proposes an approach to "share" the gap between forecasted and actual revenue. "For each calendar year, the difference between out-turn allowed revenues and forecast allowed revenues will be calculated by multiplying the maximum allowable airport charge (excluding the correction factor and other adjustment factors) for that year by the difference between out-turn passenger numbers and our forecast of passenger numbers".[73]

4.2.6 Second, the CAA suggests an approach to share the risk from deviations between forecasted and actual revenues. "The amount of risk to be shared for that year will be calculated as:

(a) 50 per cent of any difference up to 10 per cent of forecast allowed revenues; and

(b) 105 per cent of any difference above 10 per cent of forecast allowed revenues".[74]

4.2.7 Third, as opposed to the IP, the CAA now suggests a composite approach between adjustment through the RAB and updating the charges per passenger. "The risk shared for each year t will be recovered over a period of 10 years from year t+2 to year t+11. For those years that fall within the H7 period, the adjustment will be implemented through an additional term in the price control formula in HAL's licence. For the remaining years, there will be an adjustment to HAL's RAB which will lead to higher or lower charges in future control periods".[75]

4.2.8 Fourth, the CAA proposes a methodology to take account inflation and the cost of capital to ensure net present value ("**NPV**") neutrality in the spreading of the adjustment over 10 years. "The adjustment to allowed revenues from airport charges for each year within the H7 period will be calculated as one-tenth of the total relevant TRS adjustment(s), uplifted for the real WACC and general price inflation (as measured by the Retail Prices Index, for consistency with the real WACC) for each year since the original divergence between out-turn and forecast traffic levels".[76]

4.2.9 Fifth, the CAA suggests a way to update the RAB for the years outside of the H7 period. "The adjustment to the opening RAB for H8 will be calculated as the sum of the remaining TRS adjustments (that is, those that have not already been reflected in higher or lower charges during H7) uplifted using the real WACC for the period between the original divergence between out-turn and forecast traffic levels and the start of H8. As with the TRS mechanism included in our Initial Proposals, HAL will be able to update its RAB during the course of H7 to reflect these adjustments,

70 FP, Section 1, para 2.6.
71 FP, Section 1, para 2.8.
72 FP, Section 1, para 2.8.
73 FP, Section 1, para 2.36.
74 FP, Section 1, para 2.36.
75 FP, Section 1, para 2.36.
76 FP, Section 1, para 2.36.

but the only impact on charges during H7 will be through the additional term in the price control formula described above".[77]

4.2.10 Sixth, the CAA explains how it aims to depreciate the RAB adjustment for the years falling outside the H7 period. "The adjustments to the opening RAB for H8 will then be depreciated over a period of between seven and ten years. The adjustment to reflect out-turn traffic in 2022 will be depreciated over seven years (as there will have already been three years of charges adjustments during H7), whereas the adjustments to reflect out-turn traffic in 2025 and 2026 will be depreciated over ten years (as there will not have been any corresponding adjustments to charges during H7). We expect to apply a slightly backloaded depreciation profile, so that the overall impact on HAL's allowed revenues (which reflects both depreciation and the allowed rate of return) will be roughly the same in each of the seven to ten years".[78]

4.2.11 The CAA believes that these changes do not significantly alter the IP's approach, allowing for the adjustments to be smoothed out over several years, while allowing adjustments before the H8 period. The CAA also notes that forecasted passenger traffic only fell outside of the 10% range twice in the last three price control periods.

4.2.12 The CAA also argues that the outer band of the TRS mechanism allows it to anticipate extreme events, while preserving HAL's incentives to promote traffic growth.

4.2.13 The CAA estimates that the central band "will protect HAL from around 43 to 45 per cent of the expected overall impact on its EBITDA of traffic levels",[79] while the outer band "will protect HAL from between 91 and 94 per cent of the expected impact on its EBITDA of traffic changes".[80]

4.3 CAA changes that enhance the effectiveness of regulation

4.3.1 In principle, the TRS enhances the effectiveness of regulation. The CAA acknowledges the need to set the appropriate incentives for HAL to promote traffic growth, while anticipating the risk of extreme events with the TRS mechanism. However, aspects of the CAA's approach are flawed, as discussed in the next sub-section.

4.4 Aspects of the CAA's approach that raise concerns

4.4.1 As noted in the previous sub-section, we agree with the CAA that it is crucial to provide an approach to anticipate deviations from forecasted passenger volumes. However, we consider that, in its current form, the TRS mechanism described by the CAA leads to:

(a) an asymmetric impact between the under-forecast scenario and the over-forecast one;

(b) significant risk of unintended consequences from mis-calibration of the sharing factor in the outer band, whereby HAL could have limited incentives (or even negative incentive) to promote recovery;

(c) the CAA has not adequately assessed the impact of the TRS on airlines and passengers.

77 FP, Section 1, para 2.36.
78 FP, Section 1, para 2.36.
79 FP, Section 1, para 2.41.
80 FP, Section 1, para 2.44.

Asymmetric impact

4.4.2 Positive deviations in traffic will have limited benefits for airlines and consumers when HAL caps capacity on airlines as it has done recently.[81] Indeed, in the short term any upside in passenger numbers is restricted by capacity issues related to staff shortages. In the longer term, it is unlikely to observe passenger traffic significantly above the CAA's forecast because passenger volumes would ultimately reach Heathrow's maximum capacity (see Figure 3.2). As such, the upside scenario of TRS mechanism does not accurately anticipate the actual impact of positive demand deviations.

4.4.3 On the other side, HAL is excessively protected from negative deviations in traffic, with less incentive for promoting traffic growth. In the extreme case where the 10% threshold is breached, it appears HAL's incentives to promote incremental growth are all but removed. For example, HAL would have no incentive to work with existing or prospective airlines to re-energise growth, and make use of the spare capacity created by the downturn in passengers.

4.4.4 Since traffic deviations from forecast are more likely to occur in the later years on H7, most TRS adjustments will be made via RAB adjustments rather than payments during H7. Therefore, the TRS mechanism in its current form is an opportunity to provide a substantial RAB adjustment to HAL in the event of a negative deviation in traffic, with little possibility of any upside for airlines when demand exceeds forecasts.

4.4.5 However, the CAA has an option to address the shortcoming of the proposed TRS approach. The CAA should implement an asymmetric sharing, with a 60/40 rather than 50/50 sharing agreement, for difference up to 10 per cent of forecast allowed revenues. This would counteract the asymmetry that exists in HAL's favour when it decides to cap capacity available to airlines when traffic growth is strong or otherwise hits capacity constraints, and rebalance the risk to a fair bet between HAL and airlines and consumers.

4.4.6 The asymmetric impact of the TRS mechanism also emphasises the importance of adopting a robust passenger forecasting approach. While HAL is protected against over-forecast projections, the airlines have little protection against under-forecast passenger traffic.

Unintended consequences of the outer band

4.4.7 The CAA's consultants – Deloitte – reviewed the TRS and, with respect to the outer band, noted:[82]

> "The elasticities (of costs and commercial income with respect to volumes) used by the CAA to calibrate the mechanism (especially the 90-100% [now 105% in FP] sharing proportion for deviations above 10%) are difficult to accurately estimate. It is therefore possible that the outcomes (e.g. in respect of HAL's revenue, EBITDA and airport charges) could be materially different to those currently forecast by the CAA (and potentially not as desired). This could result in HAL being over-compensated or under-compensated through the TRS, potentially significantly." [Text in square brackets added]

4.4.8 Deloitte raised an important point to which the CAA has failed to respond. The CAA's choice of a 105% factor for the outer band, according to the CAA's assumptions and calculations, will protect

[81] The Guardian, 'Heathrow asks airlines to stop selling summer flights as it caps passengers', available at: https://www.theguardian.com/uk-news/2022/jul/12/heathrow-airlines-stop-selling-summer-flights-airport-staff?CMP=share_btn_tw.

[82] Deloitte, 'Review of the CAA's proposed traffic risk sharing (TRS) mechanism', Final Report, 23 June 2022, p 8.

HAL from 91-94% of the EBITDA impact from the traffic deviation.[83] Given the difficulties in estimating the opex and commercial revenue elasticities on which this calculation depends, the CAA has left insufficient margin for error and risks either leaving HAL with limited incentive to promote traffic growth, or even a negative incentive to constraint traffic.

4.4.9 The CAA should drop its use of an outer band with 105% sharing. Even though the CAA highlights that projections suggest that falling outside the 10% range will be a rare event, it is likely to affect years in the H7 period, as HAL and airlines are facing high uncertainty about the speed of recovery of passenger traffic post-Covid, and miscalibration will have severe consequences on HAL's incentives to promote recovery.[84]

4.4.10 In any event, this level of risk sharing in the outer band has no regulatory precedent from similar automatic mechanism in other airports. For example, the Deloitte report (commissioned by the CAA) gives the example of Aeroporti di Roma ("**ADR**") which bears all traffic risk within 5% of forecast and 50% of risk beyond this.

4.4.11 The CAA may refer to the NATS precedent which does have a 100% sharing factor in the upper band, but since NATS is not an airport it does not have the same ability and influence and develop overall air traffic growth as do airlines and airports.

CAA has not adequately assessed the impact of the TRS on airlines and passengers

4.4.12 The final issue we have is that, in transferring risks from HAL to airlines, and hence to passengers, the CAA must consider the impact of the increased risk to airlines, particularly in a scenario when the 10% threshold has been triggered. Airport charges will rise at times when passenger numbers fall below forecast.

4.4.13 We see no evidence that this impact has been properly considered by the CAA when calibrating the TRS.

[83] FP, Section 2, para 2.44.

[84] This uncertainty does not diminish the fact that the HAL and CAA forecasts are overly pessimistic as explained in Section 3.

5 Opex

5.1 Introduction

5.1.1 The CAA's allowance for HAL's operating expenditure ("**opex**") is intended to achieve two goals. First, it should ensure HAL's ability to cover its everyday costs of efficiently operating Heathrow airport. This includes costs for "security, staff costs, maintenance, facilities, utilities, rent and rates" over the H7 period.[85] Second, the CAA states that the allowance is designed "to incentivise HAL to run the airport efficiently in H7".[86]

5.1.2 This section is divided into three parts:

(a) Section 5.2 summarises the changes from the CAA's IP;

(b) Section 5.3 identifies changes that enhance transparency; and

(c) Section 5.4 discusses aspects of the CAA's approach that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

5.2 Changes from the IP

5.2.1 In the IP, the CAA gave a range for the H7 opex allowance by calculating weighted averages between CTA's and HAL's forecasts. Specifically, the range consisted of an "upper quartile" (which applied 75% weight to CTA's forecast and 25% to HAL's) and a "lower quartile" (which applied 25% weight to CTA's forecast and 75% to HAL's). In the FP, the CAA defended its use of a weighted average arguing that "given the stage of the price review and that we were dealing with new and emerging information […] it was reasonable to acknowledge the high degree of uncertainty around the level of future costs" by using a range of opex forecasts.[87] However, after benefiting "from the input that HAL and airlines provided in their responses to our Initial Proposals and in follow-up discussions" and "[a]lthough there remains a greater degree of uncertainty than we have encountered in previous reviews, we are now in a position to make a forecast of the expected level of efficient opex for each year of the H7 period, instead of the range of numbers we used for Initial Proposals".[88]

5.2.2 In response to the IP, HAL submitted its revised business plan (RBPu2). Based on this revision, HAL argued that the CTA's forecast underestimated its total H7 opex requirement by a substantial £739 million.[89]

5.2.3 The CAA then presented a new opex forecast in its FP that is based on a revised version of CTA's estimate. CTA revised its analysis "across all categories of opex since the [IP], primarily based on new information from HAL." The CAA states that these revisions "involved detailed expert scrutiny of each opex category based on the range of evidence available" and a careful review by CTA of HAL's submissions.[90] The opex categories with the most significant adjustments include:

85 FP, Section 2, para 4.1.
86 FP, Section 2, para 4.3.
87 FP, Section 2, para 4.39.
88 FP, Section 2, para 4.40.
89 FP, Section 2, para 4.20.
90 FP, Section 2, paras 4.41-4.43.

(a) People costs.

(i) Based on additional information provided by HAL, CTA determined that more security staff were needed while Heathrow fits its security lanes with new screening technology. This security transformation results in higher forecasted opex for personnel (and capex for infrastructure). The model also assumes that the security transformation will enable HAL to achieve efficiencies before the end of H7. The higher staff requirement had a significant impact on the opex allowance because staff costs are the largest opex category by value, and security staff costs make up around half of all staff costs over H7. Overall, these changes increased estimated opex by £331 million.[91]

(ii) The CAA also aligned its forecasts more closely to HAL's position on the London Living Wage. The exact effect of this adjustment on the opex forecast is redacted from CTA's report.[92]

(b) Utility costs. CTA increased its estimate to allow for higher energy cost inflation forecasts by HAL. The forecast is based on a weighted average of CPI and EIC (electricity and gas) inflation forecasts, weighted according to HAL's utility costs in 2019. This change increased estimated opex by £90 million.[93]

(c) Operational costs. CTA increased its estimate primarily based on insurance costs forecasts from the Swiss Re Institute. Overall, these changes increased estimated opex by £43 million.[94]

(d) One-off adjustments. The CAA increased its estimate of one-off adjustments by £6 million over H7. (We assume this should be minus £6 million.) This reflects the net impact of several adjustments made since the IP, including:[95]

(i) Reducing the one-off adjustment for Covid-19 (such as cleaning measures) from £26 million to £6 million.

(ii) Increasing the one-off adjustment for the impact of the pandemic on insurance costs from £80 million to £83 million.

(iii) Adding a £6 million one-off adjustment for the ramp up of Terminal 4 operations.

(iv) Increasing the one-off adjustment for "enhanced service" from £34 million to £39 million.

5.2.4 The CAA then adopted CTA's revised forecast as the FP' opex allowance. Accordingly, the CAA and CTA responded to HAL's criticism by revising the IP estimates based on the new information provided by HAL.

91 FP, Section 2, para 4.61.
92 CTA Final Assessment, Opex, p. 23.
93 CTA notes that "HAL chooses a pessimistic EIC energy scenario to base its inflation forecast on, but the inflation forecast produced is not highly sensitive to the choice of EIC scenario." (See CTA Final Assessment, Opex, p. 69).
94 FP, Section 2, para 4.61.
95 FP, Section 2, para 4.55.

5.2.5 Overall, CTA increased its opex forecast from £5,215 million to £5,797 million (2020 CPI prices) for H7. The FP opex forecast averages to £1,160 million per year and £16.1 per passenger per year, as summarised in Table 5.1 below.

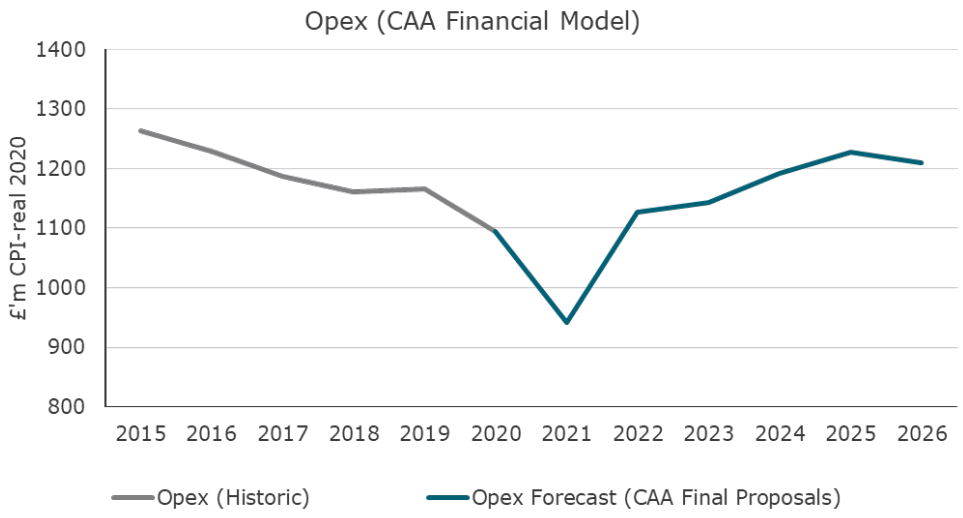
Table 5.1: CAA FP opex forecast, 2022-2026 (2020 CPI prices)

2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
Opex (£m)	1,106	1,123	1,172	1,208	1,191	5,797
Opex per passenger (£)	20.1	16.7	15.5	14.9	14.6	16.1

Source: FP, Section 2, Table 4.1.

5.2.6 Historically, HAL was able to reduce its opex from £1,262 million in 2015 to £1,165 million in 2019 (in real terms, using 2020 prices) – i.e., by 7.7% over this five-year period, or 1.6% per year. As can be seen in Figure 5.1 below, the CAA thus implicitly assumes that opex will return to its pre-pandemic level by around 2024 and increases further in 2025, before falling slightly in 2026. The CAA asserts that this pattern in opex is consistent with its forecasts of passenger volumes returning to pre-pandemic levels by 2025.

Figure 5.1: CAA Financial Model opex, 2015-2026 (£m, 2020 CPI prices)



Source: CAA Financial Model.

5.2.7 Overall, the CAA's FP opex forecast is £330 million less than HAL's RBPu2 forecast but £585 million more than CTA's forecast in the IP, as summarised in Table 5.2 below.

Table 5.2: Comparison of opex forecasts

£m, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP	1,106	1,123	1,172	1,208	1,191	5,797
CTA IP	958	1,023	1,067	1,084	1,082	5,215
HAL RBPu2	1,140	1,215	1,253	1,259	1,264	6,130

Sources: FP, Section 2, Table 4.1; IP, Section 2, Table 4.2; CAA Financial Model.

Note: The three opex forecasts each assume different passenger forecasts, which are summarised in Table 5.4.

5.2.8 A complicating factor with comparing the three different opex forecasts in Table 5.2 is that they are each based on different assumptions around passenger volumes. For example, the CAA has increased its passenger forecast since the IP (as described in Section 3 above), such that CTA's initial forecast and HAL's RBPu2 are based on lower passenger forecasts. Lower passenger volume assumptions will lead to a lower opex estimate, since certain variable expenditures vary with the number of passengers in the airport. These differences in passenger forecasts will mask differences in cost assumptions when comparing different opex estimates. To illustrate this, Table 5.3 compares the CAA's FP and HAL's RBPu2 on a common assumption of passenger volume, namely HAL's RBPu2 passenger forecast.

5.2.9 The difference between the CAA's FP and HAL's RBPu2 forecasts may be broken down into two parts. First, when using HAL's RBPu2 assumption on passenger volume, the CAA's FP opex forecast would be equal to £5,594 million, which is around £540 million less than in HAL's RBPu2. This difference purely reflects CTA's revised, lower forecast as to HAL's expected opex. This figure is some 8.7% lower than the HAL's RBPu2 based on same (i.e., HAL's forecast) passenger volumes. Second, when using the CAA's FP assumption on passenger volume, which is higher than HAL's, the opex forecast increases by £203 million to £5,797 million. This increase from £5,594 million reflects only the differences in assumed passenger volumes and not any differences in the underlying opex assumptions.[96]

Table 5.3: Comparison of opex forecasts with common passenger volume assumption

£m, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP (using the CAA's passenger forecast)	1,106	1,123	1,172	1,208	1,191	5,797
CAA FP (using HAL's RBPu2 passenger forecast)	1,058	1,080	1,136	1,164	1,157	5,594
HAL RBPu2 (using HAL's RBPu2 passenger forecast)	1,140	1,215	1,253	1,259	1,264	6,130

Sources: FP, Section 2, Table 4.1; CAA Financial Model.

5.2.10 On a per-passenger basis, CTA's opex forecast increased since the IP from £15.4 to £16.1 (2020 CPI prices) per passenger on average over H7, as summarised in Table 5.4 and Figure 5.2 below.

Table 5.4: Comparison of per passenger opex forecasts

£, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP	20.1	16.7	15.5	14.9	14.6	16.1
CTA Initial Forecast	21.0	17.0	14.8	13.7	13.2	15.4

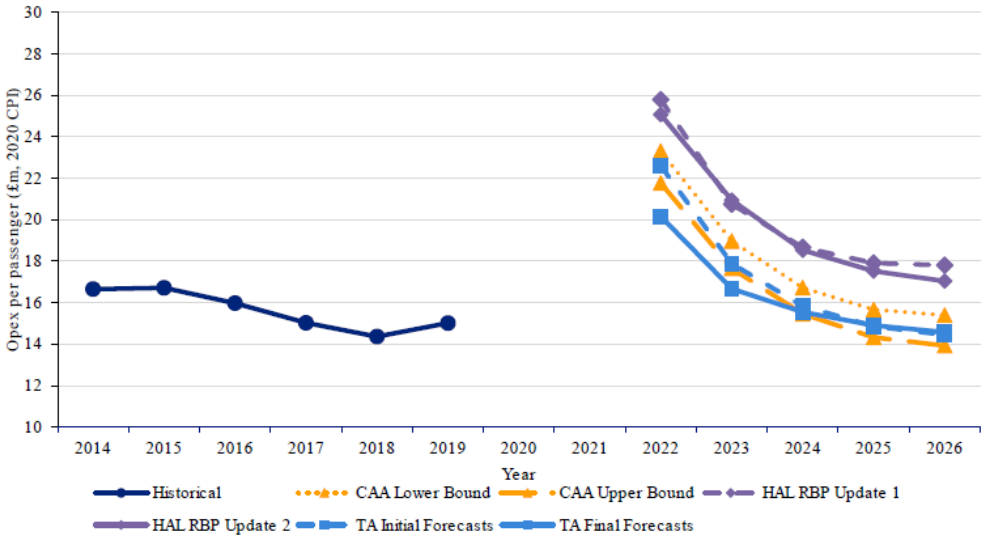
[96] This £203 million difference between the FP opex forecast when using the CAA's or HAL's passenger assumptions also includes a £4 million inflation forecast update (in real terms), since HAL's RBPu2 was based on older inflation data.

HAL RBPu2	25.1	20.9	18.5	17.5	17.0	19.3

Sources: FP, Section 2, Table 4.1; CAA IP, Section 2, Table 4.2; CAA Financial Model.

5.2.11 The downwards trend in per-passenger opex forecasts, as observed in Table 5.4 and Figure 5.2, is primarily driven by the increase in passenger numbers over time. Since the CAA's FP passenger forecast grows at a faster rate than opex, the opex estimate decreases on a per-passenger basis. Just like the passenger forecast, opex per passenger is thus predicted to return to pre-pandemic levels by 2025.

Figure 5.2: CAA FP opex per passenger, 2014-2026 (£m, 2020 CPI prices)



Note: "TA" refers to CTA's forecasts. Differences in the per-passenger opex forecasts of Table 2 and Figure 5.2 arise because of different underlying passenger volume assumptions.

Source: FP, Section 2, Figure 4.2.

5.2.12 On a per-passenger basis the comparison between forecasts is again complicated by the use of different passenger volume assumptions. The fact that the CAA's FP assume a higher passenger volume (as summarised in Table 5.5) will lead to a lower per-passenger opex forecast. This is because certain operating expenditures are fixed or semi-variable and thus do not increase at all or proportionately in response to higher passenger volumes, but still get divided by a larger number of passengers.

5.2.13 As illustrated by Table 5.6, when using HAL's RBPu2 assumption on passenger volume, the CAA's FP opex forecast would be equal to £17.6 per passenger on average over H7, which is around £1.7 per passenger less than in HAL's RBPu2. This difference purely reflects CTA's lower assumptions of HAL's expected expenditures. When using the CAA's FP assumption on passenger volume, this estimate increases by £1.5 per passenger, which reflects the differences in assumed passenger volumes.

Table 5.5: Comparison of passenger forecasts

Passengers, m	2022	2023	2024	2025	2026	H7
CAA FP	54.9	67.3	75.4	81.0	81.6	360.2

CTA Initial Forecast	45.6	60.2	72.1	79.1	82.0	338.6
HAL RBPu2	45.5	58.0	67.7	71.8	74.1	317.1

Sources: FP, Section 2, Table 4.1; IP, Section 2, Table 4.2; CAA Financial Model.

Table 5.6: Comparison of per-passenger opex forecasts with common passenger volume assumption

£m, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP (using the CAA's passenger forecast)	20.1	16.7	15.5	14.9	14.6	16.1
CAA FP (using HAL's RBPu2 passenger forecast)	23.3	18.6	16.8	16.2	15.6	17.6
HAL RBPu2 (using HAL's RBPu2 passenger forecast)	25.1	20.9	18.5	17.5	17.0	19.3

Sources: FP, Section 2, Table 4.1; CAA Financial Model.

5.3 CAA changes that enhance transparency

5.3.1 We support the CAA's decision to no longer adopt a weighted average of CTA's final estimate and HAL's RBPu2 forecasts. As described in 5.1.2 above, the CAA's IP had given a range for the H7 opex allowance consisting of a "lower bound" and "upper bound". This range was calculated using weighted averages between CTA's and HAL's forecasts. Even HAL points out that by using its own estimates as "the 'ceiling' for the CAA's range", the CAA would "set a precedent that HAL said could incentivise it to submit extreme forecasts in the future."[97]

5.4 Aspects of CAA's approach that raise concerns

5.4.1 The CAA is clear that the opex allowance, combined with its incentives for service quality, are designed "to incentivise HAL to run the airport efficiently in H7".[98] However, as discussed in Section 2.3, there is substantial information asymmetry between HAL and the CAA as to the efficient level of HAL's opex. There is no robust evidence that the CAA has set the H7 allowance at the efficient level of HAL's opex. If opex allowances are not set at the efficient level, then as HAL retains 100% of any cost savings, it will earn windfall profits and/or have reduced incentives to minimise costs. In any event, consumers would not get the benefit of these cost savings. Rather, the allowance would include a monopoly profit which consumers must pay.

5.4.2 In this regard, it should be noted at the outset the CAA recognises that "airlines may feel the revised targets could be more stringent". The CAA further agrees that there are advantages to setting "challenging targets in terms of putting downward pressure on airport charges [but] it is also important that targets are consistent with a level of costs that supports good and improving levels of service." Overall, having "worked closely with CTA to ensure that we retain challenging targets, but that these targets also evolve to reflect new information on costs and service levels",

97 FP, Section 2, para 4.23.

98 FP, Section 2, para 4.3.

the CAA concludes that "our Final Proposals for opex are consistent with furthering the interests of consumers."[99]

5.4.3 There are two fundamental issues with the CAA's assessment of HAL's opex forecasts. First, the starting point of CTA's original assessment of HAL's opex was based on a very high-level assessment of HAL's top-down financial model, without detailed bottom-up analysis of the actual costs that would be incurred, their justification and business as usual cost reduction programmes. CTA's ability to challenge HAL's costs was therefore limited.[100] HAL appears to have provided limited detail or justification for its costs, and thus CTA's original opex assessment is likely to both lack precision and overstate efficient costs. We consider that the CAA should have at least considered data on per-passenger opex at comparable UK or global airports, as a way of testing the rigour and reliability of HAL's data.

5.4.4 Second, rather than revisiting the overall adequacy of HAL's information disclosure and justifications, the CAA has relied on selective information provided by HAL to justify certain cost increases, which it has then asked CTA to apply to produce a revised estimate. HAL's incentives will be to disregard lines of costs or cost items where cost allowances were particularly generous and focus instead on providing focused justifications on a bottom-up basis for various increases. Even if all of the adjustments were fully justified, this fails to address the inefficiency (inadvertently on CTA's part) built into CTA's initial assessments. Moreover, there has been no real opportunity for the airlines to provide customer led challenge, which would require disclosure of the underlying data and methodology and would still be in the context of HAL's "relatively simple, top-down approach". As the CAA pointed out in the IP, "in many areas HAL had not provided sufficient evidence to justify its key forecasting assumptions and some items had not been adequately explained".[101]

5.4.5 Effectively, HAL is being rewarded for providing poor quality information at the outset, and in an environment where it reaps 100% of the benefits from any cost reductions below forecast. In the context of ED2, this would have led to a business plan penalty being applied, because Ofgem applied a business plan quality incentive mechanism of +/- 2% of electricity distribution network operators' ("DNOs") total expenditures ("totex", i.e. opex plus capital expenditure) – and this is notwithstanding that under the totex incentive mechanism DNOs benefit from at most 50% of any cost savings.[102]

5.4.6 At this juncture, there would appear to be strong merit in the CAA revisiting all of HAL's opex forecasts, as well as disclosing to the airlines the precise basis of these estimates so that they can be challenged.

99 FP, Section 2, para 4.82.
100 IP, Section 1, paras 4.8-4.9.
101 IP, Section 1, paras 4.8-4.9.
102 Ofgem, "RIIO-ED2 Draft Determinations – Overview Document", 29 June 2022, see Table 10.

6 Commercial revenues

6.1 Introduction

6.1.1 The allowance for HAL's commercial revenues is intended by the CAA to ensure that the H7 airport charges as calculated by the CAA are no higher than necessary, and that HAL is incentivised to optimise the profit from its commercial activities, which include "retail shops in terminals, cargo, property rents, access to the airport (rail, car parks and the terminal drop-off charge) and other services."[103] To achieve this, the CAA deducts the forecasted commercial revenues from HAL's revenue requirement when it calculates the airport charges, thus ensuring that HAL's revenues from airport charges are no higher than necessary. Further, if HAL is able to generate higher revenues than the allowance, it will be able to retain 100% of the difference, thus incentivising HAL to increase its commercial revenues.

6.1.2 This section is divided into three parts:

(a) Section 6.2 summarises the changes from the CAA's IP;

(b) Section 6.3 identifies changes that enhance the accuracy of the commercial revenues allowance; and

(c) Section 6.4 discusses aspects of the CAA's approach that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

6.2 Changes from the IP

6.2.1 Similar to its opex forecast, the CAA considered two different commercial revenue forecasts for its IP. First, the commercial revenues as estimated in HAL's RBPu. Second, a detailed review of HAL's forecast conducted by the CAA's independent experts, CTA. The CAA then proposed a range for the H7 commercial revenues allowance by calculating a weighted average between CTA's and HAL's forecasts. The range's "upper quartile" applied 75% weight to CTA's forecast and 25% to HAL's, while the "lower quartile" applied 25% weight to CTA's forecast and 75% to HAL's.

6.2.2 As with opex, we note that it is reasonable in principle for the CAA to consider a range of commercial revenue forecasts, including HAL's own business plan. However, using a weighted average of HAL's and CTA's forecasts will provide HAL with an incentive to understate its commercial revenues expectations in order to achieve a higher airport charge. In this context, it is important that HAL gives detailed explanations of their model, and that the CAA carefully considers the points where HAL's forecasts differ from those of independent experts, to avoid incentivising HAL "to submit extreme forecasts in the future."[104]

6.2.3 HAL criticised the CAA's IP commercial revenues forecast and submitted additional information to support its criticism. In particular, HAL argued that the CTA's "management stretch" assumption of 2% p.a. was overstated. While Heathrow "had ranked as the highest airport globally for the level of commercial revenue per passenger it generates" and "the best for airport shopping", it "only previously observed material real terms growth in its revenue per passenger when it had opened new terminals such as T5 and T2 and it had been able to increase the amount of retail

[103] FP, Section 2, para 5.1.

[104] FP, Section 2, para 4.23.

space at the airport. HAL said that no new space was planned in H7, "making the 'unsophisticated' extrapolation of historical revenue growth into a 2% management stretch target unrealistic."[105]

6.2.4 The CAA defended its approach in the IP as "appropriate at that stage". It further noted that it had "carried out additional work" and "engaged extensively with HAL and airlines through a series of detailed bilateral workshops on the key issues" since the IP. It also asked CTA to revise its analysis and consider the additional information raised through the consultation process.[106]

6.2.5 CTA revised its estimates "across all categories of revenues since our Initial Proposals, primarily based on new information from HAL".[107] These changes included:[108]

(a) Lowering the terminal drop-off charge forecast. HAL noted that its model included an error which mistakenly applied the TDOC to passenger pick-ups, instead of just drop-offs. Further, CTA excluded 20% of the TDOC revenues to net out chargeable VAT and increased its assumption of average vehicle occupancy from 1.5 to 1.7 passengers per vehicle. These changes reduce estimated revenues by £187 million.

(b) Adopting HAL's view on retail revenues, including the impact of tax and duty changes on margins, which reduces estimated revenues by £103 million.

(c) Lowering the upper bound of its "management stretch" assumption from 3% to 2% p.a. The CAA then adopted the CTA's lower bound estimate of 1% management stretch, which reduces estimated revenues by £241 million.

6.2.6 The CAA then accepted CTA's revised forecast as the FP's commercial revenues allowance. Overall, CTA lowered its forecast of commercial revenues (excl. cargo) since the IP from £4,608 million to £4,204 million (2020 CPI prices) over H7. The FP commercial revenues forecast averages to £841 million per year, or £11.7 per passenger per year, as summarised in Table 6.1 below.

Table 6.1: CAA FP commercial revenues forecast, 2022-2026 (£m 2020 CPI prices)

£m 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
Cargo	45	28	18	11	11	114
Commercial revenues	678	781	873	931	941	4,204
Commercial revenues per passenger, excluding cargo (£)	12.3	11.6	11.6	11.5	11.5	11.7

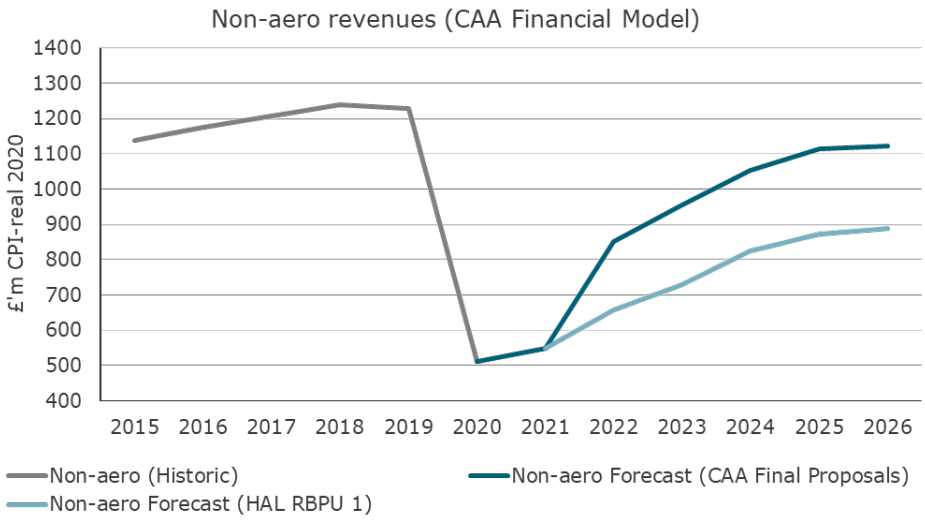
Source: FP, Table 5.3.

6.2.7 Historically, HAL was able to increase its commercial revenues from £910 million in 2015 to £981 million in 2019 (in real terms, using 2018 prices). According to HAL, this was "driven by the opening of the refurbished Terminal 2, which transformed the quantity and quality of retail space and increased passengers' average propensity to spend."[109] However, due to the relatively high elasticity of several revenue categories (in particular, retail, parking, and catering) with respect to passenger volumes, HAL's commercial revenues decreased to £397 million in 2021 during the

105 FP, Section 2, para 5.20.
106 FP, Section 2, paras 5.29-5.31.
107 FP, Section 2, para 5.55.
108 FP, Section 2, para 5.61.
109 FP, Section 2, para 5.5.

Covid-19 pandemic. According to HAL's forecast, commercial revenues will recover during H7 but not return to their pre-pandemic level, as illustrated in Figure 6.1 below.

Figure 6.1: CAA Financial Model non-aero revenues, 2015-2026 (£m, 2020 CPI prices)



Source: CAA Financial Model

Note: Non-aero revenues are greater than commercial revenue because they also include certain non-commercial revenues such as emissions fees.

6.2.8 The CAA's FP commercial revenues forecast is £661 million higher than HAL's RBPu2 forecast and £404 million less than CTA's forecast in the IP, as summarised in Table 6.2 below.

Table 6.2: Comparison of forecasted commercial revenues (excl. cargo)

£m, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP	678	781	873	931	941	4,204
CTA IP	677	834	945	1,055	1,096	4,608
HAL RBPu2	557	642	744	791	809	3,543

Sources: FP, Section 2, Table 5.3; CAA IP, Section 2, Table 5.2.

Note: The three commercial revenues forecasts each assume different passenger forecasts, which are summarised in Table 5.4 above.

6.2.9 As with opex, the commercial revenues forecasts are each based on different passenger volumes. Given that the CAA has increased its passenger forecast since the IP, this will lead to a higher commercial revenues estimate, since several revenue categories are highly dependent on the number of passengers in the airport. Thus, differences in passenger forecasts will mask differences in the underlying revenue assumptions when comparing different estimates. To illustrate this, Table 6.3 compares the CAA's FP and HAL's RBPu2 on a common assumption of passenger volume, namely HAL's RBPu2 passenger forecast.

6.2.10 We can break down the difference between the commercial revenue forecasts in the CAA's FP and HAL's RBPu2 into two parts. First, when using HAL's RBPu2 assumption on passenger volume, the CAA's FP's forecast would be equal to £3,778 million, which is around £235 million more than in HAL's RBPu2. This difference purely reflects CTA's higher assumptions around HAL's commercial revenues. Second, when using the CAA's FP assumption on passenger volume, which is higher

than HAL's, the forecast increases by £426 million to £4,204 million. This increase reflects only the differences in assumed passenger volumes and not any differences in revenue assumptions.

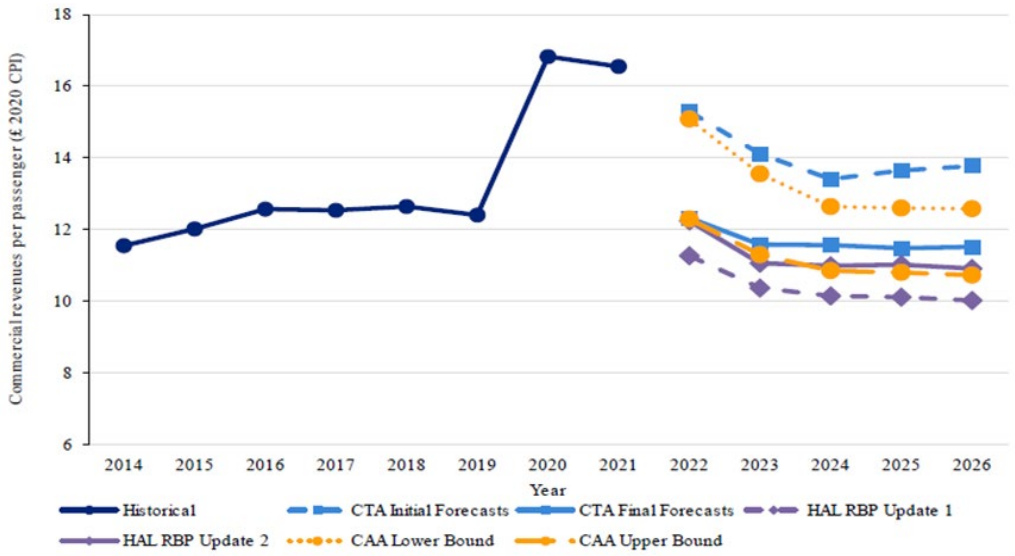
Table 6.3: Comparison of forecasted commercial revenues (excl. cargo) with common passenger volume assumption

£m, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP (using the CAA's passenger forecast)	678	781	873	931	941	4,204
CAA FP (using HAL's RBPu2 passenger forecast)	585	691	798	841	863	3,778
HAL RBPu2 (using HAL's RBPu2 passenger forecast)	557	642	744	791	809	3,543

Sources: FP, Section 2, Table 4.1; CAA Financial Model.

6.2.11 On a per-passenger basis, CTA's commercial revenue forecast decreased since the IP from £13.6 to £11.7 (2020 CPI prices) per passenger on average over H7, as summarised in Table 6.4 below.

Figure 6.2: CAA FP commercial revenues per passenger, 2014-2026 (£m, 2020 CPI prices)



Source: FP, Figure 5.2.

Table 6.4: Comparison of forecasted commercial revenues (excl. cargo) per passenger

£, 2020 CPI deflated prices	2022	2023	2024	2025	2026	H7
CAA FP	12.3	11.6	11.6	11.5	11.5	11.7
CTA IP	14.8	13.9	13.1	13.3	13.4	13.6
HAL RBPu2	12.2	11.1	11.0	11.0	10.9	11.2

Sources: FP, Section 2, Table 4.1; IP, Section 2, Table 4.2; CAA Financial Model.

6.3 CAA changes that enhance accuracy

6.3.1 As with opex (see Section 4.3), we consider it is a sensible and prudent decision by the CAA to adopt CTA's revised forecast instead of calculating a weighted average between HAL's and CTA's revised estimates. Given the extent of the divergence between HAL's estimate and CTA's revised forecasts, and the fact that the CTA revised forecasts themselves take as a starting point the HAL forecasts and apply a reasonable challenge to those, we consider that no weight should be given to HAL's estimates.

6.3.2 We agree with the CAA's decision to apply the terminal drop-off charge only to passenger drop-offs, not pick-ups. However, it should be clarified with HAL that no passengers are picked up in the drop off zone. It seems plausible that a share of passengers will still be picked up (possibly accidentally) in the drop off zone. In that case such pick-ups would incur HAL's drop-off charges and should be included in the commercial revenues allowance. Similarly, it should be clarified that the number of passenger pick-ups that the CAA removed from the terminal drop-off charges calculation are accurately captured by the forecast of car parking revenues. While passenger pick-ups, according to HAL, are not liable for drop-off charges, they should still be included in the commercial revenues allowance for HAL in the form of car parking revenues.

6.4 Aspects of the CAA's approach that raise concerns

6.4.1 The allowance for HAL's offsetting commercial revenues is intended to ensure that the H7 airport charges as calculated by the CAA are no higher than necessary, and that HAL is incentivised to optimise the profit from its commercial activities, which include "retail shops in terminals, cargo, property rents, access to the airport (rail, car parks and the terminal drop-off charge) and other services."[110] As discussed in Section 2.3, if HAL's efficient commercial revenues are understated, HAL will earn undeserved windfall profits and/or have reduced incentives to operate efficiently.

6.4.2 In this regard, there are two matters that warrant further consideration. First, the CAA accepted HAL's view on retail revenues. In particular, the CAA accepted HAL's view the impact of tax and duty changes on margins, which reduces estimated revenues by £103 million. This assumption would suggest that retailers will have no or limited response to unfavourable tax and duty changes. However, we would expect retailers to adopt mitigating strategies to offset these charges and preserve profits, including that their suppliers would reduce their wholesale prices to some degree to maintain their airport sales.

6.4.3 Second, the CAA has set a modest 1% p.a. management stretch target. The CAA notes that it does not agree with HAL's arguments relating to the management stretch target and considers it is "appropriate in the interests of consumers to set challenging but achievable targets for HAL, including a component relating to annual, year-on-year improvement in performance."[111] We agree with this assessment. However, we consider that the CAA's decision to adopt the minimum management stretch target of 1% contradicts this. As the CAA points out, 1% is the minimum target required "to capture HAL's own assessment of the potential for revenues per passenger to grow faster than general inflation."[112]

6.4.4 CTA conducted a detailed econometric analysis which found that HAL was historically able "to drive increased revenue in real terms [that] exceeds growth from passenger volumes, other bottom-up revenue drivers, capital expenditure or one-off factors." Based on this evidence, "CTA

110 FP, Section 2, para 5.1.
111 FP, Section 2, para 5.32.
112 FP, Section 2, para 5.33.

concludes that its econometric analysis implies that a management stretch target for H7 could reasonably lie in the range 1%-2%."[113]

6.4.5 In its initial assessment, CTA had proposed a range of 1%-3% and the CAA initially adopted 2% as the mid-point. Thus, by moving the upper bound of its management stretch estimate down from 3% to 2%, the CTA clearly confirmed that the use of a 2% management stretch target was reasonable despite HAL's criticism. CTA makes several important points to defend its analysis:

(a) First, in a competitive environment competition would be expected "to drive management to set stretching revenue targets" and it is thus "reasonable for a regulator to set similarly stretching revenue targets" as well. CTA further states:

"Our view is that revenue drivers we have used and the overlays we have included do not fully explain the historic growth in commercial revenues or the potential for future revenue generation opportunities. For example, we would expect retail income to increase over time with increases in disposable income. This is not explicitly accounted for in our revenue drivers, elasticities, or overlays. […] We believe that these unaccounted factors should be incorporated into our management stretch target."[114]

(b) Second, HAL admits the effectiveness of "management initiatives" to "maximise any opportunities that may present", including "investment in new facilities and retail units, as well as non-capital projects."[115] Furthermore, HAL assumes in its RBPu that it can maintain constant revenues in RPI real terms, which is equivalent to a 1% management stretch in CPI terms.[116]

(c) Third, CTA accepted an argument by Frontier that certain revenue categories are not fully within HAL's control and, as a result, should be excluded from the management stretch target. These categories are "rail track access charges, TDOC, Terminal 5 Piccadilly line revenue and property revenue". [117] Accordingly, CTA took this into account in specifying the management stretch target.

(d) Fourth, while CTA did not directly set a management stretch target, it analysed "in a confirmatory manner […] whether the historical evidence can justify the 2% management stretch target we proposed in our initial forecasts." Overall, CTA does not find "conclusive evidence in favour of or against a 2% management stretch target or a lower target as proposed by HAL." It therefore proposed "a range of possible options for management stretch targets" with a "lower bound" of 1% and an "upper bound" of 2%.[118]

6.4.6 In response, the CAA adopted a 1% management stretch target, which it considers is "an appropriate and prudent target for controllable categories of HAL's revenues during the H7 period." The CAA recognizes that the "evidence collated by CTA indicates that a 1% figure is towards the low end of what HAL has achieved in the past" and "a higher level of management

113 FP, Section 2, para 5.34.
114 CTA Final Assessment, Commercial and Cargo, p. 51.
115 HAL RBPu, Section 7.2.2.4.
116 CTA Final Assessment, Commercial and Cargo, p. 51.
117 FP, Section 2, para 5.36.
118 CTA Final Assessment, Commercial and Cargo, p. 52.

stretch could also be justified",[119] however it is concerned that "current and future economic conditions in H7 could make it more difficult for HAL" to grow its revenue.[120]

6.4.7 We note that because CTA already excluded revenue categories which may be difficult for HAL to control under potential adverse economic conditions, the already low management stretch target now only applies to "controllable categories of commercial revenue which HAL can influence".[121] Accordingly, even under potential difficult economic conditions these revenues should by definition be mitigable through changes in strategy, marketing, or contract renegotiations. Further, CTA points out that while HAL may be exposed to "headwinds" in the future, these might be outweighed by new revenue opportunities that arise through management initiatives.[122]

6.4.8 In light of the discussion above, we consider that the additional evidence provides no reason to move away from CTA's IP of a 2% management stretch, especially considering that CTA already excluded "non-controllable" revenues. In light of this, the CAA's approach to adopt the bottom of CTA's range is flawed. Furthermore, we consider that if the CAA decided to lower its management stretch target despite the results of CTA's econometric analysis, it would appear sensible to at least choose the mid-point of CTA's revised range. That is, the CAA should consider a management stretch target between 1.5% and 2% instead of the minimum 1% assumption. It would be prudent and in the interest of consumers to choose a higher, yet still achievable target.

119 FP, Section 2, para 5.60.
120 FP, Section 2, para 5.35.
121 FP, Section 2, para 5.36.
122 CTA, Commercial and Cargo, p. 53.

7 Capital expenditure incentives

7.1 Introduction

7.1.1 This section is divided into three parts:

(a) Section 7.2 summarises the changes from the CAA's IP;

(b) Section 7.3 identifies the changes that enhance the effectiveness of regulation; and

(c) Section 7.4 discusses aspects of the CAA's approach that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

7.2 Changes from the IP

7.2.1 An important innovation of H7 has been the introduction of capex efficiency incentives to encourage the cost-efficient delivery of projects by HAL. The IP suggested a range of 20-30% applied symmetrically to over and under spend relative to an *ex-ante* baseline. The FP settled on a mid-point in this range of 25%, which we consider too low for reasons given below in Section 7.4.

7.3 CAA changes that enhance the effectiveness of regulation

7.3.1 Before discussing the incremental changes from the IP, it should be noted that the CAA's proposal for an *ex ante* incentive through sharing of any cost overrun or savings, excluding those for which HAL does not have control (e.g. certain pass-through costs such as Crossrail contributions, and core capex that had already reached Gateway 3 ("**G3**") by the start of H7) is a good step forward. In particular, we agree with the CAA that *ex post* assessment (i.e. determining the efficiency of capex at the end of the price control period, and potentially disallowing capex) is inferior, because this may create regulatory risk as it is difficult for the CAA to judge the efficiency of a capex project after the event. Where this is the case, *ex post* assessments provide no financial incentive for HAL to be more efficient, with the consequent possibility that airlines, and so consumers, will overpay for capex projects that could have delivered more efficiently.[123]

7.3.2 HAL's arguments that the CAA did not find any efficiency relating to past overspends, that the proposed incentive mechanism creates downside risk for HAL, and that it may somehow stifle innovation miss the point for two reasons.[124] First, there is substantial information asymmetry between HAL and the CAA, such that it is difficult for the CAA to determine that capex was inefficient after the event, and *ex post* assessments create regulatory risk (as noted in the preceding paragraph).

7.3.3 Second, as discussed in Section 2.3, incentive based regulation seeks to create incentives to reduce costs, and indeed the FP have an opex sharing rate of zero (i.e. HAL retains 100% of opex savings). HAL should be exposed to downside risk – in a fully competitive market inefficient companies make lower profits, and this creates incentives to be efficient. Under the CAA's

[123] FP, para 7.16.

[124] FP, para 7.34.

proposals HAL will retain 25% of the benefits of innovative solutions to deliver capex at a lower cost, which creates a financial incentive for it to explore and develop such solutions.

7.4 Aspects of the CAA's approach that raise concerns

7.4.1 The CAA proposes a symmetrical sharing rate of 25% relative to a capex baseline. The CAA has decided not to apply a higher sharing rate as it considers that this will sufficiently powerful an incentive and not unduly exposing HAL to downside risk. The CAA adds that it will be the first time that HAL has been subject to such incentives and the CAA wishes to mitigate unanticipated impacts by setting a lower rate.[125]

7.4.2 There are two factors relevant to the setting of incentive sharing rates. First, higher sharing rates increase incentives for efficiency, by offering companies the opportunity to keep a proportion of the underspend. This is, however, subject to one caveat. The caveat is that with the capex plan there needs to be corresponding delivery obligations, such that capex savings are not achieved by compromising on scope, delivery and timing. Such delivery obligations are envisaged in the FP,[126] however, we are concerned that the loss of explicit timing triggers as existing in Q6 could have the unintentional consequence of providing HAL with an incentive to delay some capex programmes.

7.4.3 Second, to provide incentives for information revelation, higher sharing rates may be appropriate if the regulated entity has submitted good quality information as to efficient costs. It can then receive a higher share of any cost savings from a transparent and efficient base. The opposite applies if this is not the case. The CAA denies that this is a function of HAL's capex incentives as "HAL will be required to provide high quality information in support of its proposals".[127] However, this statement simply assumes away the information asymmetry issue - regulatory challenge, support from independent consultants, and stakeholder engagement can only ameliorate this asymmetry (as discussed in Section 2.3). This is particularly the case as the CAA cannot readily make benchmark comparisons across companies to inform its assessment of efficient capex.

7.4.4 In our view, the CAA should set a higher capex sharing factors for two reasons. First, the CAA has calculated that even a 30% overspend – which it considers "highly unlikely" as the H7 capex plan is smaller and less complex and HAL's forecasting is "generally good" – would only result in a c0.6% reduction in HAL's Return on Regulatory Equity ("**RORE**").[128] The CAA rightly describes this as "relatively modest" downside risk. However, as set out above, HAL should face downside risk under incentive based regulation; this provides incentives to be efficient. Moreover, if the rate were to be 50%, this downside risk would still only be c1.2% reduction in HAL's RORE (i.e. 2 x 0.6%). Accordingly, in our view, the incentive sharing rate for overspend should be 50%.

7.4.5 Second, the fact that HAL has never faced *ex ante* capex incentives is highly relevant, but for different reasons than those considered by the CAA. As the CAA accepts, HAL currently has no incentives to deliver capex at a lower cost than the forecast: its only incentive is to deliver to the budget and it will know that the CAA will find it difficult to challenge capex *ex post* if there is an overspend. The CAA refers to undefined "unanticipated" adverse effects[129]: the most likely

125 FP, paras 7.93 and 7.98.

126 FP, paras 7.100-7.109.

127 FP, para 7.43.

128 FP, paras 7.95-7.96.

129 In theory, a regulated company may seek to underbid on its costs if there is a gap between a company's genuine efficient costs and modelled costs in order to avoid being penalised by facing a lower cost sharing

outcome is that HAL will then seek to deliver capex projects more efficiently. (The only caveat is that there will need to be delivery obligations, as noted above.) This is a very different scenario to water/sewerage and energy networks, which have had *ex ante* capex incentives for a long period of time. Accordingly, we would expect there to be material scope for HAL to improve its delivery of capex projects.

7.4.6 This later point leads to the question of whether rates should be symmetric as regards both over and underspend. The CAA argues that a symmetric rate is appropriate to provide a balanced incentives and denies that there is any need to incentivise HAL to provide high quality information on capex;[130] a proposition with which we find unconvincing (as noted at paragraph 7.4.3 above).

7.4.7 In this regard, the CMA, on investigating PR19 in the water sector, concluded that a degree of asymmetry was appropriate for the disputing companies – 55% incentive for overspend and 45% for underspend against regulatory allowances reflecting the quality of information they provided.[131] The CMA viewed that symmetric rates should be used as a reward only to those companies that submitted acceptable business plan costs.[132] Accordingly, at G3 it would be wholly appropriate to incentivise HAL to submit high quality information on capex costs as it would otherwise face a less favourable sharing rate as regards the proportion of cost savings that it is allowed to retain. HAL retaining 40% of cost savings (i.e. 10 percentage points lower than the sharing of overspends) if the capex plan quality is not high would seem entirely reasonable, and retain a sensible balance as to overall incentives.

percentage, particularly if cost allowances were set based on other comparator companies. The CAA's assessment of HAL's capex provides clear evidence that HAL is not under bidding on its costs, and the CAA's modelling of efficient costs is largely based on HAL's own costs. Accordingly, we do not consider that this is a material risk factor.

130 FP, 7.43-7.44.

131 CMA, "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations", Final Report, 17 March 2021, para 6.106.

132 CMA, "Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations", Final Report, 17 March 2021, para 6.101.

8 Cost of Equity

8.1 Introduction

8.1.1 This Section is divided into four parts:

(a) Section 8.2 provides an overview of the Capital Asset Pricing Model ("**CAPM**");

(b) Section 8.3 summarises the changes from the IP;

(c) Section 8.4 identifies changes that enhance the accuracy of the CAA's estimate of the cost of equity; and

(d) Section 8.5 identifies the aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

8.2 An overview of the CAPM

8.2.1 In common with all other economic regulators in the UK and Europe, the CAA estimates the cost of equity through application of the CAPM in both the IP and FP.

8.2.2 The CAPM calculates the post-tax cost of equity with the following formula:

Post-tax Cost of Equity

= Risk Free Rate + Equity Beta x (Total Market Return – Risk Free Rate)

8.2.3 In this equation the Risk Free Rate ("**RFR**") and Total Market Return ("**TMR**") are generic market-wide figures that capture the overall cost of market risk to investors. They measure, respectively, the return that an investor would expect on an asset that has virtually no risk and the return that an investor would expect on a "market portfolio" weighted to represent all assets available to investors.

8.2.4 Whilst these generic market-wide figures may vary over time, they should be invariant to the company to which the CAPM is being applied. For example, we would expect to see broadly the same set of assumptions being used by the CAA for HAL in H7 as by Ofgem for the electricity distribution networks in RIIO-ED2 (given the periods to which the respective controls apply are similar), or in recent CMA decisions.

8.2.5 The Equity Beta, on the other hand, is company specific and measures the risk of the company relative to the market portfolio. According to the CAPM, this is captured through measuring the covariance between the expected return of the company and that of the market portfolio.

8.2.6 Equity beta can be directly estimated for a company with publicly listed equity. However, for a private company such as HAL it needs to be inferred by: (i) estimating the beta for the underlying assets of the company – the "asset beta" - usually by reference to other similar assets where the beta is known; and (ii) performing a "gearing adjustment" to allow for the particular debt gearing of the company – requiring further data or assumptions on debt gearing and debt beta.

8.2.7 In applying the CAPM the CAA can (and does) refer to recent CMA decisions in setting assumptions for the RFR and TMR, since these should have common values for all companies. Discussion of

HAL's cost of equity will turn on discussion of its asset beta (and to a lesser extent its debt beta and gearing). In determining an asset beta for HAL, the CAA needs to take account of the underlying risk of the HAL asset in the light of not just on-going risk of traffic volume volatility, but also the mitigations to that risk that are being put in place by the economic regulatory package of the FP. A critical issue for the CAA to determine will be the extent to which the FP package, and specifically the TRS mechanism, reduces the asset risk of HAL such that it is closer to that of other UK regulated entities. This is the main issue which we address in the remainder of this Section.

8.3 Changes from the IP

8.3.1 Table 8.1 provides a comparison of the CAPM assumptions between the IP and FP.

Table 8.1: Cost of equity assumptions

Assumption	IP	FP	Approximate impact on mid-range Cost of Equity
RFR	-1.83%	-2.03%	0.04%
TMR	5.20-6.50%	5.85%	-0.17%
Asset beta	0.52-0.67	0.44-0.62	-1.28%
Gearing	*61-62%*	*60%*	*-0.32%*
Debt beta	*0.05-0.10*	*0.05-0.10*	
Equity beta	1.20-1.63	0.95-1.47	
Post tax Cost of Equity	**6.62-11.78%**	**5.45-9.56%**	**-1.71%**

Note: The approximate impact has been calculated from individually reverting each of the assumptions back to the IP value, whilst keeping all others at the FP level. This avoids the issue that cumulative impacts depend on the order in which each individual assumption is changed due to interaction between parameters.

Source: FP Table 9.2 and AlixPartners analysis.

8.3.2 In the FP, the CAA bases the RFR on the one-month trailing average of yields on Index Linked Gilts ("**ILG**"), with allowance for a "convenience yield". This was a change from the IP that used a 6-month trailing average and also took account of deflated yields on the iBoxx non-Gilts AAA rated corporate debt. The change in averaging period was to fully capture the latest developments in inflation and more generally the economic outlook. The overall impact of both changes is minor since, from the CAPM formula above, it can be seen that if the TMR is fixed as normally assumed, changes in the RFR will have no impact when the equity beta is 1.0. In the FP the equity beta is in the range of 0.95-1.47, and so for most of this range a reduction in the RFR results in a small increase in the cost of equity.

8.3.3 The TMR in the FP is simply the mid-point of the IP range, although there is a small downward impact on the cost of equity because of the asset beta range to which it is multiplied (i.e. in the IP at the top end of the range the larger TMR is multiplied by a larger asset beta which moves the mid-point cost of equity above what would be the case had the two mid points been multiplied together).

8.3.4 The change in the asset beta is where the CAA makes significant improvements in its methodology for assessing the impact of the new H7 TRS mechanism. The TRS is designed to mitigate a proportion of traffic risk and will, therefore, mean that HAL's risk characteristics have greater resemblance to other GB companies that are regulated on the same Regulated Asset Base ("**RAB**") model as HAL. The methodological consequence of this is that asset betas of these companies

become relevant information in determining HAL's own asset beta, whilst allowance still needs to be made for the remaining proportion of traffic risk which, under the scheme, is still borne by HAL. We discuss this further in Section 8.4, but for now we note that the net impact is to bring down the mid-range cost of equity by around 1.3%.

8.3.5 Finally, the change in the debt gearing assumption to 60% (from a range of 61-62%) reduces the equity beta and so brings down the cost of equity by 0.3%. However, this is offset in the overall WACC calculation as more weight will be given to more expensive equity financing. Conventional corporate finance theory postulates that the overall WACC will be largely invariant to gearing, except with extreme high levels of gearing, reflecting that higher gearing (i.e. higher debt levels) increases the volatility of equity returns as debt interest payments are paid before shareholders receive profits.[133]

8.4 CAA changes that enhance the accuracy of the cost of equity

8.4.1 We consider that the CAA has made reasonable judgements and applied an appropriate methodology in setting in most of the CAPM inputs. In particular, the CAA has responded appropriately to evolving market conditions for the RFR by considering a shorter averaging period.

8.4.2 Table 8 shows the CAA's FP assumptions in comparison to other recent decisions: CMA for water (PR19), Ofcom (WFTMR 2021-26) and Ofgem RIIO-ED2 (Draft Determination).[134] The CAA's assumptions are closely aligned to those of the CMA and Ofcom. Whilst they differ somewhat from those of Ofgem's Draft Determination for RIIO-ED2, Ofgem explains that they were concerned to align RIIO-ED2 assumptions with those of RIIO-T2/GD2 that were also considered and accepted by the CMA as not being wrong.[135] We conclude, therefore, that the CAA's assumption for the RFR and the TMR are within the range considered reasonable by the CMA.

Table 8.2: RFR and TMR assumptions used by economic regulators in most recent decisions

Regulator	RFR	TMR	Equity Risk Premium = TMR - RFR
CMA: PR19	-2.22%	5.85%	8.07%
Ofgem: RIIO-ED2 DD Adjusted to RPI real	-0.74%	6.50%	7.24%
Ofcom: WFTMR (2021-26)	-2.00%	5.90%	7.90%
CAA: H7 FP	**-2.03%**	**5.85%**	**7.88%**

Note: Adjusted to real RPI basis using an assumed RPI/CPI wedge of 0.7%
Sources: CMA PR19 Final Decision Table 9.39, Ofgem RIIO-ED2 SSMD Finance Annex Table 1, Ofcom WFTMR 2021-26 Table A20.1, CAA FP Table 9.20.

8.4.3 We also support the change in methodology to estimate HAL's asset beta. Whilst the CAA maintains a starting point of the asset betas of other major airports (asset beta range of 0.52 to 0.71[136]), the CAA now adopts a methodology for computing the impact of the TRS by assuming a

133 Modigliani-Miller theorem.
134 Note that in this table we have needed to adjust the assumptions of Ofgem regulator from CPI to RPI real.
135 Ofgem, "RIIO-ED2 Draft Determination, Finance Annex", 29 June 2022, para 3.28. Appeals by some networks that Ofgem had erred in its discretion were rejected by the CMA.
136 Range after taking account of expected likelihood of future pandemics.

convergence towards the observed average asset beta for the England and Wales water companies and Great Britain energy networks (asset beta of 0.342). This is a reasonable approach given the number of relevant similarities between HAL and the other UK regulated entities.

8.4.4 Firstly, the water and energy networks are regulated on 5-year price controls, providing returns on a RAB indexed on UK inflation – so that it maintains value in real terms. It is worth noting that some other comparator airports used in the CAA's analysis are also regulated on 5-year price controls linked to a RAB, but without inflation indexing of the RAB. This means that HAL's investors, in common with investors in other UK regulated companies, benefit from complete inflation risk protection of past investments, in contrast to HAL's European counterparts referenced by the CAA as asset beta benchmarks.[137]

8.4.5 There are some residual differences in the economic regulatory regime between HAL and the water and energy networks. For example, GB energy network and England and Wales water companies are subject to a totex sharing,[138] whereas HAL has full opex exposure but relatively low 25% capex risk exposure. On balance, we do not see this giving any particular risk bias against HAL. Furthermore, efficiency cost risk (and other non-traffic relative risks to which HAL is exposed[139]) are non-systematic risks (i.e. due to idiosyncratic efficiency performance and so unrelated to general market conditions), meaning that these risks can be pooled by investors within portfolios and so do not contribute to the cost of equity under the CAPM framework.

8.4.6 Secondly, both HAL and the water and energy networks operate under output and service quality incentives regimes with bonus and penalty payments.

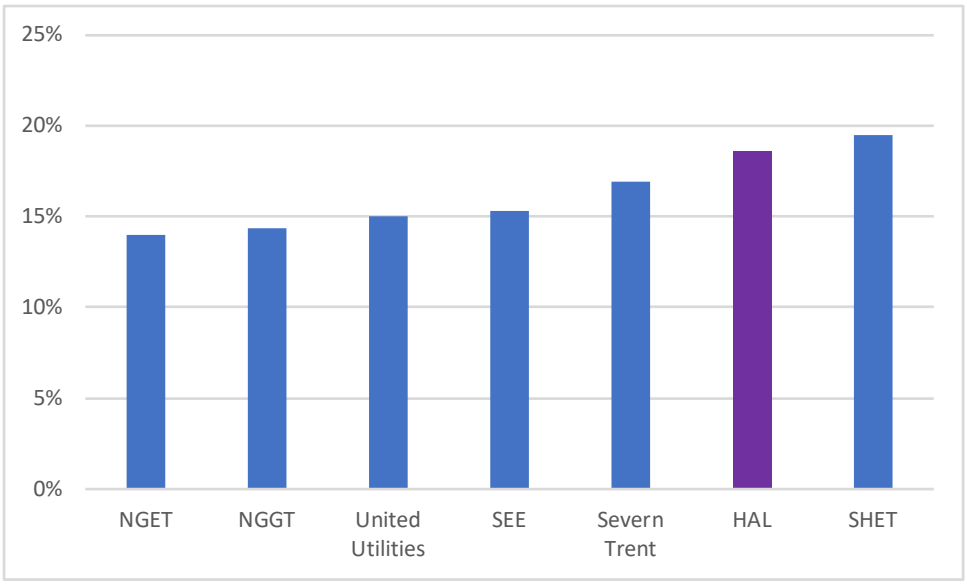
8.4.7 Thirdly, there are structural similarities in the cost structures between HAL and the other UK regulated companies. The RAB of a regulated company leads to a fixed cost base, and the resulting operational leverage is one reason why these companies carry a small positive asset beta despite having low volume risk. The comparative degree of operational leverage resulting from the RAB can be seem in Figure 8.1 which shows the ratio of regulated revenue to RAB for both HAL and the equity listed water and energy networks that compose the average asset beta used by the CAA: SEE (including SHET), NG (NGET and NGGT), Severn Trent and United Utilities. It can be seen that HAL's ratio of regulated revenue to RAB lies within the range of the other asset beta benchmark companies. If anything, the fact that HAL's ratio is towards the upper end of the range in indicative of a lower level of operational gearing since the RAB value is relatively smaller compared to annual revenue. Therefore, other than traffic risk, we should expect HAL to have approximately the same asset beta as the other utilities in Figure 8.1.

137 Dublin Airports also has a RAB indexed by CPI, but it has no publicly listed equity and so is not used as an asset beta benchmark by the CAA.

138 Totex is Capex+Opex and is the regulatory expenditure measure used by Ofgem and Ofwat. "Totex sharing" is the regulatory policy by which any overruns or underruns on totex relative to the original determination are shared between the company and its consumers in proportions determined in the settlement.

139 Traffic related risks include commercial revenues and most Other Regulated Charges ("**ORC**").

Figure 8.1: Regulated revenues as a proportion of RAB



Source: AlixPartners calculations based on company regulatory accounts.

8.4.8 Lastly, the England and Wales water companies and Great Britain energy networks carry relatively low volume risk. This would be the same as HAL were the TRS calibrated to pass all the risk onto airlines. However, since the TRS is a "sharing" mechanism HAL does retain a proportion of volume risk and so the convergence in asset betas is not complete. The estimation of this difference is discussed in the following Section 8.5.

8.5 Aspects of the CAA's approach that raise concerns

8.5.1 Whilst generally agreeing with the CAA's revised methodology to calculate HAL's asset beta, we have identified serious concerns with how the CAA has calibrated its methodology.

8.5.2 In particular, the CAA incorrectly assumes that, compared to UK energy and water networks, HAL is exposed additional risks other traffic variability. Other than traffic volatility, where risk is in any case mitigated by the TRS, and potential forecast bias removed by the various shock and traffic adjustments, there is no reason why HAL is exposed to more systematic risk than the regulated water and energy networks.

8.5.3 The CAA's precise methodology is as follows:

(a) On the basis of an analysis of observable international airport betas undertaken by Flint Global, the CCA established an initial range of asset betas of 0.52-0.71. It is important to note that this initial range:

- includes the forward-looking impact of future pandemics by virtue of assumed weighting of the historical data between pandemic and non-pandemic periods;
- does not yet take account of the TRS that is unique to the HAL H7, with no comparable mechanism in the regulatory regimes of the other airports analysed by Flint Global.

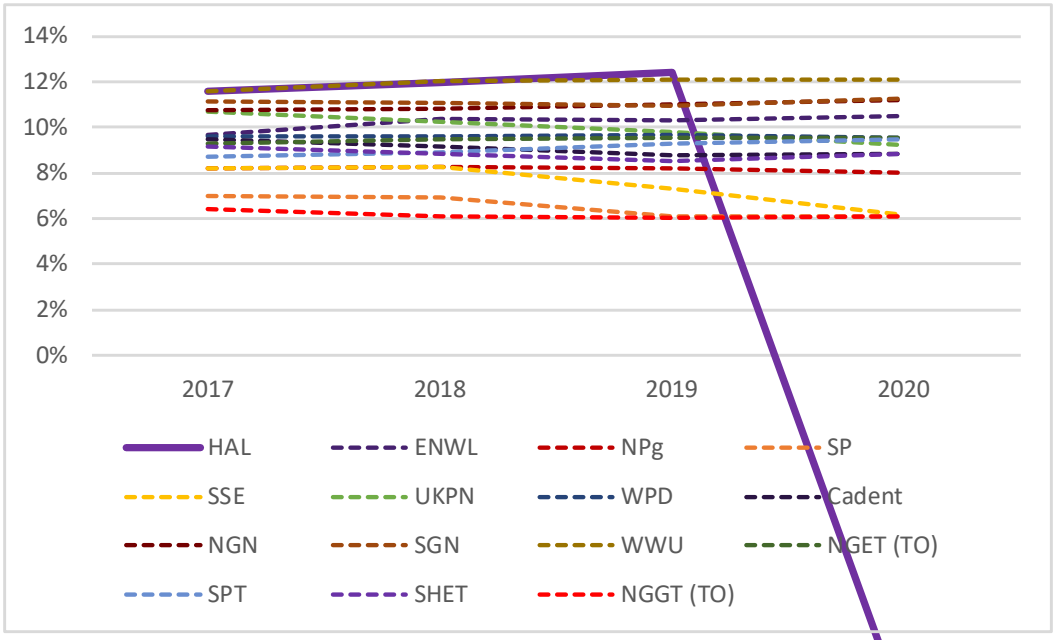
(b) The CAA then calculates the difference between the benchmark overseas airport asset beta and the average asset beta observed for UK regulated water and energy networks (of 0.342). This gives a difference of 0.178-0.368.

(c) Finally, the CAA then makes two critical assumptions:

- Between 50%-90% of the calculated asset beta difference is due to HAL's traffic risk. This is where we have material concerns with the CAA's approach. There is no reason why, other than traffic risk, HAL is exposed to more systematic asset beta risk than the regulated water and energy networks – for the reasons given in paragraphs 8.4.4 to 8.4.8. Figure 8.2 shows the Return on Regulated Equity ("**RoRE**") for HAL compared to the RIIO-1 energy networks. We have shown the period since 2017 since this corresponds to a period of relatively stable passenger growth for HAL, until the pandemic of 2020. Figure 8.2 shows that HAL's RoRE exceeded the top end of the RIIO-1 range and, other than during the pandemic year of 2020, displayed exactly the same stability characteristics as the energy networks. We, therefore, see no reason why a range of 90-100% should not be used for comparing HAL with utility networks, once volume and pandemic risk are accounted for elsewhere in the calculation.

- Finally, the CAA assumes that 50% of the traffic risk is mitigated through the TRS. We agree.

Figure 8.2: Return on Regulated Equity



Source: AlixPartners calculations from HAL regulatory accounts and Ofgem RIIO-1 performance reports.

8.5.4 Table 8.3 shows the resulting estimate of HAL's asset beta under both the CAA and the AlixPartners assumptions. Whereas the CAA's FP proposes a range of 0.44-0.62 (without justification for why, absent traffic risk, HAL's asset beta should be any different to any other UK regulated water or energy network), we find an asset beta range of 0.43 to 0.54. This has the impact of reducing the overall WACC by 0.33%.

Table 8.3: HAL asset beta taking account of the TRS

Component	CAA Low	CAA High	AP Low	AP High
A. Post-pandemic, pre-TRS asset beta	0.52	0.71	0.52	0.71
B. Network utility asset beta benchmark	0.342	0.342	0.342	0.342
C. Proportion of difference due to traffic risk	90%	50%	100%	90%
D. Proportion of traffic risk mitigated by TRS	50%	50%	50%	50%
E. Impact of TRS = (A - B) * C * D	0.08	0.09	0.09	0.17
H7 asset beta = A – E	**0.44**	**0.62**	**0.43**	**0.54**

Source: CAA; AlixPartners calculations.

9 Cost of Debt

9.1 Introduction

9.1.1 This Section is divided into three parts:

(a) Section 9.2 summarises the changes from the IP;

(b) Section 9.3 identifies the changes that enhance the accuracy of the CAA's estimate of the cost of debt; and

(c) Section 9.4 identifies aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

9.2 Changes from the IP

9.2.1 The CAA estimates the cost of HAL's debt through benchmarking against similar credit rated corporate debt. For this the CAA uses the iBoxx A and BBB 10+ year non-financials index. It is worth noting that this index is relied upon by other UK regulators, including Ofwat and Ofgem for the purposes of setting cost of debt allowances in their own sectors.

9.2.2 For the IP, the CAA used this index to calculate a 20-year collapsing[140] average as a proxy for HAL's embedded debt. However, for the FP, following consultation responses, the lookback period of the collapsing average was reduced to 13.5 years, so as to mirror the actual tenor/structure of HAL's debt.

9.2.3 For the FP, the CAA has also switched from a collapsing average to a fixed length trailing average. The CAA justify this by arguing that maturing debt will have shorter tenors and so, according to the CAA, the embedded cost of debt will remain constant over the period.[141] We discuss this further below in Section 9.4.3.

9.3 CAA changes that enhance the accuracy of the cost of debt estimate

9.3.1 We support the reduction in lookback period for the collapsing average. The original assumption of 20 years, whilst common in other utility sectors, was not grounded in the reality of the HAL debt structure. HAL's asset base and debt profile have developed in different ways to other regulated sectors, partly because of relatively recent investment in the new T2 (Queen's Terminal) and the T3IB baggage system.

9.3.2 Therefore, we agree with the CAA that it is necessary to determine the lookback period with reference to:

- HAL's issuance profile of HAL's actual debt; and

[140] The "collapsing average" refers to the historical averaging period being progressively adjusted for each year of the settlement. The starting year of the average is moved forward each year whilst the end year remains at the last year of Q6. This mirrors the repayment during H7 of the older embedded debt that was bought forward at the end of Q6.

[141] See para 9.295.

- Benchmarks of debt tenor for other major airports which, in this context, will be better indicators of debt issuance profiles than water or energy networks.

9.3.3 We do, however, have continuing concerns over whether the CAA's FP use of a 13.5 year lookback period is a sufficiently shortened period, which we discuss next in Section 9.4.

9.4 Aspects of the CAA's approach that raise concerns

9.4.1 As we discussed in Section 9.3, we agree with the CAA that the issuance profile of HAL's actual debt should be taken into account when setting the lookback period for the collapsing average of benchmark returns for setting the cost of embedded debt. In the FP the CAA has assumed 13.5 years. However, Table 9.6 of the FP shows that 41% of HAL's Class A debt has been issued since 2017, and 69% since 2012. Thus 69% of HAL's Class A debt was issued 10 or less years ago. A calculation based on the data in Table 9.6 suggests an average age of between 7.4-11.4 years[142] with a mid-point of 9.4 years. Therefore, the evidence suggests that a 10-year lookback period should be used for the average of the iBoxx index for the purposes of calculating the cost of embedded debt.

9.4.2 As discussed above, the CAA has also switched from a collapsing average to a fixed length trailing average. The CAA justify this by arguing that maturing debt will have shorter tenors and so, according to the CAA, the embedded cost of debt will remain constant over the period. We challenge this assumption since a collapsing average is the correct method to capturing the continual maturing process of embedded debt.

9.4.3 Finally, we find no justification for the addition of the 0.08% "HAL-specific premium" or "Reverse Halo", based on the average difference of HAL's actual issuance spread to that of the iBoxx. (Table H.1 of FP). Effectively, this restores the link between HAL's actual cost of debt and undermines the efficient issuance cost incentive properties of using the iBoxx indices rather than HAL's actual cost of debt.

9.4.4 These amendments to the embedded cost substantially reduce the cost of debt to become negative in RPI-real terms to around -0.5%.

[142] Range based on assuming all debt was issued at either the beginning or end of each 5-year period.

10 WACC

10.1 Introduction

10.1.1 A number of changes to the regulatory regime of HAL contained in the FP will have a very significant impact on its WACC, compared to Q6. These include:

- The TRS which, by itself, will remove over 50% of HAL's traffic risk;
- Asymmetric risk adjustments for the possibility of a future pandemic magnitude event – assessed as being a 3.5% probability.

10.1.2 Whilst the asymmetric risk adjustment is new in H7, it is worth pointing out that the risk of such events has always existed and, although of smaller magnitude than Covid-19, have occurred throughout HAL's history (e.g. Desert Storm, 9/11, SARS, liquid bombs, mad cow disease[143], London bombings, Icelandic volcanoes etc) and have all had a material impact on HAL's traffic. These have always been implicitly reflected in HAL's WACC through its asset beta[144], without application of any adjustment other than the shock adjustment to the traffic forecast. Therefore, the new asymmetric risk adjustment should be considered as an additional risk allowance over and above that which has been applied in previous settlements.

10.1.3 Whilst the CAA have appeared to apply these protections consistently, taking account of the interactions, they do nevertheless represent a significant reduction in overall risk for HAL compared to Q6, and effectively move the company's risk profile further in the direction of a traditional utility company.

10.1.4 Furthermore, the recent rises in inflation will significantly reduce the real cost of the embedded fixed rate debt in HAL's notional capital structure.

10.1.5 Taking these factors into account the significant reduction of HAL's WACC discussed in this section – and summarised in Table 10.2 - is unsurprising.

10.1.6 This Section is divided into three parts:

(a) Section 10.2 summarises the changes from the IP;

(b) Section 10.3 identifies the CAA changes that enhance the accuracy of the WACC estimate; and

(c) Section 10.4 identifies aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

10.2 Changes from the IP

10.2.1 The IP provided only a range for the WACC, whereas the FP required a point estimate. Table 9.19 of the FP lists the CAA's considerations on where to place the point estimate within this range.

143 Bovine spongiform encephalopathy (BSE).

144 This is especially the case when the shock also has an impact on the economy more generally, resulting in a systematic risk in the CAPM context.

10.2.2 The CAA recognises:[145]

- Reasons to believe that the assumption of a constant TMR will give rise to a bias if, as would be reasonable, the TMR is positively correlated with the RFR, or negatively correlated with inflation. This led the CAA to aim-down within the WACC range;

- "Welfare effects and (risk to) investment" as articulated by the UKRN - that there is an asymmetry in the implications of (a) a too high/low WACC in encouraging/discouraging investment; and (b) setting consumer prices too high/low. According to the UKRN, all else being equal, a regulator should err on the side of ensuring investment. This led the CAA to aim up.[146]

10.2.3 Balancing the considerations of the TMR bias and the need to ensure investment the CAA opted for the mid-point of the range.

10.3 CAA changes that enhance the accuracy of the WACC estimate

10.3.1 We agree with the CAA's concern of the impact on the TMR for the current inflation outlook and fall in the real RFR. Whilst the assumption of a constant TMR has been common practice in recent regulatory decisions, it is essentially only an assumption and difficult to empirically justify.

10.3.2 There are reasons to believe that in the short and medium term the TMR will be lower if the higher inflation outlook is higher and/or the real interest rate outlook is lower (e.g. with lower interest rates there will be greater demand for equities and this increases equity prices and reduces returns).

10.4 Aspects of the CAA's approach that raise concerns

10.4.1 We understand the UKRN's concerns on the asymmetry of costs and benefits from aiming up or down on the WACC. However, in the case of HAL over H7 it is clear that affordable prices are the principal concern as the aviation sector recovers from the pandemic. In fact, the weight of the argument at this time should be that the asymmetry between welfare effects and investment is reversed.

10.4.2 We also believe that there is a further consideration of which the CAA failed to take account. Unless the CAA makes further changes to the building blocks (e.g. increasing the traffic forecast as we suggest in Section 3) aiming down within the range will compensate for information asymmetries that exist between HAL, and CAA and airlines in respect of:

- Passenger forecasts (particularly the HAL model);

- Opex;

- Commercial revenues.

10.4.3 Aiming down for information asymmetries was rejected by the CMA in the RIIO-T2/GD2 cases, but these can be distinguished by the fact that:

145 FP, para 9.401-9.411.

146 FP, para 9.400-9.401, based on Wright S., Burns P., Mason R. and Pickford, D. "Estimating the cost of capital for implementation of price controls by UK Regulators: An update on Mason, Miles and Wright (2003)", published by the UKRN.

- HAL has been repeatedly criticised by the CAA for providing poor quality information, which is likely to generate a systematic bias;[147]

- Ofgem benefited from information by benchmarking across very similar companies operating under exactly the same regulatory regime and with legally enforceable access to the information it reasonably required. This degree of benchmarking is not available to the CAA, which is wholly reliant on the information that HAL provides;

- Unlike energy and water networks, HAL's opex and commercial revenues regulatory regime has no risk sharing, meaning it is highly incentivised to present forecasts that favour its interests.

10.4.4 Taking these into account we consider that Table 9.19 from the FP needs to be recast as shown in Table Table 10.1.

Table 10.1: Summary of considerations in respect of WACC point estimate

Consideration	CAA view of aiming Up/Down	AlixPartners view of aiming Up/Down
Asymmetric welfare effects and investment incentive	Up	Down
Asymmetry in WACC parameter estimates	Down	Down
Information asymmetries and incentives	**N/A**	**Down**

Source: CAA and AlixPartners

10.4.5 On balance, Table 10.1 provides a strong basis for aiming down in the range, unless the CAA takes action to address the information and incentive asymmetries that we discuss in this report.

10.4.6 Table 10.2 summarises the amendments required to the WACC as a consequence of the concerns we raised in Sections 8, 9 and 10. These are:

- The reduction in the asset beta range resulting chiefly from the new TRS mechanism;

- A reduction in the lower end of the embedded cost of debt, taking account of the collapsing 10-year average and removal of the HAL specific yield, which is now negative in RPI-real terms. This is largely a consequence of high RPI inflation forecast for 2022-2023. In this connection we note that the latest Bank of England "Monetary Policy Report" published on 4th August 2022 shows a deteriorating inflation outlook with forecasts CPI inflation remaining 9.6% in 2023 and 2.6% in 2024[148] (compared to the FP's OBR RPI forecasts of 5.5% and 2.3% respectively). This will inevitably be mirrored to a further downward revision to the OBR's RPI inflation forecast.

10.4.7 Overall, the H7 WACC mid-point estimate should be reduced from 3.26% to 2.65%, taking a mid-point of the range on the assumption that issues of information asymmetry in forecasts have been addressed by the CAA so no aiming down is necessary. However, we also note that if we adopted

147 For example, see IP "Section1: Overall approach and building blocks", para 5.31: "The depth and quality of information provided by HAL meant it was not feasible for CEPA/Taylor Airey to undertake a full bottom-up assessment of HAL's forecasts across all elements of revenues

148 Bank of England, ""Monetary Policy Report" published on 4th August 2022, annual averages from Table 1.D.

the lower cost of embedded debt in both the low and high case, as could be argued, the mid-point WACC would reduce further to 2.37%.

Table 10.2: Amended WACC

	CAA Low	CAA High	AP Low	AP High
Gearing	60%	60%	60%	60%
Risk free rate	-2.03	-2.03	-2.03	-2.03
TMR	5.85	5.85	5.85	5.85
ERP	7.88	7.88	7.88	7.88
Asset beta	0.44	0.62	0.43	0.54
Debt beta	0.10	0.05	0.10	0.05
Equity beta	0.95	1.47	0.93	1.29
Post-tax cost of equity	**5.45**	**9.55**	**5.28**	**8.10**
Cost of new debt	0.89	0.89	0.89	0.89
Cost of embedded debt	0.17	0.17	-0.90	0.17
Proportion of new debt	11.61%	11.61%	11.61%	11.61%
Issuance and liquidity costs	0.18	0.18	0.18	0.18
Cost of debt	**0.43**	**0.43**	**-0.51**	**0.43**
Vanilla WACC	**2.44**	**4.08**	**1.80**	**3.50**
Mid-point	**3.26**		**2.65**	

10.4.8 Table 10.3 uses a WACC 0f 2.65% to assess the impact of the Heathrow profiles yield per passenger over H7 based on the CAA model and subject to the same caveats as in paragraph 3.5.5, i.e. that the impact on yield per pax will be conservative since we have not accounted for commercial revenues which will more than offset opex impacts of higher volumes.[149]

Table 10.3: CAA's charge per passenger model projections, for different passenger traffic forecasts and WACC assumptions

FP - £m 2020, CPI-real	2022	2023	2024	2025	2026	H7 Total
CAA FP Mid model (adjustments + 0.87% shock)						
Passengers (m)	54.9	67.3	75.4	81.0	81.6	360.2
Profiled yield per pax	27.4	25.9	24.4	23.0	21.7	24.5
Airlines passenger forecasts						
Passengers (m)	72.0	77.7	80.9	82.5	84.9	398.0
Profiled yield per pax	27.4	24.3	21.5	19.0	16.9	22.8
CCA passenger forecast + vanilla WACC of 2.65%						
Profiled yield per pax	27.4	24.9	22.7	20.6	18.7	22.9
Airlines passenger forecasts + vanilla WACC of 2.65%						
Profiled yield per pax	27.4	23.3	19.8	16.8	14.3	20.3

Sources: CAA Price Control Model; FP, Tables 1.2, 1.4 and 1.5; AP Analysis.

Note: The profiled yields per pax are calculated by replacing the passenger volumes used as the input of the CAA price control model.

149 To test this we have run the CEPA opex and commercial revenue models under the airline passenger forecasts, and input the results into the CAA financial model. This analysis shows that, under a 2.65% WACC, the average H7 yield will be reduced further from £20.3 to £19.7.

11 RAB

11.1 Introduction

11.1.1 This Section is divided into three parts:

(a) Section 11.2 summarises the changes from the IP;

(b) Section 11.3 identifies the changes we support; and

(c) Section 11.4 identifies aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

11.2 Changes from the IP

11.2.1 The CAA did not change its approach regarding the RAB in the FP. The CAA retained the £300 million adjustment made in the IP but rejected any further RAB adjustment.

11.3 Changes we support

11.3.1 We support the CAA's conclusions that a further RAB adjustment should not be made. We agree that any further RAB increase, without investment commitment, or to increase the airport capacity or improve the service quality, would likely result in airport charges increases to the detriment of consumers and moreover would raise serious questions about the incentive properties of the regulatory framework.

11.3.2 We agree that further RAB adjustments will not lead to sufficient WACC reduction or incentives for future investments to offset the impact of the likely charges increase.

11.4 Aspects of the CAA's approach that raise concerns

11.4.1 As noted in the previous sub-Section, we consider that further adjustments to the RAB would be detrimental for customers, and we agree with the overall approach of the CAA in the FP in this regard. With this in mind, the following comments concern the £300 million RAB adjustment which the CAA has already made.

11.4.2 The £300 million RAB adjustment needs to be associated with precise and binding conditions regarding future deliverables to provide HAL with appropriate incentives.

11.4.3 Ex-post RAB adjustments, in respect of historic losses, will dull incentives. Any such adjustment should form part of an ex-ante regulatory risk mechanism (such as the TRS).

11.4.4 We note that the CAA believes the £300 million RAB adjustment will:

"… provide a clear and strong incentive for HAL to:

- undertake any necessary investment;
- maintain service quality; and

- provide necessary capacity during 2021." [150]

11.4.5 This "strong incentive" will be undermined if HAL is allowed to retain this adjustment if the necessary service quality and terminal capacity is not delivered throughout 2022.

11.4.6 In particular, the CAA refers to specific investment from HAL, associated with the RAB adjustment of £300 million in 2021.

> "HAL has set out that with appropriate incentives, it would plan to make additional investment in 2021 of around £230 million (£218 million capex and £9m of opex) to maintain and improve quality of services to consumers in 2021 and beyond." [151]

11.4.7 Hence, the CAA should make any RAB adjustment contingent on delivering such investment levels to set the appropriate incentives. Failure to deliver on this investment level should be reflected on the RAB adjustment. Otherwise, HAL will have a reduced incentive to deliver efficient investments that are beneficial for customers in the future.

[150] 'Economic regulation of HAL: response to its request for a covid19 RAB related adjustment', CAP 2140, para 4.16

[151] 'Economic regulation of HAL: response to its request for a covid19 RAB related adjustment', CAP 2140, para 4.15.

12 Outcome Based Regulation

12.1 Introduction

12.1.1 As part of its IP, the CAA provided a set of proposals for "outcomes, measures, targets, incentives and continuous improvement"[152] (collectively referred to as Outcome Based Regulation or "**OBR**") to ensure service quality and positive customer experience at Heathrow over the H7 period. In other words, the CAA proposed a mechanism to measure service quality and to incentivise HAL to satisfy certain standards, via a system of bonuses and rebates depending on whether HAL meets specific targets.

12.1.2 These proposals are built upon the "framework of service quality rebates and bonuses ("**SQRB**")"[153] used during the previous price controls regimes. It was "designed to identify the service standards that consumers and airlines can expect from HAL and to incentivise improvements in service quality".[154]

12.1.3 The IP described this updated SQRB framework the CAA suggested using over the H7 period. First, the CAA defined the set of desirable objectives in its IP, namely: providing "good value choice of flights",[155] ensuring accessibility of the airport, predictability, security, safety, support and overall positive customer experience.[156]

12.1.4 Second, the CAA proposed a list of 35 measures to quantify whether HAL is delivering on the defined objectives. The CAA suggested the following approach to measure how HAL delivered on its various objectives:

(a) Four survey-based measures with financial incentives;

(b) Fourteen operational measures with financial incentives;

(c) Ten survey-based measures with reputational incentives;[157]

(d) Seven operational measures with reputational incentives.

12.1.5 Third, the CAA provided a set of targets associated with these measures, mostly in line with "HAL's Updated RPB associated with its "optimal" capex plan".[158] Some measures did not have sufficient evidence to define an associated target within the IP. For those, the CAA noted that HAL will "be gathering data and proposing targets for some of these later in 2021 or during the first part of 2022. However, as we further discuss below, the CAA still does not have the "baseline data necessary to set a target",[159] as part of the FP. We suspect the CAA required more than a few

152 FP, Section 1, para 3.7.
153 FP, Section 1, para 3.2.
154 FP, Section 1, para 3.2.
155 FP, Section 1, para 3.8.
156 FP, Section 1, para 3.8.
157 The CAA suggests implementing reputational incentives for measures over which HAL has little control, rather than financial incentives. For those measures, "performance will be reported regularly and can be assessed in comparison with either our targets or past performance" (FP, Section 1, para 3.9.). Hence, these measures are not subject to rebates if HAL fails to meet its targets.
158 FP, Section 1, para 3.12.
159 FP, Section 1, para 3.79.

additional months of data to set a target. Hence, the CAA set out "a process and timetable for addressing these during the course of H7".[160]

12.1.6 Fourth, the CAA suggested, as part of its IP, that HAL's maximum exposure to quality rebates "should be 7 per cent of airport charges revenues, and its maximum potential bonus receipts should be 1.44 per cent of airport charges revenues".[161] This approach aligned with the current level of the SQRB scheme that HAL faces. The CAA also set the incentives associated with new measures, not currently included in the SQRB scheme.

12.1.7 Fifth, the CAA allowed a mid-term review to "cover any issues that could not be fully resolved during the current review, any specific issues arising with new or untested measures or following the installation of new equipment, or other changes required due to changing circumstances".[162]

12.1.8 According to the CAA, the approach suggested in its IP would, altogether, ensure that HAL provides a positive customer experience and service quality over the H7 period.

12.1.9 During the Consultation phase, both HAL and the airlines provided their comments on the CAA's IP. This Section discusses below how the FP address the concerns regarding the OBR expressed following the IP, including where material concerns do not appear to have been addressed in the FP.

12.1.10 This Section is divided into three parts:

(a) Section 12.2 summarises the changes from the IP;

(b) Section 12.3 identifies the CAA's changes that enhance service quality and performance improvement; and

(c) Section 12.4 identifies aspects of the FP that raise concerns, e.g. because there are material flaws in the CAA's methodology or problems with the evidence base relied upon.

12.2 Changes from the IP

12.2.1 In its FP, the CAA suggested several changes from its IP, reflecting a combination of points expressed by HAL and the airlines during the Consultation phase. As we do not have the expertise or the data to engage on the detail of individual measures and targets, we provide comments on the general approach the CAA followed.

Outcomes

12.2.2 In its FP, the CAA retained the same set of objectives it aimed to implement, namely: providing "good value choice of flights",[163] ensuring accessibility of the airport, predictability, security, safety, support and overall positive customer experience.[164]

160 FP, Section 1, para 3.14.
161 FP, Section 1, para 3.15.
162 FP, Section 1, para 3.19.
163 FP, Section 1, para 3.8.
164 FP, Section 1, para 3.8.

Measures

12.2.3 The CAA implemented several changes in its FP. First, the CAA reclassified the luggage timely delivery measure as a reputational rather than financial incentives.[165]

12.2.4 Second, the CAA proposed using the new "baggage misconnect rate as a further reputational measure",[166] because airlines and ground handlers have an important impact on this measure.

12.2.5 Third, the CAA suggested considering separately the four measures of stand facilities, instead of the combined measure proposed in the IP.[167]

12.2.6 Fourth, the CAA proposed omitting the measures relating to social distancing and "reduction in Heathrow's carbon footprint".[168] However, the CAA aimed to address the carbon footprint measure during the mid-term review.

12.2.7 Fifth, the CAA introduced a new reputational "measure of overall satisfaction with the special assistance service for passengers with reduced mobility (PRMs)",[169] that HAL proposed.

Targets

12.2.8 The CAA did not provide associated targets for a number of measures. This was the case for reputational measures without sufficient underlying evidence (e.g. airport departures/arrival management), where other agents than HAL have influence over the measure (e.g. the baggage misconnect rate), or if the measure was outside of the CAA's scope (e.g. public transport and passenger injuries).[170]

12.2.9 In addition, the CAA retained most of the financial incentives targets from its IP, except for the new check-in infrastructure measure, where the CAA proposed "a cautious target of 98 per cent availability initially",[171] and the four separate stand facilities measures, set at the SQRB level, i.e. "98 per cent availability for pre-conditioned air and 99 per cent availability for the other three measures".[172]

12.2.10 By largely retaining the set of targets used as part of the IP, the CAA adopted "the bottom end of the possible range of stretch targets suggested by [its] consultants, Arcadis".[173] The CAA voluntarily followed a "cautious approach" to account for "uncertainties around possible changes in passenger perceptions and priorities".[174]

12.2.11 The CAA also retained the target for all of its reputational measures, "except for the target for feeling safe and secure".[175] The CAA set the target at 96% of passengers agreeing they feel safe and secure, "at the lower end of the range that Arcadis advised".[176]

165 FP, Section 1, para 3.75.
166 FP, Section 1, para 3.75.
167 FP, Section 1, para 3.75.
168 FP, Section 1, para 3.76.
169 FP, Section 1, para 3.78.
170 FP, Section 1, para 3.79.
171 FP, Section 1, para 3.80.
172 FP, Section 1, para 3.80.
173 FP, Section 1, para 3.81.
174 FP, Section 1, para 3.81.
175 FP, Section 1, para 3.82.
176 FP, Section 1, para 3.82.

12.2.12 The rest of the reputational measures were "generally based on HAL's proposals",[177] except for the "timely delivery from departures baggage system", set at 98%, because HAL has not yet proposed a target for this".[178]

Incentives

12.2.13 As part of the FP, the CAA maintained its assessment that "HAL should face "knife edge" incentives in relation to rebates".[179] This means that if "in a particular month, HAL misses one or more of the targets […], it will be liable to pay a rebate calculated as one-sixth of the maximum"[180] annual rebate, calculated as a percentage of the airport charges annual revenues. This approach means that "no additional rebates would be payable in a year if HAL had already missed a certain target six times)".[181] The CAA considered that "the advantages of stronger incentives (that is, one sixth rather than one twelfth of the annual maximum) outweigh the theoretical disadvantage of weaker incentives that would kick in if HAL were to trigger a particular rebate six times in a single year".[182]

12.2.14 However, the CAA proposed a few changes in the rebates HAL will have to pay if it fails to meet the associated target. First, the CAA "have reduced the rebates payable for helpfulness/attitude of security staff and wi-fi performance".[183] This change was designed to address both HAL's and the airlines' concerns expressed in the Consultation phase, respectively arguing that wi-fi performance should have less weighting than arrival baggage carousels and that these measures should be a reputational rather than financial incentives.

12.2.15 Second, the CAA proposed separate rebates for the stand facilities,[184] because the stand facilities targets were aggregated into one in the IP. Third, the CAA removed the "rebate for timely delivery from departures baggage system, as this is now a reputational measure only".[185]

12.2.16 The CAA also implemented changes on bonuses that HAL would receive in relation to the targets, mirroring the changes on the rebates side. The CAA proposed that HAL does not "earn a bonus in relation to timely delivery from departures baggage system",[186] because this incentive is now reputational. Instead, the CAA proposed that HAL can earn a bonus in relation to security queues for transfer passengers. The CAA stated that this proposal roughly aligns with the airlines' view.[187] Moreover, the CAA proposed allocating to "transfer security queues only half of the bonus that was previously allocated to timely delivery, and [allocating] the other half to central security queues".[188]

Continuous improvement and implementation

12.2.17 The changes described above will take effect from the beginning of the H7 period. In addition, the CAA planned to have a mid-term review to address several points pending sufficient underlying evidence. More specifically, the mid-term review will allow the CAA to address issues related to

177 FP, Section 1, para 3.83.
178 FP, Section 1, para 3.83.
179 FP, Section 1, para 3.85.
180 FP, Section 1, para 3.85.
181 IP, Incentives and other issues, para 14.35.
182 IP, Incentives and other issues, para 14.35.
183 FP, Section 1, para 3.86.
184 FP, Section 1, para 3.86.
185 FP, Section 1, para 3.86.
186 FP, Section 1, para 3.87.
187 FP, Section 1, para 3.87.
188 FP, Section 1, para 3.87.

Heathrow's carbon footprint, airport departures/arrivals management, the 'airport that meets my needs' and Covid-19 safety measures,[189] not addressed as part of its FP.

12.2.18 The CAA stated that the mid-term review will also allow it to fix potential problems arising with new measures or following a new investment project.[190] It will also allow to review the level of granularity across targets, i.e. daily v monthly targets and individual v groups of control posts. The mid-term review would give an opportunity to reflect on the new security queue needs and measurement technology available.

12.2.19 Moreover, the CAA allowed for reassessments of specific targets, in particular increasing the wi-fi performance, check-in infrastructure and availability of pre-conditioned air targets.[191]

12.2.20 Finally, the CAA introduced the possibility of modifying the OBR framework provided that HAL and the airlines reach specific agreements during the H7 period.[192] Otherwise, HAL and the airlines may unilaterally request changes to the framework to the CAA. The CAA can then decide "that a modification was required in the interests of consumers".[193]

12.3 CAA's changes that enhance service quality and performance improvement

12.3.1 As part of the FP, we note that the CAA proposed several changes that address some of the concerns expressed by the airlines during the Consultation period. First, the CAA did not set targets for HAL's carbon footprint and the ease of the airport by public transport. As noted by the airlines in their responses to the IP, HAL is not in direct control of these measures so the airlines did not consider they were "appropriate measures for OBR".[194] We agree with the CAA's approach that HAL should only have targets for factors over which it has control. Setting the appropriate incentives requires that HAL has influence over these measures.

12.3.2 Second, we agree with the CAA's approach to disaggregate the four measures part of the stand facilities measure. The airlines noted during the Consultation period that they disagree with "performance under the "provision of stand facilities" measure being assessed as an average across three or four different types of asset".[195] We consider that HAL should meet the target in each of the four measures, instead of meeting the average requirement across the four categories. If the four measures were aggregated together, HAL could still meet its target by focusing on two or three asset types only and delivering poor service quality for the remaining ones. In this context, some passengers could still suffer from a poor customer experience, even though the average experience meets the CAA's target. We consider that limiting the number of extremely poor customer experience is a desirable objective in itself, as well as improving the average customer experience.

189 FP, Section 1, para 3.90.
190 FP, Section 1, para 3.90.
191 FP, Section 1, para 3.90.
192 FP, Section 1, para 3.92.
193 FP, Section 1, para 3.92.
194 FP, Section 1, para 3.28.
195 FP, Section 1, para 3.28.

12.4 Aspects of the CAA's approach that raise concerns

12.4.1 As noted above, some of the CAA's changes address some of the concerns the airlines expressed during the Consultation period. However, there are multiple changes in the FP that raise concerns, where the CAA's approach is flawed.

12.4.2 Before discussing the various detailed aspect of the FP that raise issues it is appropriate to contextualise our comments. Previous sections of this report identified that HAL is subject to certain incentives across the various price control building blocks, like any regulated business with substantial market power, that could make it profitable to under-forecast passenger traffic, overstate costs, etc, reflecting the fundamental asymmetry of information between HAL and the CAA. Analogous points apply as regards OBR in relation to the setting of:

(a) The level of targets - HAL would directly benefit from proposing lower targets that the airport can more easily achieve (an incentive effect, particularly as costs may be saved by failing to achieve the specified standards) and also from setting lower standards for the next price control period (a ratchet effect). A regulator can partially address some of these information issues by commissioning alternative evidence from independent experts and by actively engaging with users on the design of targets, as done by sector regulators in other industries, so as to set appropriate outcome targets.

(b) Financial incentives - where sufficient information is available to set appropriate output/quality targets and achievement of these targets is valued by users (airlines and passengers), it is important that HAL is appropriately financially incentivised (through penalties/bonuses) to meet or exceed these targets. This applies specifically as regards the incentives that are set but also more generally. In particular, setting no targets for a matter valued by users (either at all or at the start of H7) or inadequately specified targets can be expected to lead to poor outcomes for consumers. Financial incentives are important, particularly given the scope for HAL to reduce costs by providing sub-optimal outcomes.

The CAA does not rely enough on the evidence submitted by Arcadis, the independent experts it commissioned, when setting HAL's targets

12.4.3 First, we note that the CAA mostly relied on HAL's proposals to set targets, even though it commissioned Arcadis, an independent expert, to provide evidence relating to the setting of appropriate targets. For most reputational measures, the CAA's approach is "generally based on HAL's proposals".[196] For these, the CAA only used Arcadis' evidence to compare with HAL's proposals.

12.4.4 Even for measures where HAL did not submit evidence, the CAA deviated from Arcadis' recommendations, for instance in respect of the new check-in infrastructure measure. The CAA argued that the lack of evidence available justifies such a cautious target, of 98% of time available for use,[197] while Arcadis considered that "the data […] would suggest that aligning with the other availability targets at 99% would seem achievable".[198] Even though the dataset used in Arcadis'

196 FP, Section 1, para 3.83.
197 FP, Section 1, para 3.80.
198 CAP2366C – Arcadis OBR report, p 24.

assessment is limited in time, the last few months before the pandemic suggest that HAL would achieve a potential 99% availability target.

12.4.5 The CAA also adopted "the bottom end of the possible range of stretch targets suggested by [its] consultants, Arcadis",[199] for most of the financial incentives. Again, it is unclear why the CAA commissioned an independent expert, then used the lower bound of its suggested range, rather than the mid-point. Arcadis analysed Heathrow's historical performance across terminals to set appropriate target ranges. Hence, nothing suggests that this approach is overly optimistic and would justify adopting the lower bound rather than Arcadis' mid-point. We consider the most robust approach should fully rely on the analysis of independent experts, i.e., the target range mid-point. Otherwise, the CAA should provide evidence to justify why the lower end of Arcadis' suggestions seemed more appropriate.

12.4.6 The same concern applies for the safety and security measure, where the CAA set a target at 96%, "at the lower end of the range that Arcadis advised".[200] We note that HAL's proposal is a 95.5% target, highlighting that the CAA placed a lot more weight on HAL's suggestions than the independent analysis it commissioned. We consider that Arcadis' mid-point is a more appropriate target than its lower bound.

12.4.7 Second, the CAA did not set a target for several measures for which HAL did not submit underlying evidence, namely "an airport that meets my needs", "ease of understanding Heathrow's Covid-19 safety information", "airport departures management" and "airport arrivals management". We consider that the CAA should have commissioned further research on these measures in order to provide a robust approach to setting appropriate targets. Not setting targets means that HAL will have very limited incentives to address these four service quality criteria during the early stage of the H7 period, which is contrary to consumers' interests.

12.4.8 Hence, the CAA proposed a set of targets that are flawed. Indeed, it should be noted that the airlines argued that the CAA was excessively cautious with the targets suggested in its IP, indicating that targets were equal or smaller than HAL's current performance.[201] For this reason, under the FP, HAL would have no incentive to perform better, or in some instances, even maintain its performance.

Importance of continuous improvement and implementation during the H7 period

12.4.9 A mid-term review is an important feature of a regulatory regime where there is a degree of uncertainty. For example, RIIO-2 has provision for a re-opener part way through the period to address any emerging Net Zero issues. For the H7 period, a mid-term review of OBR targets is necessary given the uncertainty around appropriate targets due to:

(a) Dislocation of the time series that would normally be used to assess performance and set future targets, due to the pandemic;[202]

199 FP, Section 1, para 3.81.

200 FP, Section 1, para 3.82.

201 FP, Section 1, para 3.31.

202 See CAP2366C – Arcadis OBR report, p 7: "A key challenge in assessing the data has been the impact of Covid on the most recent performance data where much has changed from Q6 both in terms of volume of passengers and rules and processes around travel and passenger expectations. Arcadis has therefore chosen to consider the data pre-Covid as the normalised data set for its analysis but has still utilised the data during the pandemic to inform its conclusions but has placed more limited weight on it".

(b) Material changes in measures, partly as a result of the transition from the old SQRB to OBR;[203]

(c) The insufficient evidence gathered in the FP, leaving several crucial measures without targets, including Heathrow's carbon footprint or airport departures/arrivals management.[204]

12.4.10 Setting targets at appropriate levels is vital for HAL to provide the right level of service for consumers, and a mid-term review would allow the CAA to gather sufficient reliable data to do this for all measures.

12.4.11 As noted above, in our view, the CAA should have commissioned further research from its independent experts, Arcadis, on measures for which no underlying evidence was submitted. Allowing a mid-year review would provide the sufficient timescale for Arcadis, or another adviser, to conduct that research.

Various shortcomings in the CAA's approach are not addressed in the FP

12.4.12 In addition to the shortcomings identified above, there are further issues with the CAA's approach.

12.4.13 First, the CAA retained the proposal that targets for security queues and some other measures should be set on a monthly rather than a daily basis. This means that the CAA aims to measure the average consumer experience at Heathrow. However, this approach fails to capture how poor the service quality is for a minority of passengers who travel on particular days. Indeed, if the passenger experience of a few passengers within one day, or one flight, was extremely bad, Heathrow can easily balance this over the following weeks and meet its monthly target.

12.4.14 However, we consider that limiting the number of extremely poor customer experiences is a desirable objective in itself, as well as improving the average customer experience. Hence, we consider that the most granular metric available, i.e. at passenger level, is a robust basis to measure customer satisfaction. If it is unduly costly to gather such granular data, then setting targets on a per-flight or daily basis would be a sensible middle point.

12.4.15 The CAA even acknowledged that this is an important point and should be addressed as part of the mid-term review.[205] However, it is difficult to understand why the CAA did not address this point as part of its FP. The CAA stated that its assessment needs to consider consumers' best interests. We consider than delaying its assessment of this question by a few years would be detrimental to consumers.

12.4.16 Second, we consider it sensible that either HAL or airlines can, after negotiation between themselves, request a change to the OBR targets. If HAL does not agree to a change requested by airlines, the CAA can make a binding determination[206] in the interests of consumers. This is important since HAL has little incentive to agree to a more stringent target change that may, nevertheless, be in the consumer interests.

12.4.17 Third, we consider that targets and bonuses should be designed to improve the airport's performance. More specifically, the baseline target for security queues time provides no incentive

203 FP, Section 1, para 3.3.
204 FP, Section 1, para 3.90.
205 FP, Section 1, para 3.53.
206 FP, Section 1, para 3.92.

for HAL to improve its performance. The CAA requires that 97-99% of the security queue time are under 5 minutes for central search and 10 minutes for transfer search. However, Arcadis noted that "HAL has consistently exceeded the 95% and 99% target in every month in T2 except for around Q2/Q3 2020".[207] Similarly, for transfer search, Arcadis noted that "given the IP targets are to be maintained at Q6 levels, they are considered achievable".[208] The bonus targets seem easily reachable based on HAL's previous performance and do not incentive any performance improvement.

12.4.18 The same concern arises regarding the bonus thresholds for wayfinding and cleanliness. For these two measures, HAL was already meeting the bonus threshold in several terminals in 2021, based on Arcadis' analysis.[209,210] Hence, HAL will face little incentive to improve performance based on the current bonus thresholds.

12.4.19 Fourth, we find the lack of performance stretch is even more problematic given HAL's commitments in relation to the £300 million RAB adjustment. As noted above, we consider that this adjustment should be contingent on HAL's commitment to maintain or improve quality of service in 2021 and beyond. Hence, setting some targets at the Q6 price control level or below for some measures does not align with HAL's commitment to improve Heathrow's service quality, which would justify the £300 million RAB adjustment.

12.4.20 Fifth, the CAA's assessment that HAL is best placed to encourage "all parties to work together to the benefit of consumers"[211] causes a significant concern. As discussed in multiple sections of this paper, an unregulated firm with substantial market power has limited incentive to provide service quality in the best interests of consumers, particularly given the scope for HAL to achieve cost savings by not delivering to optimal standards. Due to this market power, consumers will not necessarily substitute to another airport with better quality, as they would have in a more competitive setting. Hence, we find it concerning that the CAA assumes that HAL works for the consumers' benefit. The fact that this is not true further justifies CAA's regulatory role.

207 CAP2366C – Arcadis OBR report, p 13.
208 CAP2366C – Arcadis OBR report, p 17.
209 CAP2366C – Arcadis OBR report, p 22.
210 CAP2366C – Arcadis OBR report, p 22.
211 FP, Section 1, para 3.46.

13 Conclusions and recommendations

13.1.1 To conclude, we summarise our main recommendations to the CAA as regards the economic regulation of HAL during the H7 charge control period. However, before doing so, one further point should be emphasised, namely that HAL's comments on the FPs should be transparent (rather than opaque, such as due to extensive redactions or simply high-level assertions) since the CAA would otherwise then risk further relying on selective information from HAL which has not been subject to robust third party challenge from the airlines.

Passenger forecasts

13.1.2 The CAA's suggested approach in the FP raises several concerns that we recommend addressing. First, we recommend reassessing the accuracy of the CAA's 2022 traffic projections based on the actual volumes recorded in the first half of the year. If we conservatively assume that the passenger traffic will keep evolving at the recovery rate observed in June, i.e. comparing June 2019 to June 2022 (when passenger volumes were at 83% of June 2019 levels), this would imply 61 million passengers for the entirety of 2022, while the CAA forecasts 55 million. (See Sections 3.6.2 to 3.6.6.)

13.1.3 Second, we recommend that the CAA publishes HAL's RBPu2 model. As any regulated firm with substantial market power has an incentive to under-forecast its future demand, the regulator should make the forecasting model available for review by the wider industry stakeholders. We question the accuracy of several of HAL's assumptions and modelling features, in particular the slow and gradual convergence towards Heathrow's capacity over the course of H7. (See Sections 3.6.7 to 3.6.16.)

13.1.4 Third, we consider that the CAA should use as many publicly available independent expert forecasts as possible. This approach would overcome the issue arising from HAL's under-forecasting incentive. Focusing on two robust external forecasts, the IATA and ACI models, with these organisations having strong incentives to provide accurate passenger projections, provides additional evidence that the CAA's suggested approach in the FP is pessimistic and raises material concerns. Relying on external expert's views would also allow the CAA to provide more robust evidence when adjusting its model for the industry risks. (See Sections 3.6.17 to 3.6.46.)

13.1.5 Fourth, we further understand that the CAA has applied an annual shock factor its traffic forecasts to reflect the incidence of non-pandemic shocks. To the extent that HAL used historical data for its estimates, it is important to consider whether these estimates already implicitly account for the impact of these shocks. (See Section 3.6.48.) It is also important to consider whether passengers delayed their travel until the end of the shock period, which would allow HAL to recapture the lost traffic. (See Section 3.6.50.) Lastly, any asymmetric adjustments to passenger forecasts should account for the TRS, which will dampen the magnitude of asymmetric shocks going forward. (See Section 3.6.51.)

Traffic risk sharing mechanism

13.1.6 Although we can support the principle of the TRS, providing of course that its impact is correctly reflected in HAL's WACC, there are concerns with its calibration and implementation. Positive deviations in traffic will generally have limited benefit to the airlines due to HAL's current operational issues and capacity constraints. Thus, the upside scenario of the TRS mechanism does not accurately reflect the impact of positive traffic deviations. Under this mechanism, HAL would be protected from negative traffic deviations with little incentive to promote traffic growth. To

address these issues, the CAA should instead implement asymmetric risk sharing (e.g., a 60/40 sharing agreement) to counteract the currently proposed asymmetry between HAL's and airlines' traffic risk exposure. (See Sections 4.4.2 to 4.4.6.)

13.1.7 Further, the CAA's choice of a 105% "outer band" risk sharing will protect HAL from most of the EBITDA impact during periods with low traffic. Depending on the realisation of actual opex and commercial revenues, we consider that this mechanism may leave HAL with limited incentive to promote traffic, or even a negative incentive to constrain traffic. Although deviations beyond 10% are considered a rare event, miscalibrations of the outer band could have severe consequences on HAL's incentives to promote traffic recovery. Thus, we consider that the CAA should drop the use of an outer band. (See Sections 4.4.7 to 4.4.12.)

Opex

13.1.8 The starting point of CTA's original assessment of HAL's opex was based on a very high-level assessment of HAL's financial model, which limited CTA's ability to challenge HAL's costs. HAL appears to have provided limited detail or justification for its costs, and thus CTA's original opex assessment is likely to both lack precision and overstate efficient costs. We consider that the CAA should have at least considered data on per-passenger opex at comparable UK or global airports, as a way of testing the rigour and reliability of HAL's data. (See Section 5.3.3)

13.1.9 Further, the CAA has relied on selective information provided by HAL and then asked CTA to produce a revised estimate. HAL's incentives are to disregard cost allowances that were particularly generous and focus instead on providing focused justifications for various increases. This fails to address the inefficiency inadvertently built into CTA's initial assessments. Moreover, there has been no real opportunity for the airlines to provide customer led challenge, which would require disclosure of the underlying data and methodology. Effectively, HAL is being rewarded for providing poor quality information at the outset, and in an environment where it reaps 100% of the benefits from any cost reductions below forecast. Hence, we consider there is strong merit in the CAA revisiting all of HAL's opex forecasts, as well as disclosing to the airlines the precise basis of these estimates so that they can be challenged. (See Sections 5.3.4 to 5.3.6)

Commercial revenues

13.1.10 While we agree with the CAA's decision to apply the terminal drop-off charge only to passenger drop-offs, not pick-ups, it should be clarified with HAL that no passenger will be picked up in the drop-off zone. Otherwise, such pick-ups would incur HAL's drop-off charges and should be included in the commercial revenues allowance. Similarly, it should be clarified that the number of passenger pick-ups that the CAA removed from the terminal drop-off charges calculation are accurately captured by the forecast of car parking revenues. (See Section 6.2.2)

13.1.11 The CAA should also revisit HAL's view on the impact of tax and duty changes on retail margins, as we would expect retailers to adopt mitigating strategies to offset these tax changes to preserve profits. (See Section 6.3.2)

13.1.12 Further, the CAA should adopt a higher management stretch target instead of its modest 1% p.a. assumption. As regards CTA's econometric analysis, and the fact that CTA already excluded "non-controllable" revenues from its target, we consider that the additional evidence provides no reason to move away from CTA's IP of a 2% management stretch target. A higher, yet achievable, target would be prudent and in the interest of consumers. The CAA's current approach to adopt the bottom of CTA's range is inadequate. If the CAA decided to lower its management stretch target

nonetheless, it would appear sensible to at least choose the mid-point of CTA's revised range, that is, between 1.5% and 2% instead of the minimum 1% assumption. (See Sections 6.3.3 to 6.3.8)

Capex

13.1.13 The CAA should set a higher capex sharing factor for two reasons. First, the CAA has calculated that even a 30% overspend – which it considers "highly unlikely" as the H7 capex plan is smaller and less complex and HAL's forecasting is "generally good" – would only result in a c. 0.6% reduction in HAL's Return on Regulatory Equity ("**RORE**"). The CAA rightly describes this as a "relatively modest" downside risk. Accordingly, in our view, the incentive sharing rate for overspend should be 50%. (See Section 7.4.2 to 7.4.4.)

13.1.14 Second, in line with the findings of the CMA and other economic regulators in the UK, at G3 it would be appropriate to incentivise HAL to submit high quality information on capex costs, and otherwise face a less favourable sharing rate as regards the proportion of cost savings that it is allowed to retain. HAL retaining 40% of cost savings (i.e., 10 percentage points lower than the sharing of overspends) if the capex plan quality is not high would seem entirely reasonable and retain a sensible balance as to overall incentives. (See Section 7.4.5 to 7.4.7.)

Cost of capital

13.1.15 Whilst generally agreeing with the CAA's revised methodology to calculate HAL's asset beta, we have material concerns with how the CAA has calibrated its methodology in relation to the adjustments made to the asset beta to allow for the TRS, new to H7. We support an alternative calibration that recognises that, other than traffic risk, HAL exhibits virtually the same degree of risk as other regulated network industries. This substantially reduces the top end estimate of the range for HAL's asset beta. (See Section 8.5.)

13.1.16 On cost of debt, the CAA has correctly reduced the look-back period for calculating the benchmark for HAL's embedded cost of debt to 13.5 years, so as to mirror the actual tenor/structure of HAL's debt. We do, however, have continuing concerns over whether the CAA's FP use of a 13.5-year lookback period is sufficiently shortened and, on the basis of data provided in the FP, believe that a 10-year lookback period is appropriate. (See Section 9.4.)

13.1.17 The CAA decided in its FP to choose the mid-point of a range of potential estimates that it provided in the IP. We agree with the CAA's concern about the impact of high inflation on the TMR. We also understand the UKRN's concerns on ensuring high investment incentives over lower consumer prices. However, over H7, it is clear that affordable prices are the principal concern as the aviation sector recovers from the pandemic. We also believe that the CAA failed to take account of the fact that aiming down within the range of WACC estimates will compensate for information asymmetries that exist between HAL and the CAA in terms of passenger forecasts, opex, and commercial revenues (should the forecasts remain as in FP). On balance, we consider there is a strong basis for the CAA to aim down by 25% within the WACC range. (See Sections 10.4.1 to 10.4.6.)

13.1.18 In conclusion, an RPI-real vanilla WACC of 2.65% should be used for H7, but with a lower case of 2.37% if the full impact of a 10-year collapsing average benchmark for the cost of debt is used. (See Section 10.4.7.)

Regulated asset base

13.1.19 We recommend the CAA to make the £300m RAB adjustment at the start of H7 contingent on HAL delivering on its investment commitments to set the appropriate incentives. (See Sections 11.4.1-11.4.7)

Outcome based regulation

13.1.20 The OBR framework suggested by the CAA raises several concerns. First, we recommend that the CAA adopts the suggestions provided by the independent experts it commissioned, by adopting the mid-point of its recommended ranges. The CAA should otherwise justify why it adopts a more cautious approach and implements the lower bound of the suggested range. (See Sections 12.4.2-12.4.9)

13.1.21 Second, we recommend implementing a mid-term review of the OBR framework. This would provide an opportunity to set targets for the multiple measures that the CAA left unaddressed in the FP and gather more evidence to set these targets. (See Sections 12.4.10-12.4.13)

13.1.22 Third, we suggest that the CAA sets targets on the most granular basis as possible, i.e., per passenger level. If it is unduly costly to gather such granular data, then setting targets on a per-flight or daily basis would be a sensible middle point. (See Sections 12.4.15 to 12.4.17)

13.1.23 Fourth, we recommend that the CAA designs the targets, rebates and bonuses in a way which improves performance. In the FP, several measures have identical or lower targets than in the current SQRB scheme. This approach does not align with HAL's commitment to maintain or increase service quality in relation to the RAB. This is particularly true for the bonuses HAL would receive for meeting its target on security queues times, already achievable based on Arcadis' analysis. (See Sections 12.4.19 to 12.4.21)

13.1.24 Finally, we find it concerning that the CAA assumes that HAL is well placed to act in the best interests of customers. HAL has substantial market power, which reduces its incentives to provide optimal service quality, which further justifies the regulatory role of the CAA in the first place. (See Section 12.4.22)