

PwC Economics

Estimating the cost of capital for H7

A report prepared for the Civil Aviation Authority (CAA)

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Summary

The CAA is currently in the process of consulting on a number of issues relating to the regulation of Heathrow Airport Limited (“HAL”). The focus of this consultation is on the upcoming price control for HAL – referred to as “H7” – and in particular, issues relating to new capacity. As part of this process of consultation, the CAA has commissioned PwC to provide our view of an initial range for the weighted average cost of capital (“WACC”) for the H7 period (currently defined as the 2020-2024 period).

The purpose of providing this initial WACC range is to help guide the initial preparation of the H7 price control. This report does not provide a final WACC estimate that will be used in the setting of the price control.

Our report begins with an introduction setting out the assumptions applied in conducting our work and also the broader methodological considerations relating to the use of current market evidence in setting the WACC (Section 1). It then sets out the context to H7 - summarising HAL's performance over the Q5 and Q6 periods, and highlighting key macroeconomic trends that could impact H7 (Section 2). The report then sets out the appropriate initial WACC range for HAL 'as is', which captures the balance of risk and reward for HAL *without* the third runway scheme. This 'as is' assessment is structured into three parts:

1. the level of notional gearing (Section 3);
2. the cost of debt (Section 4); and
3. the cost of equity (Section 5).

Having provided this assessment of the H7 WACC for HAL 'as is', we then discuss the impact that the third runway scheme could have on the risk profile of HAL and its WACC (Section 6). We then provide a brief overview of tax rate impacts on the WACC (Section 7) before concluding with an initial view on the H7 WACC (Section 8).¹

We provide an overview of each of these sections in the remainder of this summary.

Assumptions and methodological considerations

Given the early stage of the H7 consultation process, in providing a view of the initial range for the H7 WACC we have made a number of assumptions. Four key assumptions are listed below:

1. The CAA continues to apply a single WACC to a single measure of the regulatory asset base (RAB). This means that the RAB is not segmented or treated any differently for different types of existing assets or new assets. In this circumstance, the WACC has to encompass the risks associated with the delivery of new capacity as well as the risks associated with the existing 'as is' regulated business;
2. The CAA sets the cost of new debt allowance on an ex-ante basis (as was the case in Q6). We do not consider an alternative approach whereby the WACC could change throughout the price control if an indexation approach were adopted by the CAA²;
3. The CAA calculates the control in constant prices using the Retail Price Index (RPI) as the basis of indexation for both revenues and the RAB; and
4. The H7 period begins in January 2020 in line with the current one year extension in place.³

¹ Consistent with the CAA's approach to the WACC in previous price controls, for the purpose of this report we set out both the range for a vanilla and a pre-tax WACC.

² The CAA commissioned CEPA to consider indexation of the cost of debt in CEPA (2016), “Alternative approaches to setting the cost of debt for PR19 and H7”

³ The CAA is considering a further extension to Q6 but a decision on the length of the future extension has not been made at the time of publication.

As well as these assumptions, it is important to understand the wider methodological considerations associated with the approach taken in setting the WACC. Specifically, of key consideration is the trade-off between long-run historical approaches and current market approaches.

Broadly speaking, as long-run historical approaches typically rely on long-run averages of financial time-series, WACC estimates produced by this approach tend to be slow to evolve. This gives WACC estimates greater stability, but increases the risk that allowed returns are unreflective of current market conditions. In contrast, current market based approaches reflect current market conditions, but by their nature are more sensitive to changes in the economic and market outlook - meaning the WACC produced by this approach can be more volatile.

As such, given that there is still a relatively long lead-time from now until the beginning of the H7 period, where the estimates in this report are based upon current markets approaches, the estimates should be reviewed and/or updated to reflect material changes in the economic and market outlook.

We therefore recommend that the CAA monitors changes to the economic and market outlook between the cut-off date used in this report (end of October 2017) and later in the H7 process, updating the WACC estimate accordingly.⁴

Ultimately, the decision over whether to draw upon evidence from current market approaches or long-term historical approaches will be one for the CAA to consider in the build up to the H7 determination.

H7 context

As the H7 control period approaches there are some key differences in the macroeconomic environment compared to the equivalent period in the build-up to Q6. The key inputs to the Q6 WACC range were formed against a backdrop of rising government yields (from 31st December 2012 to 31st October 2013 nominal 10yr gilt yields increased by 0.8 percentage points), an expectation that interest rates would continue rising over the control period (the 10-year nominal gilt yield spread over the 2-year nominal gilt at 31st October 2013 was +2.2%) and that the outlook for UK economic growth was robust.⁵ This backdrop differs materially from how the Q6 control period actually unfolded.

Moving towards H7, two key differences from Q6 are that:

- The yields on government and corporate bonds have reached new historic lows (the average real yield on 10-year index-linked gilts over the period November 2016 to October 2017 was -1.92%); and
- Expectations of future interest rates rises are considerably softer (as shown by the flattening slope of the yield curve). In particular, market expectations of the real 10-year gilt yield in 10-years' time has fallen by around 1.75 percentage points between the start of 2014 and the end of October 2017.

We also note that expectations of a "lower for longer" interest rate environment have been largely unaffected by the recent (November 2017) monetary policy decisions from the Bank of England. The modest change to short-term interest rates of 25bps is small compared to the scale of interest rate reductions since 2007.⁶

These differences between the build-ups to the Q6 and H7 periods are reflected in our estimates for each component of the H7 WACC.

Consistent with the macroeconomic and financial market environment set out above, HAL has been able to secure low cost financing below the cost of new debt assumed by the CAA for Q6. Achieving a low cost of new

⁴ In most instances, unless otherwise stated, the data cut-off for this report was the end of October 2017, but where relevant we also consider information regarding the Bank of England's 2nd November 2017 base rate change.

⁵ As at October 2013, the consensus economics view for the UK GDP growth rate was 2.2% for 2014 (with a small standard deviation across the sample of forecasters).

⁶ Following the interest rate rise on 2 November 2017, gradual and limited future interest rate movements have been signalled by the MPC. Specifically, the MPC dropped their guidance that the Bank Rate may need to rise more than markets imply, and Governor Mark Carney said two additional 25bp rate hikes over three years "are consistent with" inflation falling back towards target by the end of the forecasting horizon.

debt alongside strong levels of passenger growth has helped HAL deliver higher than expected returns on average RAB in the Q6 period to date.

Gearing

In setting a gearing assumption for HAL 'as is' we assume a notional capital structure. We see this approach as being an integral part of the RPI-X incentive based regulation and one that provides company management with the incentive to manage the actual financing of the airport efficiently.

Based on evidence from HAL's actual gearing, credit rating agency methodologies and the regulatory decisions taken by other regulators, we find that a notional gearing range consistent with achieving an investment grade credit rating could be as wide as 60% to 75%. However, a reasonable point estimate would be towards the bottom end of this range – particularly given the notional gearing figures selected by other regulators in sectors which benefit from a greater degree of predictability of cashflows. As such, we consider **60%** to be an appropriate notional gearing figure for using in the WACC.⁷ A selection at the bottom of the range provides financial headroom to manage shocks and allow for short-term deviations in capital structure without placing undue pressure on ratings or the cost of debt.

Cost of debt

Cost of new debt

Consistent with the notional approach taken to gearing we focus on a notional cost of new debt for an investment grade credit rating cross-checked to HAL's actual financing cost. In providing an estimate for the cost of debt we focus on a single 'ex-ante' cost of debt figure that is reflective of an average expected cost of debt over the H7 period.

Based on current market yields for long-term investment grade corporate debt, the real cost of new debt is close to 0%.⁸ This represents a substantial decline in yields from the first quarter of 2016, where real yields were around 1.5%.

As yields are unlikely to persist at their current levels through the H7 period, we consider it appropriate to apply a forward-looking adjustment to current yields, factoring in the market expectations for the future path of interest rates.⁹ One source of these market expectations is forward-yields as implied by gilts. Based on data from index-linked gilt yields (at October 2017) we find an expected uplift (to be added to current market yields) to October 2022 of approximately +0.4 percentage points.¹⁰ Applying this uplift to the current market yields of 0%, and factoring in some degree of inaccuracy from forward-looking adjustments based on forward yields, we conclude that the cost of new debt could be 0.4% +/-0.25%, producing a range of **0.15% to 0.65%** in real terms.

While there is uncertainty over the degree to which current market yields are being driven by temporary or permanent factors, evidence from the future direction of long-term interest rates supports the view that long-term equilibrium interest rates may have declined.¹¹ However, as there is a risk that current rates used for the purposes of our analysis are being distorted by shorter-term market uncertainty, market movements should be monitored between now and the final determination of the H7 controls.

⁷ In Appendix A of the report we discuss the implications of different notional capital structures for the WACC. We find that overall there is little impact on the WACC from considering alternative notional structures.

⁸ As at October 2017.

⁹ Market based expectations should factor in forward-looking views of both the future path for short-term rates and the prospect for future unwinding of quantitative easing.

¹⁰ The uplift implied by nominal gilts is larger than this and is approximately 0.9 percentage points.

¹¹ Even in the US, where short-term rates have been rising, the Federal Reserve Chair has highlighted that recent studies suggest that the neutral level of the federal funds rate appears to be much lower than it was in previous decades (Yellen (2017), 'A Challenging Decade and a Question for the Future', At the 2017 Herbert Stein Memorial Lecture).

Cost of embedded debt

For the cost of embedded debt we also adopt a notional approach cross-checked to HAL's actual financing. In order to calculate the cost of embedded debt we focus on trailing averages of investment grade corporate bond yields.¹² Specifically, we consider 10yr and 15yr trailing averages. We do not consider periods longer than this as, at the time H7 begins, the proportion of HAL's outstanding funding associated with their August 2008 re-structuring will be a small percentage of embedded debt.

While recent 10yr and 15yr trailing averages are around 1.9% and 2.2% respectively (in real terms), rolling forward these averages on a basis consistent with the cost of new debt set out above, we anticipate the 10yr and 15yr averages could be around 1.1% and 1.8% by the end of 2019.¹³ The upper end of this range, as informed by the 15yr average, may better reflect past-trends in HAL's issuances and could be considered more consistent with an assumption of long-term notional financing. On that basis, we use this **1.8%** figure as our estimate for the real cost of embedded debt.

Overall cost of debt

For HAL 'as is' we find that a weighting on new debt of 12.5% is appropriate. Combining this with an allowance for issuance costs of 10bps produces an overall real cost of debt estimate of **1.7% to 1.8%**.

Cost of equity

Total market returns and risk-free rate

The Capital Asset Pricing Model ("CAPM") approach to setting the cost of equity requires that total market returns ("TMR") are the sum of the risk-free rate ("RFR") and the equity market risk premium ("EMRP"). Broadly speaking, there are two approaches that can be taken when calculating the cost of equity. The first is to build up to the cost of equity through individually estimating the RFR and EMRP; the second is to estimate the TMR and deconstruct into RFR and EMRP.

In this report we focus on estimating the TMR, then deconstruct into RFR and EMRP by reviewing evidence on government bond yields. However, where the equity beta is close to one – as it has been for HAL in previous regulatory decisions – the exact decomposition of the TMR into RFR and EMRP makes little difference to the cost of equity.

Total market returns

When reviewing the appropriate TMR for the H7 period there are two broad types of evidence that can be used. The first is long-term historical equity returns (ex-post sources) and the second is forward-looking evidence from current market expectations of TMR using techniques such as dividend discount modelling, market valuation and investor surveys (ex-ante sources). We review both sources in this report. However, given the wider economic and market context within which investors are forming their return expectations, which of late has been characterised by 'lower for longer' interest rates, we place more emphasis on the use of ex-ante sources of evidence. This is because the periods on which long-term historical evidence is based do not contain a comparable period of ultra-low interest rates – increasing the risk that this evidence is unrepresentative of equity financing costs in the H7 period.

Specifically, we focus on three sources of ex-ante evidence:

- Dividend discount modelling (DDM) – DDM is a long established technique and is undertaken by a range of market analysts. A multi-stage DDM model has the advantage of capturing both short-term

¹² Nominal yields are converted into real yields using long-term breakeven inflation as inferred from gilts. Nominal yields used are the average of the A and BBB rated iBoxx non-financial 10Y+ series.

¹³ These averages are rolled forward on the assumption that observed yields increase linearly from October 2017 spot yields through the yields for October 2022 for the real cost of new debt. However, it should be noted that forward curves suggest a larger proportion of increases could occur in early time periods (rather than being linear as assumed). The large decline in the forward-looking 10-year average is caused by higher yields from 2008 dropping out of the sample as the averaging window rolls forward to 2019.

expectations of future dividend growth as well as long-term expectations of future dividend growth, making it suited to the dynamics of a 'lower for longer' scenario. The outputs from our monthly DDM analysis produce a nominal TMR spot rate of 8.4%, while the average since January 2014 has also been 8.4%.

- Market valuation evidence – Another observation is provided by evidence from RCV premia on regulated utility transactions. Recently, there have been several transactions that have achieved premiums above the x1.24 long-run average. There could be two major factors driving these elevated premiums. One is outperformance of regulatory allowances (including the cost of debt). The second is that the cost of equity allowed by regulators is regarded by investors as being in excess of required returns. Given the magnitude of the recent RCV premia across regulated assets, it seems unlikely that outperformance alone can explain recent premiums, and therefore this appears to imply that investor required rates of return are below earlier regulatory assumptions (in recent years regulators have coalesced around a 6.5% real TMR assumption - approximately 9.5% in nominal terms). Our work for Ofwat on publicly listed water company RCV premia suggested a nominal TMR of 7.5% to 8.2%.
- Investor survey evidence – A further piece of ex-ante evidence that can be used to triangulate estimates of TMR is investor survey evidence. We find that the most up to date survey evidence for the UK market shows investors are, on average, applying a nominal TMR assumption of 8.1%.

Based on our review of the three sources above, we conclude that an appropriate TMR in current market conditions is in the range **8.0% to 8.6%** (nominal).¹⁴ Using an RPI inflation assumption of 2.8%, this is equivalent to a real TMR of **5.1% to 5.6%**. This range is lower than regulatory precedents on TMR, but lies within the 5.0% to 6.5% TMR range proposed by the CMA in the determination for Northern Ireland Electricity (NIE) in 2014.

Greater use of ex-ante source of evidence does come with associated policy implications though, and these should be carefully considered by the CAA. In particular, by placing weight on current market data, rather than more stable long-run averages, greater volatility can be introduced into the WACC, and hence greater volatility to overall charges. For example, using forecast data on WACC, RAB and passengers for 2018 as a representative year from HAL's April 2014 notice on the proposed licence, we find that a 1 percentage point widening in the TMR range adds around £1 (2011/12 prices) additional variability to regulated yield per passenger. This is equivalent to approximately 5% of the overall regulated yield per passenger. Furthermore, with greater use of ex-ante sources of evidence, there tends to be a wider scope for subjectivity. This is because the outputs from ex-ante techniques are often sensitive to the underlying input assumptions applied. For example, any approach which attempts to infer TMRs from transactions requires an assumption for expected outperformance; and, a DDM approach to estimating TMR requires an assumption for future dividend growth. Therefore, the risks associated with increased subjectivity, divergence from past regulatory approaches to TMR and bill volatility must be weighed against the risks that long-term averages are unrepresentative of required returns over the H7 period.

Where a longer-term historical approach is used as a reference point in setting TMR, it is important that the raw figures are adjusted for key elements that are not considered to be persistent and for structural changes to inflation measurement such as the formula effect. Our analysis suggests that real TMR estimates on an adjusted long-run historical basis could lie in the range 5.6% to 6.3%. This shows that our current market approach is resulting in a negative adjustment to long-term (adjusted) historical returns of around 0.5% to 0.6%.

Drawing upon evidence that there is a less than perfect negative correlation between the RFR and EMRP, for the purposes of this report we use the TMR range from current market evidence.

Risk-free rate

In assessing the risk-free rate for H7, we use market data on index-linked gilt yields to produce an estimate. Since the final proposals were developed for Q6, gilt yields have declined substantially, and dropped sharply in

¹⁴ We note that the upper limit for the real TMR proposed by the CMA in the 2014 determination for NIE is equivalent to an upper limit of 9.5% in nominal terms using an RPI assumption of 2.8% (the RPI assumption adopted in Q6).

2016 as expectations of 'lower for longer' interest rates set in. As expectations for future interest rate increases have also softened relative to the pre-Q6 period, this suggests that the risk-free rate should be lower than the 0.5% figure the CAA adopted for Q6.

Forward yields from index-linked gilts show that a forward-looking adjustment to current spot yields (of around -1.8% in real terms) could be relatively small e.g. +0.4 percentage points from spot yields. This would suggest a real RFR estimate of -1.4%. Comparing this figure to recent regulatory decisions on the RFR, an estimate as low as this would depart significantly from other regulatory decisions. Taking account of this, and factoring in a degree of uncertainty, we propose an upper end figure of -1.0% for the real risk-free rate. Our recommended range based on current market data is therefore **-1.4% to -1.0%**. Combining this with the upper and lower end of the TMR range implies an EMRP of 6.5% to 6.6%.¹⁵

Consistent with the approach to TMR, this approach places more emphasis on current market evidence, and less weight on long-run averages or historical regulatory precedents. However, where the equity beta is close to one, the deconstruction of the TMR between RFR and EMRP makes only a minor difference to the overall cost of equity. Nevertheless, this approach would require updating for capital market movements between now and the final determination for the H7 period.

Asset beta

The TMR represents the returns required by investors on equities of average risk. The actual returns needed for a particular equity investment vary with the degree of risk to which it exposes the investor. Using the CAPM framework, investors only require compensation for bearing systematic risk. The asset beta captures the systematic risk of an equity on an unlevered basis. The higher the asset beta, the more compensation equity investors require for bearing additional systematic risk.

Our approach to estimating the asset beta for HAL is twofold. Firstly, we review key systematic risk drivers at HAL, to provide an initial view on whether there has been a fundamental movement in the systematic risk affecting the airport. Secondly, we review evidence from comparator airport asset betas, contrasting their exposure to systematic risk to that of HAL.

Systematic risk drivers at HAL

In considering the asset beta of HAL in the 'as is' H7 case, there is little reason to conclude the asset beta range applied in Q6 should be amended. This is for three reasons:

- Firstly, there is no reason to consider that HAL will be any differently exposed to demand risk, as the airport can be expected to continue to operate in an environment of excess demand and capacity constraints.
- Secondly, there is no expectation of a fundamental change in HAL's cost structure compared to Q6. Therefore, in terms of the impacts of input price risk, operational leverage and capex risk in beta, there is no reason to anticipate a change.
- Thirdly, there is no anticipated material change to regulatory protections or incentives that drive systematic risk e.g. no step change in the protections against capex risk. Were the regulatory regime to change incentives significantly, then there would be grounds for revisiting the Q6 asset beta range.

Evidence from comparator asset betas

Given the rationale set out above, only a marked departure as suggested by comparator airport evidence should lead to a revision to the 'as is' asset beta range of 0.42 to 0.52 adopted for Q6.

Overall, this comparator cross-check shows that the average asset beta across the international airport comparator group reviewed is 0.43 (both for daily and monthly data). Furthermore, focusing on Fraport

¹⁵ A lower figure for the RFR is paired with a lower figure for TMR (and vice versa) – reflecting whether there is a higher or lower general returns environment.

(Frankfurt) and ADP (Charles de Gaulle), which are the two comparators closest to HAL in terms of size, geography and hub status, we find that:

- The asset betas for both airports have declined since the Q6 final determination.
- Using daily data, the outputs for ADP are close to 0.5 more recently, while for Fraport the outputs more recently are between 0.3 and 0.4.
- Using monthly data, the recent outputs for ADP are broadly between 0.4 and 0.5, while for Fraport they are closer to a 0.45 to 0.55 range.

We therefore find that there is consistency between the **0.42 to 0.52** range used for HAL in the Q6 price control and the review of evidence from comparator asset betas, and recommend its continued use for HAL ‘as is’.

Overall cost of equity and overall ‘as is’ WACC

Applying our estimates for the RFR, asset beta and TMR we estimate a cost of equity range (real, post-tax) for HAL ‘as is’ in H7 of **4.9% to 7.1%**. Combining this with the cost of debt assumptions above, and a notional gearing assumption of 60%, this produces a real vanilla WACC of **3.0% to 3.9%** for H7 ‘as is’. Where a statutory corporation tax rate assumption of 17% is applied, this equates to a real pre-tax WACC of **3.4% to 4.5%** for H7 ‘as is’.

Third runway impacts

In October 2016, the UK government announced its support for a new northwest runway at Heathrow. The scheme is still going through parliamentary and planning processes and is subject to revision. The planned third runway at Heathrow represents a major long-term investment with an estimated overall cost of the scheme of £17.6bn (2014 prices).¹⁶ In this report we consider three third runway impacts on the WACC: (i) construction phase risk impacts; (ii) financing structure impacts; and (iii) issuance cost impacts.

Construction phase risk impacts

In terms of the scheme’s implementation, the construction phase is expected to take place predominantly over the years 2019 to 2025. Under the proposed scheme, the third runway is expected to be open by 2026 – overlapping with some residual construction risk. In terms of the regulatory cycle, this means that the period of construction risk associated with the scheme lies mostly in H7, with operational and demand risk associated with the opening of the third runway concentrated in the subsequent regulatory period (“H8”).

In order to assess the impact of the scheme on HAL’s WACC we review six case studies of other cost of capital adjustments which have been made to capture the impact of additional risks in the construction phase of a project. We then consider the relevance of these case studies to the third runway scheme. Specifically, we consider six key case studies (i) Thames Tideway Tunnel (ii) Ofgem RIIO, (iii) HAL – Terminal 5 (iv) Offshore wind projects (v) OFTOs and (vi) Hinkley Point C. In the table below we summarise the findings from each of these case studies.

¹⁶ Cost and timing information regarding the expansion is prepared using 2015 costs estimates from the Airports Commission for the Heathrow Airport Northwest Runway (LHR NWR).

Table 1: Case studies

Case study	Notes	Relevance for H7	Scale of WACC uplift in ascending order (percentage points)
Thames Tideway Tunnel	The Thames Tideway Tunnel is being delivered through an infrastructure provider distinct from Thames Water. The project also received some governmental assistance, reducing its risk profile.	Low – similar regulation but a distinct project with additional government support.	~0
Ofgem RIIO-T1 relative risk	The WACC uplift (calculated) associated with the scale of investment between different transmission network companies represents an upper bound estimate. Other relative risk factors associated with totex mean that a central uplift for scale of investment alone is likely to be lower than this. Specifically, the figure of 0.23 percentage points shown is commensurate with approximately a 14 percentage point increase in the Capex:RAB ratio.	Medium – related to scale of investment.	Up to 0.23
CC/CAA T5	The T5 WACC uplift was for the large terminal capital programme occurring alongside the existing regulated business. The uplift factored in aspects such as construction risks, some element of demand risk, potential increases in financing premiums and considered asymmetric risks arising from the limited ability to outperform. The CC applied a 0.25 percentage points uplift to the entire BAA group, which is equivalent to 0.33 percentage points if applied to Heathrow only.	High – HAL specific case study.	0.33
Crown Estate Offshore Wind	Developer risk has been driven by the complexities and relative inexperience in the construction of offshore wind projects, which has previously resulted in some severe project cost overruns.	Low – bearing significant long-term project risk.	0.33
Ofgem OFTOs	Offshore transmission projects are bespoke and complex assets and involve bearing construction risk. Technology risk specific to OFTOs are potentially less relevant.	Low – additional risks not relevant to HAL.	0.50
Hinkley Point C	The NAO report specifically considered the level of return required under a 'hybrid' RAB model. However, there is a history of considerable cost overruns and delays associated with the technology being used.	Low – could become more relevant where construction capex risk was entirely borne by investors.	1.1

Source: PwC

As shown by the case studies above, there is support for the provision of an uplift for construction phase risk impacts. Within the set of case studies reviewed the similarities between T5 and the third runway scheme, and the uplift implied from benchmarking against Ofgem's RIIO-T1 determination, suggest that a logical positioning against precedents supports a WACC uplift towards the lower end of the range set out above. However, a case could also be made for the uplifts towards the upper end of the range, particularly in a scenario where capex incentives exposed HAL's investors to a greater degree of risk – especially if such risk was asymmetric. In terms of forming a plausible range for this uplift, we propose an indicative range of **0.25% to 1.0%**; this relatively wide range reflects the developmental stage of the H7 price control.

Financing structure impacts

When considering financing structure impacts, we assume our notional gearing level is sustained throughout the construction of the third runway. This requires that the additional capex is funded in the same proportions as the notional capital structure. So for every £100 of capex, £60 is funded through debt and £40 through equity, either by way of retained earnings or through issuance of new equity.

The impact on HAL's credit metrics will depend upon the regulatory approach adopted and the associated charging profile. Where revenues start recovering capital expenditure in the year in which it is incurred then there is likely to be little impact on credit metrics, rating and cost of debt. Where charging for the investment in the new runway is not allowed prior to its operational launch, then credit metrics will likely deteriorate in the construction phase, and maintaining the notional capital structure may suggest a higher cost of debt is warranted.

Assuming a constant 60% notional capital structure, we estimate that the proportion of new debt relative to total debt in H7 will be approximately 60%. The viability of this notional funding structure will require testing through financeability analysis and will also depend on the regulatory approach implemented by the CAA for H7.

As set out above, the estimate for the cost of new debt is based on current market yields plus a forward-looking uplift. However, projections of future yields based on forward curves are not always accurate predictors of outturn yields. Given the significantly higher proportion of new debt (associated with the capital required to fund the third runway scheme) expected in H7, the risk associated with forecast error on the cost of new debt is magnified. While this report does not review the approach to the cost of new debt in H7, we note that any cost of new debt projection is susceptible to forecasting error, particularly over long time periods.¹⁷ Therefore, although we have factored in a small margin of uncertainty around the cost of new debt projection, the range of possible outcomes may be much wider than this in practice.

Issuance cost impacts

Due to the large amount of capital required in H7, including equity as well as debt, the CAA could consider an allowance for equity issuance costs. A similar recognition of these costs was made by Ofgem for RIIO-T1. Specifically, Ofgem made an ex-ante allowance for equity issuance costs of 5% of the amount of notional new equity required during the regulatory period – with a clawback mechanisms based on actual equity issuance. We recommend a similar approach where new equity issuance costs are incorporated into the allowed revenues as part of the H7 financial modelling.

Conclusion

Combining all the evidence set out above, and focusing on the **lower end of the third runway impacts** adjustment of +0.25 percentage points, we derive a real vanilla WACC of **2.8% to 3.8%**. This is broadly similar to the 'as is' real vanilla WACC range for H7 because the third runway uplift to the WACC is counterbalanced by more weight in the capital structure being placed on relatively low cost new debt. Where a statutory corporation tax rate assumption of 17% is applied, this equates to a H7 pre-tax WACC of **3.2% to 4.4%**.

Focusing on the **upper end of the third runway impacts** adjustment of +1.0%, we derive a real vanilla WACC of **3.5% to 4.6%**. In this instance, the effect of the third runway adjustment is larger than the downward pressure on the WACC arising from more weighting on relatively low cost new debt. Where a statutory corporation tax rate assumption of 17% is applied, this equates to a H7 pre-tax WACC of **3.9% to 5.1%**

¹⁷ The CAA commissioned CEPA to consider indexation of the cost of debt in CEPA (2016), "Alternative approaches to setting the cost of debt for PR19 and H7"

1. Introduction

- 1.1 The CAA is currently in the process of consulting on a number of issues relating to the regulation of Heathrow Airport Limited's (HAL's) price control and in particular issues relating to new capacity. For this work, the CAA is specifically interested in the financial issues relating to HAL's new capacity and the related price control. The current price control for HAL ends on 31 December 2019. The CAA is therefore now starting their review to decide what regulatory arrangements should be put in place from 1 January 2020. This new price control is referred to as H7.
- 1.2 As part of this process of consultation, the CAA has commissioned PwC to provide our view of an initial range for the weighted average cost of capital ("WACC") for the H7 period (currently defined as the 2020-2024 period). The purpose of providing this initial WACC range is to help guide the initial preparation of the H7 price control. The purpose of this report is not to provide a final result that will be used in the setting of the price control.
- 1.3 In most instances, unless otherwise stated, the data cut-off for this report was the end of October 2017, but where relevant we also consider information regarding the Bank of England's base rate change on 2 November 2017 and updated OBR forecasts produced for the budget on 22 November 2017.

Assumptions

- 1.4 Given the early stage of the H7 consultation process, in providing a view of the H7 WACC we have made a number of assumptions. Four key assumptions are listed below:
1. The CAA continues to apply a single WACC to a single measure of the regulatory asset base (RAB). This means that the RAB is not segmented or treated any differently for different types of existing assets or new assets. In this circumstance, the WACC has to encompass the risks associated with the delivery of new capacity as well as the risks associated with the existing 'as is' regulated business;
 2. The CAA sets the cost of new debt allowance on an ex-ante basis (as was the case in Q6). We do not consider an alternative approach whereby the WACC could change throughout the price control if an indexation approach were adopted by the CAA¹⁸;
 3. The CAA calculates the control in constant prices using the Retail Price Index (RPI) as the basis of indexation for both revenues and the RAB; and
 4. The H7 period begins in January 2020 in line with the current one year extension in place.¹⁹

Methodological considerations

- 1.5 Provided with these assumptions, it is also important to understand the wider methodological considerations associated with the approach taken in setting the WACC. Specifically, of key consideration is the trade-off between long-run historical approaches and current market approaches.
- 1.6 Broadly speaking, as long-run historical approaches typically rely on long-run averages of financial time-series, WACC estimates produced by this approach tends to be slow to evolve. This gives WACC estimates greater stability, but increases the risk that allowed returns are unreflective of current market conditions. In contrast, current market based approaches reflect current market conditions, but by their

¹⁸ The CAA has considered proposals for the indexation of the cost of debt in CEPA (2016), "Alternative approaches to setting the cost of debt for PR19 and H7"

¹⁹ The CAA is considering a further extension to Q6 but a decision on the length of the future extension has not been made at the time of publication.

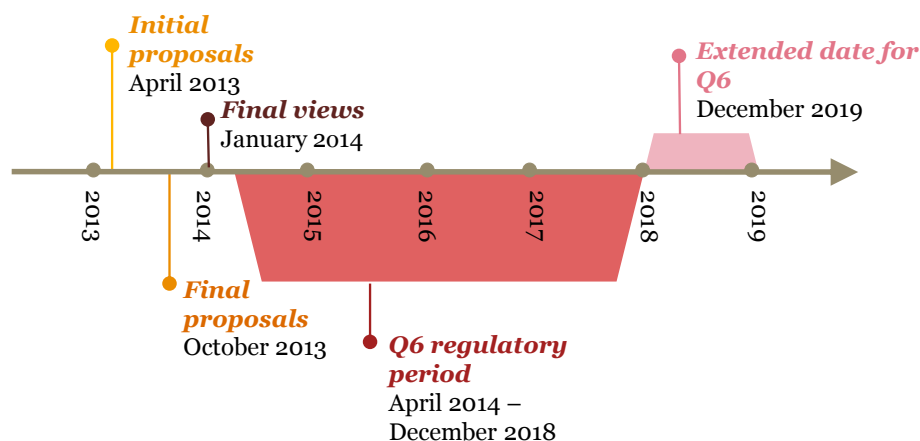
nature are more sensitive to changes in the economic and market outlook - meaning the WACC produced by this approach can be more volatile.

- 1.7 As such, given that there is still a relatively long lead-time until the beginning of the H7 period, where the estimates in this report are based on upon current markets approaches, they should be reviewed and/or updated to reflect material changes in economic outlook.
- 1.8 We therefore recommend that the CAA monitors changes to the economic and market outlook between now and later in the H7 process, updating the estimate of the WACC range accordingly.

Q6 background

- 1.9 The Q6 consultation process took place over the 2012-13 period. This is shown in Figure 1.1 below. The CAA published their initial proposals in April 2013, its final proposals in October 2013 and its final views in January 2014. The Q6 regulatory period then commenced in April 2014 and was initially scheduled to conclude at the end of December 2018, however, it was subsequently extended by an extra year to December 2019.

Figure 1.1 Q6 timeline



Source: CAA

- 1.10 The cost of capital methodology applied in Q6 used a notional capital structure. For the cost of equity, it considered both current market evidence as well as long-term returns evidence. And for the cost of debt, it considered evidence from corporate bond indices as well as HAL's own bonds.
- 1.11 In terms of economic context, while monetary policy was loose in the build up to Q6, over 2013 there had been a significant rise in government and corporate bond yields. This was coupled with an increasingly upward sloping yield curve. This market evidence suggested some expectation of reversion towards long-term market returns.

Cost of capital parameters in Q6

- 1.12 In this sub-section we set out the final parameters for the cost of capital used by the CAA in its final views. We also include a brief rationale for the main parameter selections. The table below sets out the WACC parameters applied in Q6.

Table 1.1: Q6 WACC calculation

	Q6 Final Views	
	Low	High
Gearing	60%	60%
RFR	0.50%	1.00%
TMR	6.25%	6.75%
Asset Beta	0.42	0.52
Debt beta	0.1	0.1
Equity beta	0.90	1.15
Cost of equity (post-tax)	5.68%	7.61%
Cost of debt embedded debt	3.15%	3.65%
Cost of new debt	2.20%	2.65%
Weighting of new debt	50.0%	30.0%
Issuance costs	0.10%	0.10%
Real Cost of debt (pre-tax)	2.78%	3.45%
Vanilla WACC	3.94%	5.12%

Source: CAA

Total market returns (TMR)

- 1.13 Throughout the Q6 consultation the CAA used a real TMR range of 6.25% to 6.75%. This was based upon a blend of historical and forward-looking evidence. For example, in terms of historical evidence, it drew upon a range of long-run average return estimates – focusing on shorter-term holding periods. And in terms of forward-looking evidence, the range drew upon Dividend Growth Model (DGM) analysis.
- 1.14 The final view of the CAA was a point estimate of 6.25%. This was lower than the 6.75% point estimate used for proposal stages. This point estimate was in part influenced by the NIE draft determination from the CC (now CMA) released in November 2013.
- 1.15 This CC document set out an in depth discussion on TMR. The CC concluded that a TMR range based on long-run historical evidence was 6.0% to 7.0%, but that when placing more weight towards ‘contemporary’ evidence (as the CC saw as appropriate), an upper bound value for TMR was 6.5%. At the lower end of the range, the CC selected a figure of 5.0%. While no point estimate for TMR was provided, the CC’s draft point estimate for the WACC overall was towards the centre of their range.²⁰

Asset beta

- 1.16 In Q6 the CAA used an asset beta range of 0.42 to 0.52. This was the same asset beta range used for HAL in Q5, which in turn was derived from BAA stock market data that had been deconstructed by airport (including Gatwick and Stansted).
- 1.17 The continued use of this asset beta range was justified with reference to international airport betas and analysis of any changes to HAL’s relative risk versus the market.
- 1.18 In terms of HAL’s relative risk compared to the market, the CAA found that there was little evidence to suggest a material change in relative risk. The CAA view was that HAL remained a capacity constrained

²⁰ Ultimately, the final determination for NIE (published at the end of March 2014) selected a WACC figure which is consistent with a TMR value of 6.5% (real).

airport with excess demand and that the asset beta range was logical when placed against broader regulated companies.

1.19 In terms of international airport betas, the range of evidence supported retention of the Q5 range.

Risk-free rate (RFR) and the cost of debt

1.20 The real risk-free rate in the final view for Q6 was set in the range 0.5% to 1.0%. This was above prevailing market rates and represented an increase from the initial proposals range of 0.25% to 0.75%.

1.21 Both this figure and the cost of new debt were set against a monetary policy context of rising yields and a steepening yield curve – suggesting that rates rises, albeit gradual, were likely in the short-term. On this basis, the CAA made a material upward forward-looking adjustment to yields prevailing in the market at the time.

Scope and structure of this report

1.22 In this report we set out our view on the WACC as an initial estimated range for the H7 period. The estimate is formed of two parts. The first part is a WACC estimate for HAL ‘as is’, without the capital programme associated with a third runway, the second part then estimates the impact of the third runway on the overall HAL WACC.

1.23 The structure of the report is as follows:

- H7 context (Section 2) – this section sets out the economic context and the HAL specific factors that are most relevant to setting the H7 cost of capital.
- Gearing (Section 3) – this section sets out our approach and estimated range for gearing.
- Cost of debt (Section 4) – this section considers the use of notional and actual cost of debt parameters and sets out our approach and estimated range for the cost of debt.
- Cost of equity (Section 5) – this section considers the appropriate balance between current market estimates of the cost of equity and long-run historical approaches to the cost of equity; it then sets out our approach and estimated range for the cost of equity.
- Third runway impacts (Section 6) – this section provides an overview of the H7 capital programme and considers the case for any adjustments to the WACC associated with this capital programme to deliver new capacity.
- Tax (Section 7) – this section sets out the competing tax approaches that could be applied in converting the post-tax cost of equity to a pre-tax cost of equity, and sets out the tax assumptions we apply.
- Conclusion and overall WACC (Section 8) – this section presents our view on an appropriate initial WACC range that could be applied in H7.
- Appendix A sets out an alternative notional financing approach, which has been tailored to privately held airports.
- Appendix B sets out the details underlying our asset beta estimation.
- Appendix C sets out a comparison of risk-free rate estimates.
- Appendix D sets out the technical details of the Dividend Discount Model used.

1.24 In the next section we set out the context to the H7 price control, including the wider UK economic context and HAL’s recent business performance.

2. H7 Context

2.1 In this section we set out the context to the H7 WACC. This covers:

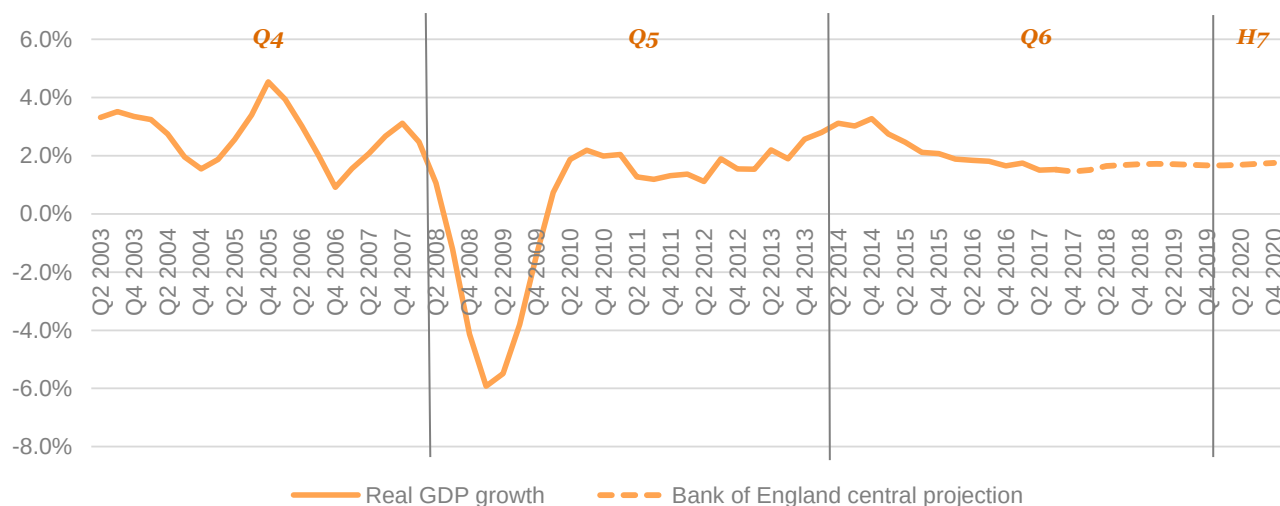
- The wider macroeconomic context to the H7 price control;
- An overview of HAL's recent business performance; and
- Financial market context;

Macroeconomic context

2.2 Following the downturn in 2008-09, GDP growth over the period 2010 to 2016 averaged 2.0%, and has averaged 2.2% for the Q6 price control to date. This level of growth is broadly projected to continue. Figure 2.1 below shows past and forecasted real GDP growth for the UK going into the Q7 price control period.

2.3 According to Bank of England projections, the UK economy is expected to be growing at a rate of under 2% per annum by 2018, which is below its historical average from 1980-2007 of 2.8% growth per annum and long-term post-war average of around 2.5%.

Figure 2.1 UK GDP growth



Source: Thomson Reuters and Bank of England (November 2017 inflation report)

2.4 Looking further ahead, GDP forecasts from the Bank of England (BoE) suggest that growth is expected to be below 2% heading into H7, but there are clear risks around these forecasts, such as wider geopolitical uncertainties.²¹

Inflation

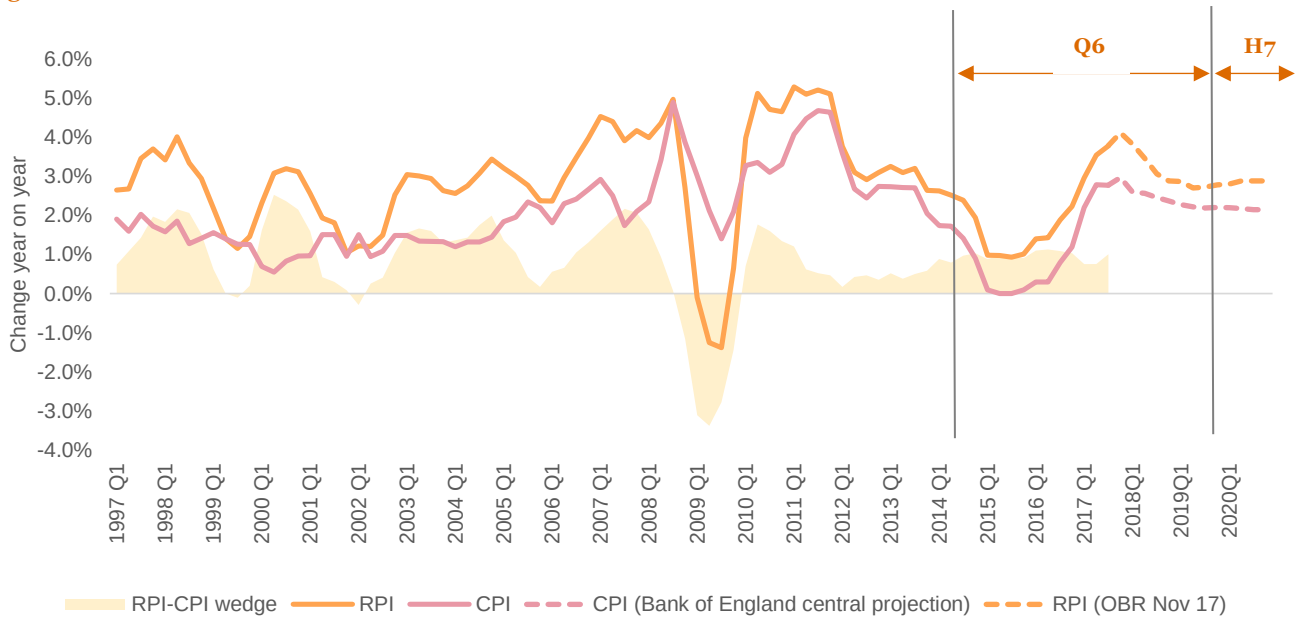
2.5 Figure 2.2 below shows year-on-year growth rates of CPI and RPI. CPI and RPI inflation were 2.8% and 3.8% (in Q4 2016), respectively, with the wedge between the RPI and CPI being close to around 1 percentage point.²² This recent estimate of the RPI-CPI wedge is higher than long-term averages –

²¹ As set out in PwC's June 2017 Global Economy Watch, forecasts of UK GDP in 2017 have become increasingly uncertain as shown by the standard deviation in projections of GDP growth.

²² This wedge is driven by a combination of the formula effect and the different compositions of RPI and CPI. The calibration of the wedge on a forward-looking basis also needs to monitor the potential impact of proposed changes to RPI in 2017. Specifically, the proposal to update the housing components of RPI for the new UK house price index introduced by the ONS. Although the Bank of England has commented that the change is unlikely to materially impact holders of index-linked gilts, they did note that the proposal was a fundamental change to RPI.

which are driven by a combination of formulae and coverage effects – for example over the period since 1997, the average of the difference between the RPI and CPI has been around 0.8%.

Figure 2.2 Historical inflation evidence combined with forecasts



Source: ONS, OBR

- 2.6 The Bank of England in its November inflation report²³ has projected that CPI will remain above the target rate in the short term (CPI is estimated to be around 2.7% for 2017), one driver of this has been the fall in sterling that has occurred since the EU referendum leading to higher import prices. Inflation is then expected to trend back towards the target level of 2%.
- 2.7 Table 2.1 below shows independent forecasts for 2017 and 2018 for CPI and RPI compiled by HM Treasury (as at October 2017). These suggest that CPI inflation is expected to remain above the target rate of 2.0%. Generally, forecasts for RPI are marginally over 3.0% in the latter half of Q6.

Table 2.1: CPI and RPI - HMT's independent forecast (October 2017)

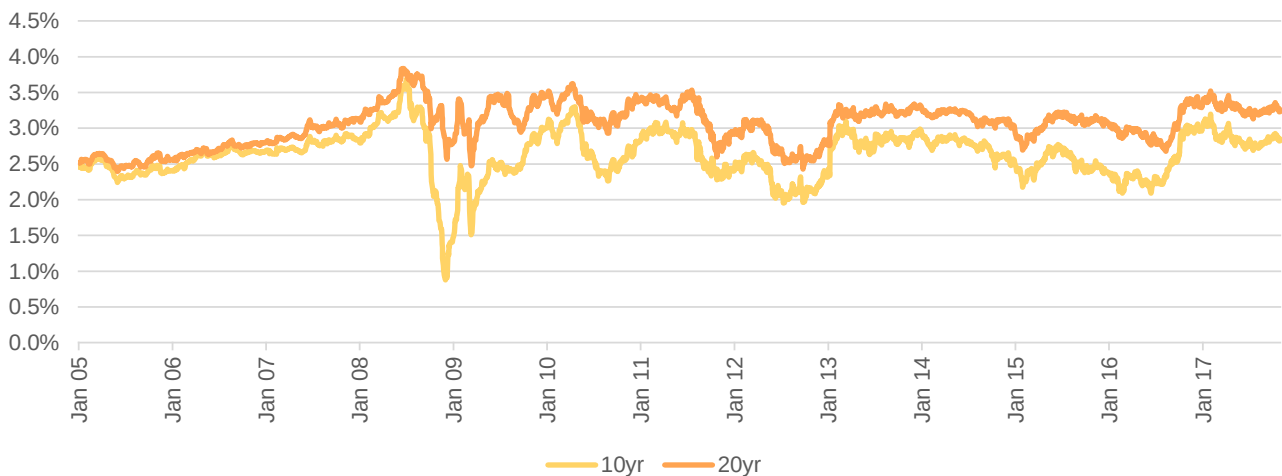
Inflation forecasts		March	
Inflation for 2017 (%)	Average	Low	High
CPI	2.9	2.6	3.3
RPI	3.9	3.3	4.4
Inflation for 2018 (%)	Average	Low	High
CPI	2.4	1.5	3.0
RPI	3.2	2.6	3.9

Source: HM Treasury

- 2.8 Implied inflation from gilts also provides another source of RPI expectations. In Figure 2.3 below we show the difference in yields between conventional gilts and index-linked gilts (net of an assumed inflation risk premium). As set out in Figure 2.3, evidence from 10yr gilts suggests that RPI expectations implied by spot yields at the end of October 2017 are approximately 2.8%, while evidence from 20yr gilts suggests an equivalent figure of approximately 3.3%.

²³ Bank of England (2017), *Inflation Report November 2017*

Figure 2.3 Implied inflation from gilts



Source: Bank of England

Note: Figures presented are net of a 0.3 percentage point inflation risk premium.

- 2.9 Based on a preliminary assessment of the evidence above, an RPI figure of approximately 3% is supported by independent forecasts. However, an RPI figure of 2.8% (as was used at Q6) continues to be supported by market evidence. An RPI assumption in the range 2.8% to 3.0% therefore seems most relevant to the H7 period at this stage. For our analysis in this report – in line with market evidence – we continue to use the **2.8%** RPI assumption adopted in Q6.

HAL's recent business performance

- 2.10 HAL has delivered robust financial performance throughout Q6 and has outperformed its regulatory determination across a number of measures. This is partly a consequence of stable economic growth over the period. In a performance summary below we consider passengers and ATMs (Air Traffic Movements), financial performance and financing.

Passengers and ATMs

- 2.11 HAL has achieved passenger growth faster than that assumed by the CAA in the Q6 determination. This follows a large (negative) differential between HALs passengers numbers and the CAA's projection in Q5. This is captured in Table 2.2 below. Cumulatively in the control period to the end of 2016, outperformance has totalled approximately 8 million passengers.

Table 2.2 Heathrow passenger numbers vs CAA projections

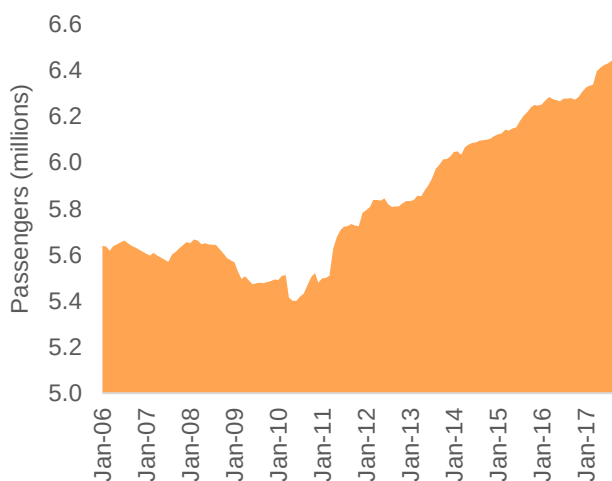
Time period (year ended)	CAA projected PAX (millions)	HAL realised PAX (millions)	Variance to CAA assumption (millions)
31 st Mar. 2009	70.4	65.9	-4.5
31 st Mar. 2010	72.5	66.1	-6.4
31 st Mar. 2011	74.5	66.1	-8.4
31 st Mar. 2012	76.2	70.1	-6.1
31 st Mar. 2013	78.2	70.3	-7.9
31 st Mar. 2014 ²⁴	-	72.4	-
31 st Dec. 2014 (9 months)	55.4	57.4	2.0
31 st Dec. 2015	72.0	75.0	3.0
31 st Dec. 2016	72.7	75.7	3.0

Source: Heathrow regulatory accounts

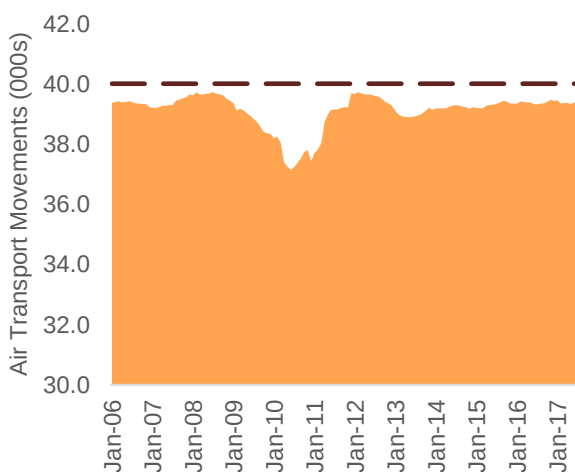
- 2.12 This strong growth in passenger numbers in recent years is shown in Figure 2.4 below. The figure also shows that PAX growth has been delivered despite more modest changes in ATMs. This strong recent performance contrasts with the previous (Q5) price control where HAL passenger growth was negatively impacted by the financial crisis and economic recession.

Figure 2.4 HAL ATM and passenger statistics

HAL monthly PAX (12 month rolling average)



Heathrow 12 month average ATMs v. cap



Source: Heathrow traffic statistics

- 2.13 Over the year to September 2017, HAL experienced a record 77.4m total passengers; 2.8% higher than the year before.²⁵

Financial performance

- 2.14 Consistent with below expected passenger volumes in Q5, HAL's average return on RAB was lower than projected in the years 2009-13. This is shown in Table 2.4 below. More recently, in 2016, higher revenue from airport charges was largely driven by increased passenger numbers. More broadly, over Q6 to date, revenue performance has exceeded the CAA price control target, with cumulative outperformance on revenue of approximately £419m between FY14 and FY16 (see Table 2.3 below).

²⁴ The Q5 period was originally planned to finish in March 2013 but was extended an extra year, for this reason we leave the forecast and variance columns empty for the period ending March 2014.

²⁵ Heathrow news release 11th October 2017

- 2.15 HAL's report on its December 2016 regulatory accounts²⁶ also suggests that regulatory operating profit was above the CAA's forecast due to higher passenger numbers, and this in turn brought a higher return on average RAB than assumed. This trend of higher return on average RAB than projected can be seen throughout Q6 in Table 2.3 below.

Table 2.3 Measures of financial performance

Time period (year ended)	Total revenue		Regulatory operating profit		Return on average RAB	
	Performance	Variance to CAA assumption	Performance	Variance to CAA assumption	Performance	Variance to CAA assumption
31 st Mar. 2009	£1629.7m	£-18.8m	£239.6m	£-111.8m	2.5%	-1.1%
31 st Mar. 2010	£1742.9m	£-32.1m	£155.0m	£-320.6m	1.5%	-2.9%
31 st Mar. 2011	£1853.6m	£-145.0m	£538.3m	£-67.6m	4.8%	-0.1%
31 st Mar. 2012	£2074.1m	£-155.1m	£396.8m	£-352.6m	3.2%	-2.4%
31 st Mar. 2013	£2225.4m	£-242.1m	£563.1m	£-331.6m	4.3%	-2.0%
31 st Mar. 2014	£2507.0m	-	£765.0m	-	5.4%	-
31 st Dec. 2014*	£2094.0m	£118.0m	£710.0m	£112.0m	4.79%	0.77%
31 st Dec. 2015	£2745.0m	£156.0m	£881.0m	£116.0m	5.92%	0.84%
31 st Dec. 2016	£2786.0m	£145.0m	£925.0m	£106.0m	6.13%	0.80%

Source: Heathrow regulatory accounts

* Performance summary for the 9 months ending 31st December 2014

- 2.16 Lastly, although for the year ending 31st December 2016, net operating costs were 4% greater than the CAA price control target, at £1,138m²⁷, for the three months ended 31st March 2017, operating cost per passenger was down by 2.9%.²⁸

HAL financing

- 2.17 In August 2016 a £400m fixed coupon bond with 35 years to maturity was issued. HAL was able to secure a nominal yield at issue of approximately 2.8% on this issuance. In real terms this is approximately 0%. This is significantly below the real cost of new debt allowance implied by the assumption used in the CAA's Q6 final view of approximately 2.5%.
- 2.18 More widely, HAL has financed itself steadily over Q6, with several senior and junior bond issuances since April 2014. In total, between April 2014 and December 2016, HAL issued a total of approximately £2.6bn worth of senior debt.
- 2.19 This steady financing over the control period means that HAL's average cost of debt on its historical issuance has tracked downwards, suggesting a lower cost of embedded debt in H7 relative to Q6 is appropriate.

²⁶ Heathrow (SP) Limited (2016) *Regulatory Accounts year ended 31 December 2016*

²⁷ Heathrow (SP) Limited (2016) *Regulatory Accounts year ended 31 December 2016*

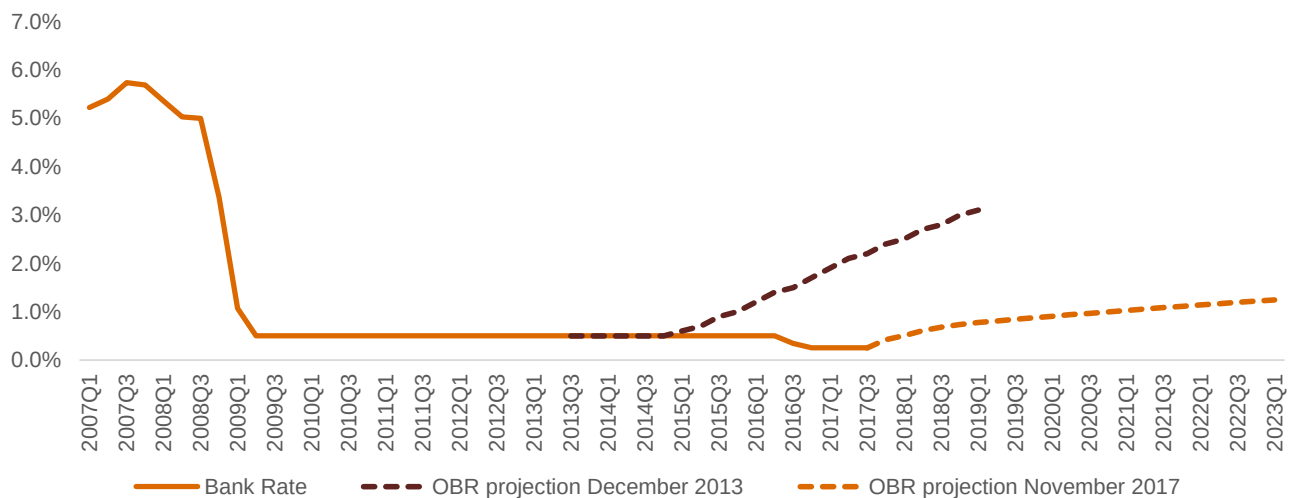
²⁸ Heathrow (SP) Limited (2017) *News Release 27 April 2017*

Financial market context

Interest rates

- 2.20 Despite expectations that interest rates would rise at the time of the Q6 proposals, these rises failed to materialise. Instead the Bank of England looks set to maintain ultra-low interest rates for the foreseeable future. This prolonged period of ultra-low interest rates is typically referred to as 'lower for longer'.
- 2.21 Current market expectations are that short-term interest rates will only change very gradually. This is set out in Figure 2.5 below, with the latest OBR projections (based on market data) for the base rate compared to projections back in December 2013 (just before the Q6 final view).

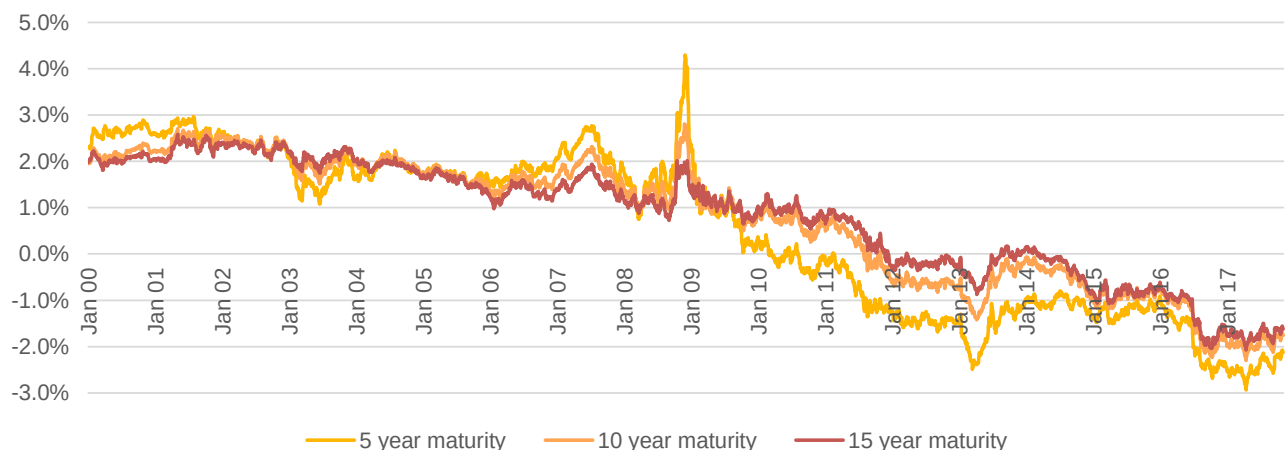
Figure 2.5 Base rate history and projections



Source: OBR, Bank of England

- 2.22 Ultra-low short term interest rates, combined with other monetary policy tools such as Quantitative Easing have also brought down longer-term interest rates. Government bond yields are close to historic lows and the current yield curve is relatively flat compared to recent years. This is shown in Figure 2.6 below, which tracks index-linked gilt yield over the period January 2000 to March 2017. The current market expectation is that the H7 period will be characterised by low interest rates.

Figure 2.6: Index-linked gilt yields



Source: Bank of England

Infrastructure investment

- 2.23 Helped by low interest rates and the search for higher yielding assets, demand for infrastructure assets is currently strong. The demand for high quality infrastructure assets which are able to provide stable real-terms cash flows is being driven by both UK and foreign institutional investors and sovereign wealth funds.
- 2.24 Since 2006, more than \$200bn has been raised by specialist funds – with at least the same again allocated by pension funds and other direct investors.²⁹ Of the capital raised by infrastructure funds since 2006, 48% has been by vehicles with a maturity of over 10 years.³⁰
- 2.25 As a result of this strong demand, over half of investors see asset pricing as being a key issue in 2017 – with high valuations putting pressure on returns.³¹ Nonetheless, the majority of managers were expecting to deploy more capital to infrastructure assets in 2017 relative to 2016.³² This is consistent with the growing aggregate value of global infrastructure investment funds – which raised \$47bn last year, and have raised a further \$25bn in the first quarter of 2017 alone.³³

²⁹ PwC and GIIA (2017), *Global Infrastructure Investments*

³⁰ Source: PwC analysis of InfraDeals data

³¹ Preqin (2017), *Preqin Global Infrastructure Report*

³² Preqin (2017), *Preqin Global Infrastructure Report*

³³ Economist (2017), *How and when to use private money in infrastructure projects (based on InfraDeals data)*

3. Gearing

- 3.1 In this section we set out a range for HAL's gearing in our 'as is' scenario. Specifically, gearing is defined as the ratio of net debt to the regulatory asset base.

Approach

- 3.2 We consider the need to assume a notional capital structure approach in setting allowed revenues as an integral part of RPI-X incentive based regulation. It provides company management with the incentive to manage the actual financing of the airport. Management are best placed to manage finance risks, through the timing of finance raising, the maturity profile of debt raised, the types of finance raising instruments used (e.g. index-linked debt or more complex debt instruments) and which markets to tap (including international debt capital markets).
- 3.3 This form of control using notional capital structure assumptions incentivises companies and not the regulator to take responsibility for managing company finance risk and also wider movements in debt markets. For example, a company can seek to avoid raising finance at times of heightened debt finance costs by carefully managing cash flow.
- 3.4 In our opinion, an economic regulator is not best placed to make these detailed financing assumptions and decisions, and any approach which moves the management of finance risk from companies and on to customers through the regulatory regime risks dampening longer term incentives for efficient financial management by companies. For this reason we consider the notional gearing approach used by the CAA in Q6 remains fit for purpose in H7. Alternatives, such as mirroring actual gearing levels in the regulator's own assumptions, risk dampening incentives for efficient financing. In Appendix A we review a different notional structure which better reflects privately held companies, but note this has little impact on the resultant cost of capital.
- 3.5 Consistent with the financing duties of the CAA, we focus on a range of gearing values which are commensurate with an investment-grade credit rating.³⁴

Evidence

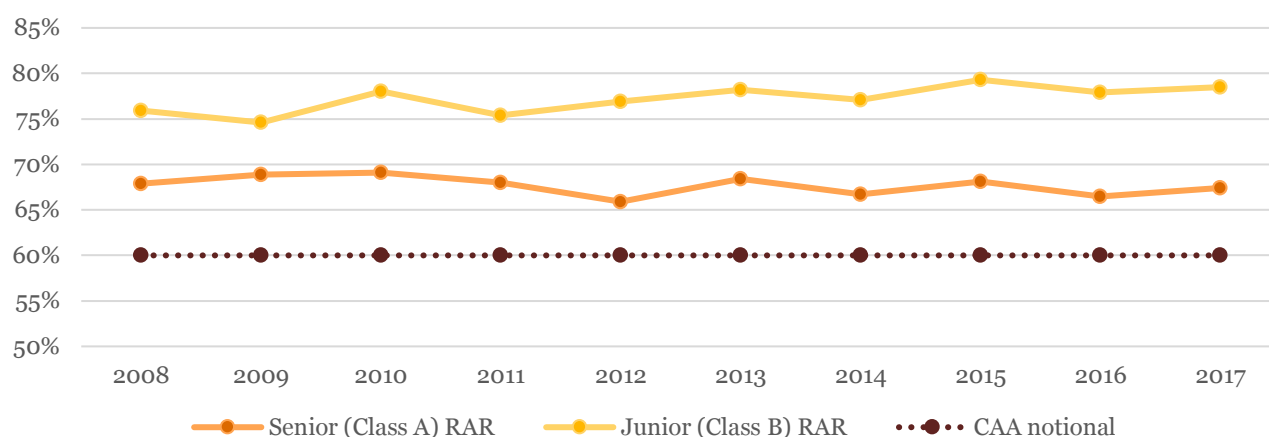
- 3.6 To estimate a range for H7 gearing we review three sources of evidence:
- The actual gearing level and credit rating of HAL in recent years;
 - Evidence from credit rating agency guidance on gearing levels which are consistent with investment-grade ratings; and
 - Regulatory benchmarks on notional gearing levels.

The actual gearing level and credit rating of HAL

- 3.7 HAL's actual gearing level has been relatively stable over the last 10 years. This is shown in Figure 3.1 below. The orange line represents the amount of gearing attributable to senior debt, and the yellow line represents the total level of gearing, including junior debt. Over the period 2008 to 2017, total gearing has tended to stay within the 75% to 80% range – consistently higher than the notional gearing level set by the CAA in Q6 of 60%.

³⁴ The statutory duties of the CAA are set out in CAP 1195: 'Discussion paper on the regulatory treatment of issues associated with airport capacity expansion'.

Figure 3.1 HAL regulatory gearing compared to notional gearing



Source: Heathrow Investor Reports, CAA

- 3.8 In terms of the risk associated with the different debt types, HAL has been able to attain a credit rating of A- on its senior debt (as rated by both S&P and Fitch) and has been able to attain a credit rating of BBB on its junior debt (as rated by both S&P and Fitch).³⁵

Evidence from credit rating agency guidance

- 3.9 In terms of credit rating agency guidance, we note that Moody's credit rating methodology document for privately managed airports is more focused on leverage ratios in respect of concession/lease based arrangements. This does not directly read across to HAL's form of regulation. We therefore look more broadly to guidance on regulated utilities.³⁶
- 3.10 In the regulated utilities space, Moody's guidance for regulated electric and gas networks provides a useful reference point. In this guidance a gearing range associated with a Baa credit rating is set out as 60% to 75%, while the gearing range associated with an A credit rating is 45% to 60%.
- 3.11 While this guidance shows that a gearing level as high as 75% could be consistent with an investment-grade credit rating for these utility networks, HAL faces a greater degree of demand risk due to the price-cap regime it operates under.³⁷ Therefore, when considered in isolation from other aspects that influence an overall credit rating,³⁸ the upper end of a plausible investment grade gearing range is therefore likely to be under 75% for a price-cap regime such as HAL's.

Regulatory benchmarks on notional gearing levels

- 3.12 The level of notional gearing adopted in the recent regulatory determinations in other sectors have been relatively similar – ranging from 60% to 65%. This is captured in Table 3.1 below.

³⁵ Heathrow (SP) limited has a senior debt gearing ceiling in its covenants of 70%. Heathrow refer to gearing as the Regulatory Asset Ratio or RAR. They define this as the ratio of nominal net debt (including index-linked accretion) to RAB.

³⁶ We note that HAL in its investor reports benchmarks itself against the gearing levels of other regulated utilities e.g. water companies.

³⁷ Regulated electric and gas networks often operate under a revenue-cap regime.

³⁸ Other aspects include other credit ratios and qualitative factors.

Table 3.1 Recent regulatory decisions on notional gearing

Regulator (determination)	Notional gearing
Ofwat (PR14)	62.5%
Ofgem (RIIO-ED1)	65.0%
Ofgem (RIIO-GD1)	65.0%
Ofgem (RIIO-T1)	60.0% - 62.5%
ORR (CP5)	62.5%

Source: Regulatory determinations

Discussion and conclusion

- 3.13 Based on the evidence set out above, a notional gearing range for HAL consistent with achieving an investment grade credit rating could be as wide as 60% to 75%. However, a reasonable point estimate would be towards the bottom end of this range – particularly given the notional gearing figures selected by other regulators in sectors which benefit from a greater degree of predictability over cash flows.
- 3.14 We also note that the WACC is insensitive to the notional gearing assumption, indeed, our assessment of an alternative notional gearing assumption based upon privately held securitisation structures had limited impact on the WACC (see Appendix A).
- 3.15 We therefore recommend a notional gearing figure of **60%** as this should provide significant financial headroom to manage shocks and allow for short-term deviations in capital structure without placing undue pressure on ratings or the cost of debt.

4. Cost of debt

- 4.1 In this section we set out a range for HAL's real cost of debt in our 'as is' scenario. This real cost of debt is comprised the real cost of *new* debt and the real cost of *embedded* debt (with an allowance for issuance costs).

Cost of new debt

- 4.2 The cost of new debt is a forward-looking allowance for debt costs on new debt issuance in the upcoming control period. The forward-looking nature of the allowance therefore relies upon an initial view as to average investment-grade bond yields over the control period.³⁹ Below we set out a range for this initial view.

Approach

- 4.3 Our approach to assessing the cost of new debt is consistent with the notional financing assumption in the previous chapter. We therefore draw upon evidence from broader corporate bond market evidence rather than placing too much reliance on HAL specific data. Nevertheless, HAL specific debt data is used to cross-check the suitability of the corporate bond benchmarks applied.
- 4.4 To estimate the cost of new debt we first estimate a spot-yield – for which we use a recent average rather than over-relying on a figure from a single day. We then apply a forward-looking adjustments to this spot-yield based on expectations of the path for future interest rates.

Evidence

- 4.5 In this subsection we set out evidence on the cost of debt. We begin with a review of the suitability of an iBoxx cost of debt benchmark for the notionally financed Heathrow airport.

Suitability of an iBoxx notional benchmark

- 4.6 An iBoxx cost of debt benchmark is used as a reference point for many different regulated sectors in the UK. For example, it is the benchmark that Ofgem uses to index the allowed cost of debt. Specifically, the index which is most typically referenced is the long-term, non-financial index for investment grade rated bonds (taken as an average of A and BBB ratings).⁴⁰
- 4.7 To test whether this benchmark is suitable in the context of HAL's cost of debt we review two pieces of evidence. The first is the comparison of yields on HAL's bonds to the yields of the index. This is shown in Figure 4.1 below. Specifically, we focus on HAL's bonds which are the closest to being 'ordinary' and without additional features which may impact their yield.⁴¹ As shown in Figure 4.1 below, the yields on these bonds – all of which have an A- credit rating – track relatively closely to the selected iBoxx benchmarks.
- 4.8 The December 2026 bond exhibits the largest (negative) spread to the iBoxx benchmark, but this is expected given it has under ten years remaining to maturity, as compared the benchmark index within which all bonds have over ten years remaining to maturity (shown by the dashed line). Focusing on the remaining three bonds, as shown in Table 4.1 below, we find that these, on average, trade at yields close to but slightly below the average of the A & BBB iBoxx benchmark. This is consistent with their A- credit rating.

³⁹ This is also referred to as an 'ex-ante' allowance. This allowances can either be fixed (with the airport bearing the interest-rate risk) or it can be indexed (where the customer bears a greater proportion of interest-rate risk).

⁴⁰ The 10 year and upwards (10Y+) version of the index contains the bonds with the longest time remaining to maturity.

⁴¹ The yields shown are for HAL bonds which are sterling denominated, fixed coupon, senior debt and over £250m in size. Where optionality exists on the bonds, this could influence their yields. We focus on those bonds issued after the 2008 corporate securitization of BAA.

Figure 4.1 Comparison of iBoxx yields to selected HAL senior bond yields

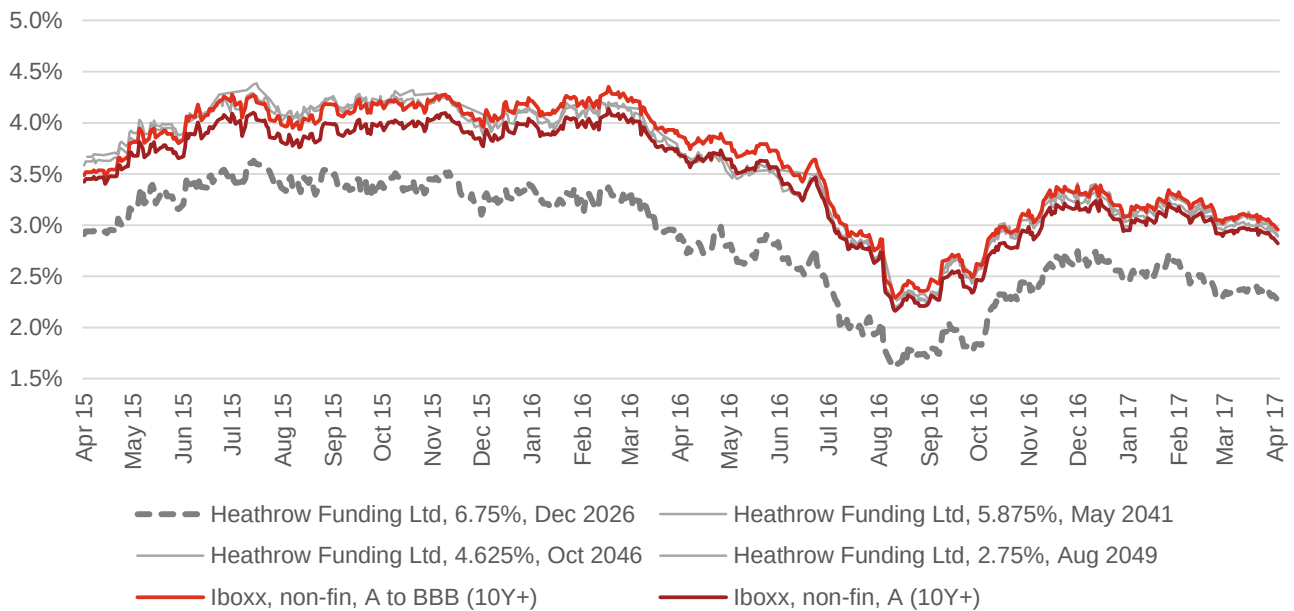


Table 4.1 spread of HAL bonds to iBoxx by time period

	Apr.15 – Mar.16	Apr.16 – Mar.17	Aug.16 – Oct.17
Spread of HAL yields to iBoxx (A and BBB)	-1bps	-9bps	-4ps

Source: Thomson Reuters, Heathrow debt information

Note: August 16 to March 2017 time period chosen as the issuance of the 2.75%, August 2049 bond impacted the average spread

- 4.9 The second piece of evidence is to contrast the ‘remaining life’ of the iBoxx benchmark to years to maturity on HAL’s bond issuances. This is to test for any material maturity mismatches between the benchmark and HAL’s actual financing. Figure 4.2 below shows the expected remaining life of the benchmark index, which changes over time as the constituents in the index evolve. As shown, the expected remaining life in years of the benchmark has averaged approximately 19 years since 1998, and has fluctuated within the range 17 years to 22 years.
- 4.10 This compares to an average years to maturity at issuance of 18 years on the outstanding bonds of HAL (as at October 2017).⁴² We therefore find consistency between the bonds used in our benchmark analysis.

⁴² Based on 29 HAL senior debt ISINs available at October 2017 (source: Heathrow, Thomson Reuters).