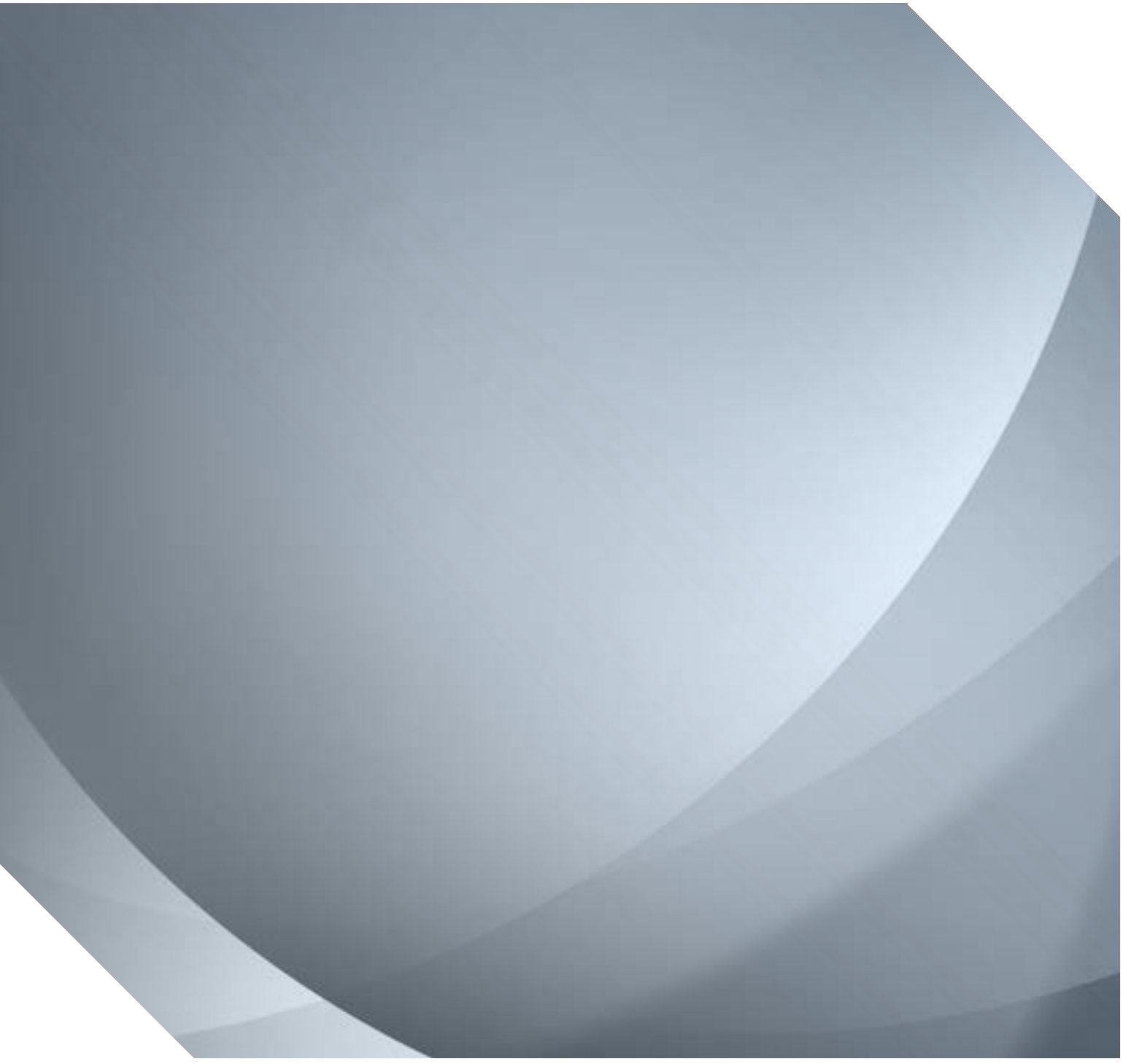
Estimating the cost of capital: a technical appendix to the CAA's Final Proposal for economic regulation of Heathrow and Gatwick after April 2014

CAP 1115



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Regulatory Policy Group

CAP 1115

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CHAPTER 1
Summary

1.1 The CAA proposes to use a pre-tax real[1] weighted average cost of capital (WACC) of 5.6% for Heathrow Airport Limited (HAL) and 5.95% for Gatwick Airport Limited (GAL) for Q6.

1.2 The CAA's final proposals are slightly higher than the CAA's April 2013 initial proposals of 5.35% and 5.65% respectively. This is primarily due to an increase in the cost of debt assumption.

1.3 The WACCs for both airport operators have reduced compared to the Q5 settlement[2] of 6.2% for HAL and 6.5% for GAL. This mainly reflects reductions in corporate tax and the cost of debt compared to the previous settlement (2008/9 to 2013/14).

Approach

1.4 The CAA's approach to the WACC continues to assume notionally financed airport operators. The financing structure should remain the responsibility of the regulated company. The regulated companies and their shareholders should bear the risk of highly leveraged structures (or gearing above the notional gearing assumptions).

1.5 The CAA assumes gearing (debt to regulatory asset base (RAB)) of 60% for HAL (Q5: 60%) and 55% for GAL (Q5: 60%).

1.6 The CAA's approach was a combination of a careful assessment of the individual components of the WACC estimation and a top-down assessment of the WACC. Evidence was taken in the round by the CAA to reach its proposals for the point estimates for the WACC.

[1] All figures in this document are expressed in pre-tax real (i.e. inflation adjusted) terms unless otherwise stated.

[2] The Q5 headline WACC was 6.2% (HAL) and 6.5% (GAL), but the figures applied to the RAB to derive the actual capital charge were reduced to 6.01% and 6.3% respectively owing to the airport operators' ability to reinvest returns within the year. A similar automatic adjustment has not been made for Q6; instead the concept has been taken into account as one factor when deciding the point estimates within the range.

Cost of equity

1.7 The cost of equity is estimated using the Capital Asset Pricing Model (CAPM). The post-tax cost of equity estimate for HAL is unchanged from Q5 at 7.33%. The CAA has not been persuaded by HAL's arguments that its equity is significantly riskier than was the case for the Q5 settlement; nor has the CAA been persuaded by the airlines' argument that HAL's equity is less risky than implied by the Q5 settlement. Among the evidence the CAA has used to inform its judgement on the cost of equity are other European airports' betas and other UK regulated sectors' betas and WACCs.

1.8 The CAA's estimate of the WACC does not include a specific uplift for skewed equity returns, something HAL had argued for. For example, HAL considered that similar to other investments it suffers in recessions but, relative to other investments, it cannot benefit when the economy is doing well owing to capacity constraints. The CAA has carefully considered the evidence presented by stakeholders and its own advisers and concludes that it would not be appropriate to include a specific uplift for skewed equity returns. The evidence presented by HAL is not conclusive and depends on which time period is chosen for the data. The CAA also notes that if it were to make an adjustment for skew, it would also need to make a corresponding reduction to the relative level of risk (beta) owing to the fact that the same structural feature (excess demand over capacity) drives both.

1.9 The post-tax cost of equity estimate for GAL is slightly lower at 7.42% than Q5 (7.87%). The lower gearing assumption (Q6: 55%, Q5: 60%) is partially offset by the CAA edging up slightly to recognise slight increase in risk faced by GAL since it was divested from BAA.[3] As a consequence, the reduction in gearing increases GAL's WACC by around 8 basis points (bps) compared to Q5.

Cost of debt

1.10 The CAA's estimate of the cost of debt recognises that the notionally financed airport operator would have issued debt over a number of years, but that it also will need to issue new debt during Q6. The CAA

[3] By mechanically applying the lower gearing to the cost of equity the WACC would have remained broadly unchanged, which was not the intention of the slightly lowering the gearing assumption. To capture a slight increase in risk the CAA has slightly increased the asset beta compared to Q5.

has therefore taken into account a range of evidence on the cost of debt, including historical rates and current rates. The CAA has included an allowance for fees. The CAA proposes a cost of debt of 3.2% for both airport operators. This compares to a cost of debt in the initial proposals of 2.9% for both airport operators. The difference mainly relates to the CAA using longer run averages (and placing less weight on very recent market evidence),[4] some technical changes to the way the CAA's consultants have estimated bond yields, an allowance for debt platform costs and taking into account different assumptions for the split between embedded and new debt. Compared to the Q5 settlement, the cost of debt has been reduced by 35bps from 3.55%. .

1.11 Having carefully considered the potential advantages and disadvantages, the CAA does not propose to introduce debt indexation for Q6. Debt indexation is the automatic update of the cost of debt within the control period for market movements. The CAA does not consider that the benefits of debt indexation for the regulated airport operators in Q6 are significant enough to outweigh the disadvantages, costs and risks.

[4] The CAA's consultants have also used more up-to-date data - June 2013 for PwC's updated report, compared to March 2013 cut off for the initial PwC report.

CHAPTER 2
Introduction

2.1 This document sets out the CAA's reasoning for its assessments of the WACCs to apply to the Q6 price settlements for HAL and GAL. Unless otherwise stated this document refers to the pre-tax real WACC.

2.2 This document should be read in conjunction with the final proposals for HAL and the final proposals for GAL, both published at the same time and available from the CAA's website.

2.3 The CAA has continued to engage PricewaterhouseCoopers (PwC) to provide independent expert advice and all cost of capital related submissions have been shared with PwC. This document should be read alongside PwC's three reports.[5]

- Estimating the cost of capital for designated airports, a report prepared for the Civil Aviation Authority (CAA), September 2013; (the updated PwC report).
- Estimating the cost of capital for designated airports, a report prepared for the Civil Aviation Authority (CAA), April 2013; (the initial PwC report).
- Cost of capital for UK Designated Airports, Paper on the split cost of capital and skewed returns - prepared to the Civil Aviation Authority, April 2013.

2.4 The remainder of this document is structured as follows.

- Chapter 3 considers **methodological issue** including whether adjustments need to be made for **skewed equity returns**.
- Chapter 4 considers whether it is appropriate to introduce **debt indexation**.
- Chapter 5 sets out the **overarching comments** received.

[5] All available from the CAA's website http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

- Chapter 6 assesses **gearing** and the appropriate value for the cost of debt.
- Chapter 7 assesses **risk** and the appropriate **cost of equity**.
- Chapter 8 draws together the preceding chapters and assesses the appropriate **WACC** value.

CHAPTER 3

Methodological issues

3.1 This chapter considers the basic framework and skewed equity returns. Debt indexation is discussed in Chapter 4.

Basic framework

WACC and CAPM

3.2 The initial proposals concluded that, consistent with previous reviews and other regulated sectors, a WACC was the appropriate basis for estimating the cost of capital and that the two elements of the cost of capital were the cost of debt and the cost of equity. Furthermore, the most appropriate basis for calculating the cost of equity was the CAPM.

3.3 No respondents suggested a departure from this approach, and hence the CAA concludes that the WACC continues to be the most appropriate way to assess the cost of capital and the CAPM framework is the most appropriate way to assess the cost of equity.

3.4 HAL thought that the 'standard' CAPM should be modified or extended to take into account 'skewed' equity returns.[6] This specific issue is discussed in more detail below.

3.5 GAL thought that its evidence suggested that its returns were more negatively skewed than those of HAL and that this implied a greater uplift to the CAPM-based cost of capital for GAL.

Split cost of capital

3.6 The initial proposals concluded that it was not appropriate to adopt the split cost of capital for Q6.[7] The CAA did not receive any subsequent

[6] Equity returns are the returns earned by shareholders in the form of dividends (income) and share price appreciation (capital growth).

[7] The split cost of capital assumes that the RAB is a long-term relatively risk-free asset, in contrast to the development of new capital investment and the operation of the airport, which are inherently riskier. The split cost of capital proposes that the RAB can be fully debt-funded and should, therefore, attract a relatively low cost. The capital base required to support capital expenditure and operating expenditure is riskier and should attract the cost of equity. A fuller

responses in favour of adopting the split cost of capital. The CAA proposes not to adopt the split cost of capital for Q6.

Accounting rate of return

3.7 The accounting rate of return (ARR) is a concept that recognises that within a year returns can be reinvested, and therefore in order to earn the WACC by the end of the year, a lower cost of capital (called the ARR) should be applied to the RAB. The ARR was used in previous quinquennia and is used in other, but not all, regulated sectors.

3.8 In the initial proposals, the CAA noted that since the WACC was ultimately a judgement within a plausible range of outcomes, formulaically applying the adjustment might result in spurious accuracy. However, the CAA continued to consider that there was an argument for the use of the concept of the accounting rate because returns that are earned throughout the year can be reinvested. The CAA noted that it was, therefore, something the CAA expected to take into account when judging where in the range to adopt its initial proposals for the WACC.

3.9 The CAA did not receive any responses in respect of its proposed approach to the concept of the ARR. The CAA therefore proposes to take into account the concept when assessing the point estimate for the WACC in light of the range it has identified (discussed in Chapter 8).

Skewed equity returns

3.10 Negatively skewed equity returns would mean that compared to other investments, an airport operator has more downside risk than upside potential. For example, the airport operator would suffer in recessions, but not be able to benefit when the economy is doing well.[8] If

explanation can be found in the initial proposals.

[8] The CAPM assumes that share returns have a normal distribution. This distribution is symmetric, with equal chances of the same upside gain and downside loss. Because of this symmetry, risk can be fully described by the standard deviation (or equivalently by the variance). Professor Ian Cooper, on behalf of HAL, argued that when returns are not normally distributed, the CAPM is an incomplete model. Skewness means that the upside potential of a company's shares is different to their downside risk. Positive skewness means that upside potential is greater than downside risk, and negative skewness means that downside risk is greater than upside potential. In particular, Cooper argued when there is significant skewness of returns the standard deviation (and consequently the CAPM beta) is no longer an adequate description of risk. Furthermore, Cooper argued that skewness matters because it affects the desirability of an investment

skewness exists and is material, investors with well diversified portfolios are concerned about the coskewness of the investment relative to the market generally.

Initial proposals

3.11 The initial proposals set out the representations made by HAL, GAL and British Airways (BA), along with the advice from the CAA's own independent study by PwC, on whether or not the CAA should make a specific adjustment to uplift HAL's and GAL's cost of equity to reflect negatively skewed equity returns. The CAA concluded that it was not persuaded to make such an adjustment, and among other things, placed weight on PwC finding no conclusive proof of asymmetric risk and the argument that downside risks can partially be mitigated by the airport operator. For example, the airport operator could make its cost base more efficient and flexible. The CAA also considered that, even if HAL or GAL had negatively skewed equity returns, it is not clear it would materially change the estimated WACC.

Responses

HAL

3.12 HAL stated that the CAA had failed to take account of the evidence for the impact of coskewness of equity returns.

3.13 HAL stated that the executive summary in CAA's initial proposals misrepresented HAL's case; the initial proposals suggested that the downside risks were shocks such as ash clouds. HAL stated that its concern with asymmetric risks:

- was not in respect of 'shocks', which were correctly dealt with by taking their expected future impact into account in the demand forecasts, and whose residual risk is largely diversifiable; but
- was that the correlation between the asymmetry of returns faced by HAL and the asymmetry of returns faced by investment markets in general (in another word coskewness).

3.14 It was the coskewness element of asymmetric risk that could not be diversified in a market portfolio, and so, in HAL's view, must be taken

to investors and, hence, the cost of equity. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

into account in the cost of capital.

3.15 HAL provided reports by NERA[9] and Europe Economics[10] that explained the asymmetric feature of HAL's equity returns were unlike those of other regulated utilities which meant that the standard CAPM was inadequate in application to HAL. HAL stated that NERA's analysis concluded that asymmetry is largely driven by systematic risk (particularly passenger forecasts).

3.16 HAL noted that coskewness was the way that it was able to benefit, or lose out, in the respective upturns and downturns in economic activity and how the airport operator's value changed asymmetrically with improving or worsening prospects for the wider economy and consequently market equity returns. HAL considered that the underperformance of passenger volumes in Q4 and Q5 was an illustration of the asymmetric risk to which it was exposed: HAL failed to meet its Q5 passenger forecasts in part due to the economic recession. The Q5 forecast made an expectation, based on expert views across the airport community at the time, that passenger numbers were able to expand to the levels forecast. HAL considered the economic recession of 2008 to 2009 played a role in those expectations not being met, and had the world turned out differently, and that recession been a boom, the chances of HAL significantly exceeding that forecast were very limited because of the capacity constraints on the airport and the only limited upside available was increased load factors.

3.17 HAL noted that the CAA raised a number of objections to including an allowance for coskewness in HAL's cost of capital, none of which, in HAL's views, was valid.

- No conclusive proof of asymmetric risk. HAL noted that, although PwC found no evidence in the period from 1987 to 2006, PwC did find evidence in the period from 2001 to 2006 (precisely the period, in which HAL considered Heathrow to be capacity constrained). HAL noted that its own analysis came to the same conclusion –

[9] NERA: A Review of the Risk Assessment in the CAA's Initial Proposals for Q6. A Report for London Heathrow 10 June 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

[10] Europe Economics: Response to PwC Arguments on the Cost of Capital for Q6. Report for Heathrow May 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

asymmetry, and more specifically coskewness, was empirically evident from 2001. HAL considered that the hypothesis that the CAA should be testing is whether coskewness existed in the capacity constrained period of from 2001 to 2006 – not the period from 1987 to 2006.

- Incorporating coskewness into the CAPM was challenging due to the need to modify the equity risk premium (ERP) and beta. HAL considered that, while it is true that the CAPM needed to be modified to incorporate coskewness, there was now a very well established body of academic work to show how this could be done in a rigorous way. HAL noted two approaches: the 'Harvey and Siddique' approach (using this method the uplift to the cost of equity would be in the region of 0.8% to 1.4%); and the 'Kraus and Litzenberger' approach, used in the Europe Economics report[11] (which would lead to an uplift in the region of 1.3%). Furthermore, HAL noted that PwC calculated that, based on the 2001 to 2006 period, the uplift to the cost of equity would be 0.9%.
- In response to the initial proposals, which suggested that HAL could make its cost base more efficient and flexible, HAL made three points.
  - HAL considered that this criticism demonstrated a misunderstanding of risk: the efficiency of HAL's operations would affect the level of its equity returns but was irrelevant to the variability or risk of those equity returns.
  - HAL considered that it would always have an incentive to make its cost basis flexible so that it could respond to variations in demand and optimise its cost position within the quinquennia. HAL also considered that a fully flexible cost base was not necessarily efficient.
  - HAL considered that there were limits to how far the overall cost base (other than operating expenditure) could be made flexible given that an airport operator would always have a large fixed cost base. HAL estimated that its operational costs were

[11] Europe Economics: Response to PwC Arguments on the Cost of Capital for Q6. Report for Heathrow May 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

approximately 80% fixed in the short to medium term, and total costs were over 90% fixed when depreciation and the return on the RAB were included. HAL concluded that it was unrealistic to suggest that asymmetric risk could be mitigated by making the cost base entirely variable to short, medium or even long term fluctuations in demand.

- HAL considered that PwC concluded that other revenue sources (e.g. commercial revenues) would be symmetric. HAL stated that this was not true because commercial revenues (and indeed virtually all of HAL's revenues sources) were primarily driven by passenger numbers, which were at the heart of the coskewness of HAL's equity returns. It stated that it was true that expenditure per passenger would show symmetric variation with the economic cycle, but the fact that passenger volumes were negatively coskewed meant that virtually all revenue streams would be similarly coskewed.

3.18 HAL noted that PwC criticised the use of passenger numbers and cashflows as unsatisfactory proxies for financial equity returns, and this led PwC to use the available market data on BAA's equity returns. HAL considered that PwC's analysis showed that coskewness was evident in the period 2001 to 2006 (the only period when HAL was capacity constrained, and for which market data on equity returns are available). Using this data, HAL noted, was consistent with the CAA's approach of basing the Q6 beta on the Q5 estimate from the 2001 to 2006 BAA equity returns data. HAL concluded that if the CAA is to accept the Q5 beta estimate, which was based on analysis of HAL's equity returns in the period up to 2006, then it must also accept the estimate of coskewness derived from the same data.

3.19 Europe Economics contended that the coskewness of airports in general, and HAL in particular, had risen since the last price control, and that rise in coskewness was regarded by investors as unattractive.

3.20 Examining the period after 2006, HAL suggested that the CAA should examine equity returns from other large airports such as Frankfurt, (HAL noted that Europe Economics showed that coskewness has increased) - or other measures for HAL such as passenger numbers or cashflow. HAL noted that although PwC criticise the use of these measures they were nonetheless useful cross-checks for trends in coskewness of equity returns. Furthermore, HAL noted that the

increase in coskewness shown by these measures since 2006 must be indicative of the increase in coskewness of financial equity returns. In HAL's view, the impact of coskewness estimated by both Europe Economics and PwC (0.9%) for the period 2001 to 2006 must, therefore, be a lower bound.

GAL

3.21 Oxera considered that its analysis indicated that, in the period beyond Q5, GAL could face a distribution of profitability that is negatively skewed around the central forecast of the business. In Oxera's view this was a consequence of negatively skewed outcomes for demand, and the operational leverage generated by fixed costs and investments. In order to quantify the effect of the negative skew that is relevant to the cost of capital for GAL, Oxera estimated the coskewness coefficient for the three London airports, suggesting that returns at GAL were more asymmetric than at HAL and STAL.

3.22 Oxera also considered that the asymmetry in GAL's returns was also indicated by its underperformance against regulatory assumptions on the cost of capital every year since 2004. If GAL's returns were symmetric, it would be expected to outperform in some years and underperform relative to regulatory assumptions in other years. GAL's persistent under-recovery against the CAA's assumption suggests that the distribution of revenues and profits is asymmetric.

3.23 Oxera noted that quantifying the impact of skewness on the cost of capital entailed addressing a range of empirical challenges. In its view, adopting a point estimate for the cost of capital at the top end of the estimated range was a practical way to recognise the evidence that suggested that GAL faced a negatively skewed range of commercial outcomes.

BA

3.24 BA noted that HAL, through its consultants, has argued that it faces asymmetric risk for which it should be rewarded. BA characterised HAL's argument, as being that as HAL was full, it only faced downside risk with limited or no opportunity for upside risk, and that this meant that the WACC should be significantly higher than the WACC for Q5 or indeed WACCs set by other regulators. BA did not agree that HAL was full, with average load factors of around 75%, and so there was significant potential for upside

3.25 BA considered that should an asset (i.e. equity shares in HAL) have no upside (i.e. only downside risk), it was 'almost the textbook definition of debt'. As debt has continued to be cheaper than equity, in the case of only downside risk the WACC and charges should be lower.

3.26 BA also put forward evidence from Cambridge Economic Policy Associates (CEPA)[12], which it said showed that 'third moment' analysis, such as that proposed by HAL, is a theoretical curio – almost impossible to implement, and with an effect so small that it was hard to distinguish from noise in the calculation.

LACC

3.27 London (Heathrow) Airport Consultative Committee (LACC) noted that the analysis presented on the skewness of equity returns in equity markets (Europe Economics 2013 and Cooper 2011) was not convincing. LACC noted that it was not possible to observe skewness or otherwise in equity market returns of HAL as it was not separately listed. Adjustments to the cost of capital based on assumed skewness relied on the use of a large number of modelling assumptions which did appear, as noted by CEPA, to be debatable and not consistent with best regulatory practice.

Independent advice from PwC

3.28 PwC in its updated report for the CAA continued to consider that it was not appropriate to make a specific additional allowance for skewed equity returns. PwC's updated its analysis of asymmetric risk and equity returns and considered:

- whether the post-2000 period was as relevant as HAL suggested (given HAL's argument that the airport became capacity constrained in 2000); and
- the relationship between coskewness and the beta.

3.29 On the evolution of capacity related issues, PwC considered that this was not as stark as HAL portrayed, for example, PwC noted that:

[12] BA's response to the initial proposals http://www.caa.co.uk/docs/78/BAApr13.pdf and the CEPA report to which it refers: Setting the Weighted Average Cost of Capital for Heathrow and Gatwick in Q6 http://www.caa.co.uk/docs/78/CEPAAirportWACCEstimates.pdf.

- there have been some form of capacity constraints at HAL since 1990 (for example as reflected in a gradual switch from short-haul to long-haul traffic); and
- investors ought not to be influenced just by current operational constraints but also by what they foresaw in the future.

3.30 The value of an investment today depends on investors' expectations of the future. Once investors start to expect 'something ' (e.g. tightening capacity) could happen in the future it affects the performance of the shares, and as the 'something' becomes more certain the affect on the shares is greater. Therefore, given these forward-looking expectations, capacity constraints should be factored into share performance before the capacity constraints actually bite.

3.31 PwC considered that even if capacity constraints started in 2000, this should have influenced shareholder expectations and return requirements in the preceding period (implying relevance of positive coskewness estimates prior to 2000). Moreover, investor views on mechanisms through which capacity constraints might be alleviated in the future (e.g. by use of larger aircraft, higher load factors, new terminals, a third runway, etc) were also likely to affect the underlying coskewness. Therefore, PwC did not agree with HAL to specifically focus on the post-2000 period when analysing coskewness estimates.

3.32 PwC noted that the interaction of capacity and excess demand would affect beta and skewness. In particular, tightening capacity reduced demand risk (i.e. reduced the beta) and also increased negative coskewness. PwC's cross-sectional analysis of coskewness and beta suggested that, on average, higher betas tended to be associated with zero (or low but positive) coskewness estimates (for example as was the case at the time of Q5 decision). In comparison, periods of low negative coskewness, on average, generally tend to be associated with low betas. PwC noted that this was largely consistent with historical evolution of coskewness and beta, where they have generally tended to increase or decrease in tandem. PwC did not find negative coskewness associated with an asset beta above 0.45, therefore the beta estimate proposed by the CAA of 0.5 for HAL is too high to be associated with negative coskewness.

3.33 Using its estimates of BAA's beta and the coskewness co-efficient over the period 1992 to 2006, PwC also estimated a second moment

CAPM (only beta risk) and a third moment CAPM (beta risk and an allowance for coskewness). Broadly speaking, the second moment CAPM led to a higher cost of equity before 2000, the third moment CAPM led to a higher cost of equity after 2000 and over the whole period they were on average broadly equal.

3.34 PwC used its long-run ERP (5%) to show that the HAL specific risk premium for both the second moment and third moment CAPM ranged from 3.1% to 5.7%. Adding this to PwC's long-run risk-free rate (RFR), the post-tax cost of equity for both the second moment and third moment CAPM ranged from 4.7% to 7.3%. This evidence was consistent with PwC's estimate of the post-tax cost of equity.

3.35 Overall, based on the additional analysis and evidence presented in its initial report, PwC did not consider an asymmetric risk uplift to be appropriate.

Discussion of the issues

3.36 PwC's initial work for the CAA's initial proposals suggested that there was possibly negative coskewness in the period between 2000 and 2006 and this coincided with the period in which, in HAL's view, capacity was tightening. However, the CAA has considered the issue and concludes that investors' expectations of capacity constraints and therefore the effect on equity returns is complex and not as clear cut as HAL's submission might suggest. Because share prices capture investors' forward-looking expectations, if capacity constraints started in 2000, this should have influenced shareholder expectations and return requirements in the period before 2000 – i.e. it would be expected there would be some evidence of negative coskewness before 2000. However, in the period before 2000 BAA's equity returns demonstrate positive coskewness.

3.37 The CAA also concludes that beta and coskewness are likely to be driven by the same factor (excess demand over fixed capacity) and therefore as capacity tightens, one would expect the beta to fall and negative coskewness to increase, other things being equal. PwC estimated the risk premium for HAL taking into account beta only (second moment CAPM) and beta and coskewness (third moment CAPM). This analysis showed that the post-tax cost of equity was ranged from 4.7% to 7.3%. Because of the commonality of factors driving beta and coskewness, there appears, in fact, no difference in

the end result. The CAA is proposing to use a post-tax cost of equity of 7.3%, which is at the top of this range.

3.38 PwC did not find negative coskewness associated with the BAA asset beta above 0.45, therefore the beta estimate proposed by the CAA of 0.5 for HAL is too high to be associated with negative coskewness.

3.39 The CAA therefore concludes that it would not be appropriate to maintain its current beta estimate and make an adjustment for coskewness. If the CAA were to include an allowance for coskewness it would be appropriate to reduce the beta.

3.40 The CAA considers that there is insufficient merit in including an allowance for skewness and reducing the beta. PwC's estimates of the third moment CAPM suggest that on average over the long-run they were within the margin of accuracy of the second moment CAPM and that there is benefit in a consistent approach with previous control periods.

3.41 Oxera noted that GAL had not earned its cost of capital in any year since 2004 and that this indicated asymmetric risk. The CAA notes that in the early control periods (before 2004) the airports generally earned returns in excess of the cost of capital.

3.42 HAL considered that there was now a very well established body of academic work to show how the CAPM could be modified to incorporate coskewness in a rigorous way. The CAA understands that other regulators have not made such adjustments and that PwC is not aware that such adjustments are made when the WACC is used in other practical situations such as business valuations.

3.43 Taking all these factors into account in the round, the CAA proposes not to include an additional allowance for coskewness of equity returns.

CHAPTER 4

Indexation of the cost of debt

Initial proposals

4.1 The CAA sets a cost of capital that includes a cost of debt assumption. In Q5 and previous quinquennia, the cost of capital and its components were fixed, ex-ante, for the quinquennia. An alternative approach (called indexation) is for the cost of debt and therefore the cost of capital to be updated in line with market movements during the control period.[13] Indexation could take the form of a transparent, automatic annual update to the cost of debt. The pre-determined mechanics of the automatic update could use market data such as benchmark indices.

4.2 The initial proposals noted that Ofgem had recently introduced debt indexation for its eight-year control periods. Ofgem's model took a simple average of A and BBB rated benchmark indices and deducted an inflation estimate based on government gilts. From this information a rolling 10-year historical average was calculated. No adjustment was made for fees. Each year the price cap is updated for changes in the rolling average.

4.3 In the initial proposals the CAA noted that the arguments for and against indexation were finely balanced. Arguments in favour noted that:

- it might reduce the incentive on the regulator to aim up in its estimate of the cost of debt to protect against market movements;
- it would enable the costs of cheaper finance (or more expensive finance) to be passed through to passengers as markets moved; and
- it would encourage the regulated company to continually finance itself efficiently rather than just take the opportunity to lock-in gains

[13] The cost of equity is often considered to be a long-run estimate and relatively unmoved by markets in the shorter run (i.e. during the quinquennium). In contrast the cost of debt is considered to be more dependent on short-run market conditions which can change during the quinquennium.

by issuing debt at the start of the control period.

4.4 Concerns over the introduction of debt indexation were:

- whether airlines or passengers could manage the risk better than the airport operator and therefore would it lead to an increase in risk;
- whether the mechanism could be in place for multiple control periods; and
- whether it could be suitably designed so as to perform as intended.

4.5 In summary, the initial proposals noted that greater uncertainty over future yields during the price control period (whether that was due to a longer price control period or to increased market uncertainty) would suggest that the benefits of the mechanism might outweigh the costs, with the opposite being likely if uncertainty was low.

4.6 In the initial proposals the CAA also noted its intention to explore the issue further before its final proposals.

Responses

HAL

4.7 HAL was not opposed to debt indexation, provided that an appropriate index was identified to accurately reflect the costs of HAL's efficiently incurred debt. Although Ofgem had adopted debt indexation, HAL noted that other regulators (for example Ofwat and the Office of the Rail Regulator (ORR)) had been more cautious.

4.8 HAL considered that the CAA should be cautious about moving to debt indexation in a hurried manner at the end of the Q6 determination process, without a full analytical basis. HAL thought it may make sense to monitor various indices during Q6 and run a yearly shadow analysis of what would have happened under different mechanisms. This would enable the CAA and stakeholders to look at the practicality of the proposed schemes, and fully evaluate the impact on incentives for cost minimisation.

4.9 HAL noted that debt indexation aimed to reduce risks for airport operators by allowing pass-through of relevant market debt rates and that if airlines and/or passengers were better able to deal with risk this would be a good policy.

4.10 HAL disagreed that debt indexation would avoid blunting incentives in a situation where the airport operator was making an 'arbitrage profit' from debt costs falling below the settlement level. It considered that it would always have the incentive to cost minimise regardless of the base level of profit (or loss) that it makes.

4.11 To reduce risk, HAL considered that a number of issues would need to be addressed:

- the CAA would need to provide assurance that, over the course of a number of quinquennia, the indexation regime would be applied consistently in those periods where interest rates were expected to rise, as in those where they were expected to fall;
- the CAA would need to take a view that, over the long term (many quinquennia), airlines were in a better position to absorb interest rate risk than HAL; and
- there would be a number of significant challenges to the construction of the control index:
  - how it would reflect the pattern of HAL's new debt requirements, both historically (if an embedded approach were to be adopted) and in the future. The latter would need to take a view on the capital expenditure requirements for the next 30 years or so, reflecting the average useful life of HAL's assets; and
  - what particular type of corporate bonds (sector, tenure and risk rating) would be included in the index.

4.12 HAL considered that if debt indexation were to be adopted by the CAA, it would require the following characteristics:

- reflect the 10 to 15 year average maturities of HAL's actual debt;
- the weighting in the historical averaging would reflect the actual profile of HAL's actual debt issuance;
- the level of the index would be adjusted to reflect the premium HAL's debt incurs compared to the index (e.g. because of HAL's airport risk profile) – in its view at least 60bps;
- the relationship between the chosen index and HAL's actual debt yields would need to be shown to be sufficiently stable; and

- an additional allowance would be included for HAL's efficient debt platform costs that would not be captured by the index (e.g. transactions costs and fees).

4.13 HAL also questioned whether a pass-through of the risk associated with the cost of debt would result in an unintended bias towards debt compared to equity financing.

GAL

4.14 GAL noted that as it is a smaller company than HAL, it had less flexibility to adopt a rolling refinance programme, therefore updating the cost of debt for GAL on an annual basis was unlikely to be a significant improvement to the match between allowed and the actual cost of debt. GAL considered that annual indexation was likely to increase the gap between allowed and actual cost of debt as well as introducing additional uncertainty into the price cap, creating significant complexity when determining an appropriate and objective annual index and the additional costs associated with implementing an annual update. Methodological challenges aside, GAL also considered that indexing would add uncertainty to annual airline charging levels and leave customers exposed to price increases as debt funding costs rose. In its view the case for moving to an annual update of the cost of debt for GAL was weak, and therefore GAL did not support annual indexation of the cost of debt.

Airlines

4.15 BA was in favour of indexing the cost of debt and commissioned CEPA to prepare a note[14] on the subject. CEPA's paper set out in detail the benefits of indexation and how the index could be constructed and applied.

4.16 CEPA considered that the main benefits from indexation were:

- the index would more accurately track actual debt costs, given that the allowance would move to reflect the cost of debt observed within a regulatory period, not set only using data from the period preceding the price control review. This accuracy would reduce the risks faced by both airport operators and consumers (airlines and their customers);

[14] Note on a Cost of Debt Indexation approach for Q6 Note prepared for British Airways June 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

- indexation would better serve the CAA's duties of protecting the interests of passengers and cargo and ensuring the financeability of airport operators. In its view this meant that passengers, would not end up paying more than necessary when rates fell, and that when rates increased the airport operator would remain financeable; and
- as the regulator places greater weight on the risks of under-investment as opposed to over-investment, by aiming up in the absence of indexation, the regulator had included headroom within the cost of debt to account for unexpected rises. CEPA cited work by Brealey and Franks (2009)[15] that calculated that the headroom for Stansted Airport Limited (STAL) in the last price control was 73bps on the risk-free rate relative to the index. In addition, CEPA noted that Ofgem set out that network companies had been able to issue debt at coupons 58bps below the corresponding spot rate on the cost of debt indices.

Figure 4.1: CEPA's proposed approach

Source	Proposal
Tenor of debt	3-5yr/7-10yr/15yr+
Averaging period	10yrs
Credit rating	Broad A/ Broad BBB
Data source	iBoxx
Deflation	10yr breakeven inflation
Current real cost of debt	2.50%
Current average life of assets	12.4yrs

Source: CEPA
Note: as of May 2013

4.17 HAL reviewed CEPA's proposed approach and expressed the following concerns:

- HAL's debt historically required yields above the proposed iBoxx indices. NERA found that between 2008 and 2012 HAL's sterling bonds averaged a premium of 80bps to CEPA's proposed iBoxx benchmark index. HAL considered that the fact that the difference narrowed in recent months simply showed that the relationship was

15 Oxford Review of Economic Policy, Vol. 25, Issue 3, pp. 435-450, 2009.

unstable and could not be relied upon for the whole of Q6;

- the maturities of HAL's debt did not match the equal weightings of 3 to 5-year, 7- to 10-year and 15+ years proposed by CEPA;
- HAL's debt requirements were lumpy, making the 10-year trailing average an incorrect proxy; and
- CEPA's proposals ignored debt platform costs (e.g. transaction costs).

4.18 The LACC considered the issues around indexation and concluded that:

- if airlines were strongly in favour of the benefits of indexation; and
- understood and were prepared to bear the costs of it (which are that if interest rates rise aeronautical prices would automatically rise without a regulatory intervention); then
- it can be argued that the presumption should be in favour of indexation unless there is strong evidence against.

4.19 The ACC supported indexation because of what it saw as 'headroom' (aiming up) in the existing approach.

Independent advice from PwC

4.20 In its updated report PwC noted that, as set out in its recent report for Ofwat,[16] it considered that there were both benefits and costs associated with indexing the cost of debt. Whilst it could provide more clarity and transparency on the cost of debt allowance within regulatory determinations over a sustainable period, it also transferred market wide debt financing risks from companies to customers, who were less able to manage such risks. Moreover, the approach might reduce overall incentives for companies to minimise financing costs. Overall, whilst PwC noted that views on the appropriateness of debt indexation approach vary, it did not consider it to be appropriate for airports for Q6.

Discussion of the issues

4.21 Since the initial proposals the CAA has further considered the appropriateness of indexing the cost of debt.

[16] See for example http://www.ofwat.gov.uk/pricereview/pr14/rpt_com201307pwccofc.pdf.

4.22 The CAA considers that a significant benefit of indexation is its ability to reflect market movements during the control period and therefore take into account information that is not available to the regulator at the time of the determination. On the assumption that the index is correctly designed, this would lead to a more accurate price control.

4.23 Furthermore, by keeping in place the same indexation model for multiple periods, the CAA would bring increased certainty to future price determinations. In effect, the cost of debt would no longer be a topic for consideration at each review.

4.24 The CAA notes that by introducing a debt indexation model that reflects an efficient approach which treasury management might be expected to replicate, passengers would only pay the efficient cost of debt.

4.25 The CAA has reviewed Ofgem's approach, and notes that one of the main motivations for indexation is that Ofgem regulates many companies in different energy markets whose control periods are not all aligned. Furthermore, Ofgem has recently increased the length of the control period to eight years. In contrast, the CAA currently regulates three airport operators and NATS (En-Route) plc (NERL). The control periods are all approximately five years long and approximately co-terminus. The CAA considers that some of the benefits would not therefore be realised in the aviation sector.

4.26 Without pre-judging the likely form of price control at GAL or NERL, both have RABs in the region of £1 to 2 billion, which have not generally been financed on a rolling basis. It is not clear that a standardised approach would be appropriate for aviation as it is to energy, and therefore the benefits to aviation might not be as great as the benefits to energy. The CAA could tailor its approach to each airport operator and NERL.

4.27 The CAA considers, therefore, that GAL is unlikely to be able to benefit from debt indexation (i.e. it is unlikely to decrease GAL's risk). Therefore, it does not appear to pass risk from GAL to passengers (via the airlines) but rather increase risk for passengers without materially reducing the risk for the airport operator. This would increase total risk which, ultimately paid by passengers, is unlikely to be in the passengers' interests at GAL.

4.28 The CAA notes the concern of HAL in the design of the indexation model. As well as the choice of the bond indices, time period and method of averaging, the model would need to include inflation estimates.

- Some of HAL's concerns appear to be directing the CAA towards matching the indexing model closely to HAL's actual financing. For example, HAL considered that the historical weightings should be matched to debt actual issuance. The CAA noted that it assumes a notional financial structure and that the weightings should reflect the debt requirements of the notionally financed airport operator. The CAA considers that while it is important to select the appropriate indices, the appropriate time period and the appropriate weighting in the averaging method, it might be appropriate for these to differ from HAL's actual financing. If the CAA were to introduce debt indexation it would not imply a policy change away from the notional capital structure assumption.
- The CAA sets a real cost of capital while corporate bond benchmark indices estimate nominal yields and therefore an inflation assumption is required. In theory benchmark yields reflect investors forward-looking expectation of inflation and therefore a forward-looking estimate of inflation is required. Ofgem uses the difference between government index-linked gilts (ILGs) and nominal gilts to estimate forward-looking inflation. The CAA is concerned that specific issues in the gilts market and in particular the relatively small ILGs market risks producing 'incorrect' inflation estimates[17]. While the CAA could step in to make corrections, this would be inconsistent with the idea that indexing the cost of debt becomes mechanical and provide certainty over how future allowances would be calculated. An alternative approach to inflation would be to use actual, historical inflation (measured on a monthly basis). While pragmatically this might be a solution, conceptually, this backward looking measure is not consistent with the forward-looking inflation expectations in bond yields.

4.29 The CAA considers that for the benefits of debt indexation to be

[17] These rate the same issues which mean that regulators are generally wary of simply setting the risk-free rate as equal to index-linked gilt yields. Often cited examples include market segmentation over certain maturities driven by pension regulation.

achieved it would need to aim to keep in place the same mechanics over more than one control period. The CAA is concerned that in the event of significant capex after Q6 (for example arising from the Airport Commission's recommendation on capacity), the CAA would need to reassess the mechanics to ensure that the cost of debt allowance reflected the lumpy nature of debt issuance arising from the lumpy nature of capex.

4.30 If uncertainty creates a tendency or incentive for the CAA to aim up when fixing the cost of debt for the control period, it could also create a tendency or incentive for the CAA to aim up in its design of the mechanism. When designing the mechanism, in almost every aspect[18] there would be a choice or judgement to be made. Some options might lead to a higher expected cost of debt than other options. There is no certainty that introducing an automatic mechanism would reduce any tendency or incentive to aim up.

4.31 The gearing assumption is integral to the estimation of the cost of debt allowance. Gearing is an important credit metric for ratings agencies, and all other things being equal, materially higher gearing is likely to be associated with a lower credit rating and a higher cost of debt. An approach, which indexed the cost of debt but enabled the CAA to adjust the gearing assumption at subsequent reviews might not fully create multi-period certainty. While the cost of debt expressed as a percentage might be mechanically calculated by the indexation model, the monetary value would still be in the control of the CAA through its gearing assumption (i.e. the amount of debt to which the percentage is applied). On the one hand the flexibility could be seen as an advantage, because it would give the CAA the ability to adjust its approach in light of changing circumstances. On the other hand it could be argued that the raison d'être for indexation is that it provides certainty and removes the regulator's judgement each control period and thus this certainty cannot be achieved unless the regulator provides some multi-period commitment to the level of gearing.

4.32 Some responses raised the concern whether indexation would increase or decrease the incentive on the airport operators to finance themselves efficiently. The CAA considers that regardless of whether

[18] For example the choice of indices, the average method, the time period, the way in which adjustments are made for inflation or allowance for fees.

the cost of debt is fixed ex-ante or is indexed to market movements, the airport operator has the incentive to try and outperform the assumption because it retains the profit. Some suggested that with the current fixed ex-ante approach, the airport operators might be incentivised to fix its debt for the entire control period shortly after the price determination is made and not re-visit the issue until the next determination. The CAA has not seen any evidence of this in the airports sector. HAL has a rolling debt issuance programme, and the nature, timing and duration of STAL and GAL's financial arrangements are driven by managements' views of their needs and their recent disposal by BAA.

4.33 Having considered the evidence on balance, the CAA proposes that it would not be in passengers' interests to introduce debt indexation for the airport operators for Q6.

CHAPTER 5

Estimating the WACC - summary

Initial proposals

5.1 The initial proposals set out the representations made by HAL, GAL, BA, and the AOC along with the advice from PwC from its own independent study on the appropriate estimate of the cost of capital.

Figure 5.1: Summary of the CAA's initial proposals for the WACC

	HAL			GAL	
	Current market rates	**Long-term returns**		**Current market rates**	**Long-term returns**
Gearing	60%	60%		55%	55%
Pre-tax cost of debt	2.3 - 3.0%	2.65%		2.35 - 3.05%	2.7%
Total market return	6.25 - 6.75%	6.6%		6.25 - 6.75%	6.6%
Risk-free rate	0.25 - 0.75%	1.6%		0.25 - 0.75%	1.6%
Equity risk premium	6.0%	5.0%		6.0%	5.0%
Asset beta (number)	0.42 – 0.52	0.47		0.46 – 0.58	0.52
Equity beta (number)	0.9 – 1.15	1.03		0.9 – 1.17	1.03
Post-tax cost of equity	5.65 – 7.65%	6.73%		5.65 – 7.75%	6.77%
Tax rate	20.2%	20.2%		20.2%	20.2%
Pre-tax cost of equity	7.08 – 9.59%	8.43%		7.08 – 9.71%	8.48%
Pre-tax WACC range/point estimate	4.21 – 5.63%	4.96%		4.48 – 6.05%	5.30%
Vanilla WACC range/point estimate	3.64 - 4.86%	4.28%		3.84 - 5.17%	4.3%
Initial proposals pre-tax WACC	**5.35%**			**5.65%**	
Initial proposals vanilla[19] WACC	**4.62%**			**4.84%**	

Source: CAA's initial proposals

[19] The vanilla WACC is the pre-tax cost of debt and the post-tax cost of equity, weighted by gearing. The vanilla WACC does not include any adjustments for tax.

5.2 The main differences between the initial proposals and the Q5 decisions were the reduction in Corporation Tax and the reduction in the cost of debt. Other adjustments reflect the incorporation of the accounting rate concept in the WACC decision (rather than applying it formulaically later in modelling of the price cap calculation). The initial proposals noted that, compared to the Q5 decision the point estimate was broadly in the same place within the range.

Responses

5.3 The CAA addresses the following overarching issues along with specific issues on individual components in the remainder of this appendix.

HAL

5.4 HAL stated that the initial proposals were flawed in some instances, and in other instances ill-judged (particularly in their treatment of HAL's risk).

5.5 In relying on the PwC report, in HAL's view the CAA underestimated the cost of debt by over one percentage point - mainly through errors in calculating HAL's existing debt costs and through the use of unrealistic assumptions for future rates.

5.6 HAL also considered that the CAA's estimate of pre-tax cost of equity was underestimated by over one percentage point because it placed reliance on out of date estimates from Q5 of HAL's beta risk and ignored HAL's asymmetric risk profile.

5.7 HAL questioned the CAA's assumption that the Q5 WACC was set at the correct level. It noted that although corporate taxes had reduced and interest rates had fallen, the CAA failed to reassess HAL's equity risk in the Q6 period, or to recognise the higher debt spreads which, in HAL's view, were to be expected in Q6 compared to the historically low levels at the time of the Q5 determination.

5.8 HAL considered that evidence from market-to-asset ratios (MARs). was extremely difficult to interpret, but if anything, pointed to the materially higher risk of airport operators compared to regulated utilities.

5.9 HAL stated that the CAA's proposals assumed that HAL's risk profile was effectively the same as that of the energy transmission companies

and Network Rail. HAL considered that it was incorrect to compare HAL to Network Rail and National Grid Electricity Transmission (NGET) because these had assured revenue streams almost entirely free of volume risk. HAL considers that it had more demand risk than utilities because:

- demand forecast for airports were more uncertain; and
- unlike utilities, the price cap design for HAL did not protect them from demand risk.

5.10 HAL said that its shareholders regarded the CAA's initial proposals as totally inadequate to compensate their provision of capital and had refused to finance enhancement investment over Q6. HAL stated that in light of the CAA's initial proposals it had no choice but to revert to a £2 billion capital plan for Q6 that still enabled the airport operator to maintain compliance whilst also sustaining passenger experience, protecting current hub capacity and resilience, and improving airport efficiency.

5.11 HAL re-estimated the cost of capital to be 6.74%, down slightly from its Final Business Plan (January 2013) of 7.06%. The reduction was a consequence of a slightly lower cost of debt assumption and a slightly lower tax assumption. HAL considered that a WACC of 6.7% was the appropriate WACC for a £3 billion capex plan.

GAL

5.12 GAL stated that the estimate of WACC in the initial proposals did not reflect the level of uncertainty in current capital markets. In this context, the CAA and its advisers not only assumed a RFR which was inconsistent with the uncertainty that current low rates will persist, but dismissed inappropriately the evidence that the fundamental risk of GAL was higher than assumed in Q5. GAL's adviser Oxera continued to consider that the most appropriate estimate of the real pre-tax WACC for GAL was 7.1%.

5.13 GAL identified two over-riding concerns with the CAA's analysis and initial proposals:

- the complete disregard for the WACC impact of the increase in risk over the period since February 2006, the cut-off data for analysis of the BAA Q5 beta, which underpinned the WACC assumptions for Q5;

- the conclusion that GAL and HAL had the same cost of debt despite GAL having a lower credit rating and higher bond yields reflecting the higher risk of GAL relative to HAL. In any event, the cost of debt applied to GAL was too low.

5.14 GAL argued that the WACC proposed by the CAA was inappropriate and provided some simple cross-checks. In particular:

- the WACC for GAL had been reduced relative to that for HAL since Q5. This did not reflect the increase in risk for GAL following the break-up of BAA;
- the initial proposals implied that GAL is significantly less risky than BT Openreach, without any evidence to support this risk differential;
- the proximity of the WACC proposed for GAL to that assumed by Ofgem for electricity transmission networks did not reflect the relatively higher risk of GAL; and
- the transaction value of GAL for the sale in Q5 at 0.88 of the RAB supported the analysis of fundamental risk drivers that suggested that forward-looking risk at GAL had increased. The analysis by PwC that suggests transaction values of around 100% of RAB was incorrect.

HAL airlines

- The LACC's response states that the CAA's WACC range appeared to be largely consistent with the evidence and that the changes in the proposed cost of capital estimate compared to the determination for Q5 appeared reasonable. However, there were two important reasons why the CAA's proposed determination was likely to over-state the required returns. The equity beta used in the cost of capital estimates was based on market comparators that are dual-till in contrast to the single-till of HAL. The LACC considered that the beta of dual-till airports would be higher reflecting greater sensitivities to commercial earnings.
- The CAA 'aimed-up' in its estimate, choosing a cost of capital towards the top end of the range. The choice of where to pitch the cost of capital estimate should depend not just on capital market conditions, but also on the ability of the regulated entity to act in a way that meets or exceeds its customers' expectations. The opportunities here appeared to LACC to be substantial, and not

reflected in the CAA's determination.

5.15 BA continued to consider that the appropriate WACC for HAL was 4.5% on a pre-tax WACC basis.

5.16 In BA's opinion, the CAA's proposal of a WACC of 5.35% was indefensibly high, and would distort investment at HAL, by over-incentivising HAL to invest, and by making it harder and more expensive for the airlines to invest. BA stated that the airline asset base at Heathrow was twice that of HAL's, and argued that the adverse effects on the airlines and their passengers would outweigh the positive effects for HAL and their shareholders.

5.17 BA argued that the evidence from HAL's behaviour, the capital markets and the independent ratings agencies showed that HAL's equity beta was less than 1 and that evidence from its consultants showed that it had declined since Q5. BA considered that the CAA had not sufficiently taken into account its five investor tests.

5.18 BA also questioned the CAA's choice of 5.35% rather than the mid-point of PwC's recommendations because the underlying assumptions were generous and therefore choosing a point above the mid-point was excessively generous to HAL.

GAL airlines

5.19 The ACC's response states that there were strong arguments that GAL's cost of capital had reduced over the last five years. This recognised the fall in returns seen in global markets; the significant falls in interest rates; and the reduction in corporate tax rates. Based on this, the ACC proposes a cost of capital for GAL of 4.9%.

5.20 Virgin agreed with the CAA that the cost of capital seemed to have declined over the past five years. It also questioned whether the CAA should have chosen a point estimate in the top quartile of its WACC range, rather than the mid-point.

5.21 BA raised similar points in respect of GAL as it did HAL. BA referred to its previously submitted evidence that the cost of capital for GAL should be in the range 4.5% to 5.5%. BA also presented a narrower range 4.7% to 4.9% and suggested a mid-point of 4.8%. BA strongly disagreed with the proposed WACC of 5.65% considering it would be excessive and unbalanced, and would harm passengers' interests by reducing airport efficiency incentives, increasing air fares and harming

airline growth and investment in new aircraft, routes and frequencies.

Stakeholders updated WACC estimates

5.22 In response to the initial proposals HAL updated its WACC estimate to 6.7% (down from 7.1%) reflecting updated market evidence on the cost of debt and a slightly lower tax rate. GAL and BA did not update their WACC estimates. For completeness, Figure 5.2 sets out HAL, GAL and BA's current positions.

Figure 5.2: Summary of responses

%	HAL	GAL		BA	
				HAL	GAL
Gearing	60	55		60	60
Pre-tax cost of debt	4.13	3.2		2.50	2.50
Total market return	7.00	7.25		6.50-6.75	6.50-6.75
Risk-free rate	2.00	1.75		1.50-1.75	1.50-1.75
Equity risk premium	5.00	5.50		5.00	5.00
Equity beta (number)	1.30	1.19-1.29		0.9	1.0
Post-tax cost of equity	8.50	8.3-8.9		6.00-6.25	6.50-6.75
Tax rate	20.2	21.0*		20.2	20.2
Pre-tax cost of equity	10.65	11.2-11.9		7.52-7.83	8.15-8.46
Pre-tax WACC range/point estimate	6.74	6.8-7.1		4.51-4.63	4.76-4.88

Oxera applied a tax rate of 21% to the nominal cost of equity to calculate the tax cost, which equates to an approximate rate of 25% when applied to the real cost of equity. Oxera's analysis was undertaken before the announcement in the March 2013 Budget of the reduction in the tax rate from 21% to 20% from April 2015 onwards.

Source: HAL, GAL and BA.

Independent advice from PwC

5.23 In light of responses to the consultation and updated market evidence, PwC updated its recommendations for the value of the cost of capital. Figure 5.3 sets out a summary of PwC's updated report.

Figure 5.3: Summary of PwC's updated report

%	HAL			GAL	
	Current market rates	Long-term returns		Current market rates	Long-term returns
Gearing	60	60		55	55
Pre-tax cost of debt (50/50)	2.78 - 3.25	3.02		2.95 - 3.43	3.19
Pre-tax cost of debt (70/30)	2.97 - 3.45	3.21		3.09 - 3.58	3.34
Total market return	6.25 - 6.75	6.6		6.25 - 6.75	6.6
Risk-free rate	0.5 - 1.0	1.6		0.5 - 1.0	1.6
Equity risk premium	5.75	5.0		5.75	5.0
Asset beta (number)	0.42 – 0.52	0.47		0.46 – 0.58	0.52
Equity beta (number)	0.9 – 1.15	1.03		0.9 – 1.17	1.03
Post-tax cost of equity	5.68 – 7.61	6.73		5.68 – 7.71	6.77
Tax rate	20.2	20.2		20.2	20.2
Pre-tax cost of equity	7.11 – 9.54	8.43		7.11 – 9.66	8.48
Pre-tax WACC (50/50)	4.51 – 5.77	5.18		4.82 – 6.23	5.59
Pre-tax WACC (70/30)	4.62 – 5.89	5.30		4.90 – 6.31	5.65

Source: PwC updated report

5.24 The cost of debt is shown on two bases. 50/50 reflects the weighting of historical fixed rate debt (50%) and new debt and floating rate debt (50%). The 70/30 weighting places greater weight on the historical fixed rate debt. The WACC is also shown on both bases.

CHAPTER 6

Estimating the WACC: gearing and the cost of debt

Gearing

Initial proposals

6.1 In the initial proposals the CAA proposed that the appropriate gearing would be 60% and 55% for HAL and GAL respectively. For HAL the gearing assumption was unchanged from Q5. For GAL the initial proposals were 5% lower than Q5. The CAA considered that the difference in risk between HAL and GAL warranted a lower gearing assumption for GAL.

Responses

6.2 HAL accepted the gearing assumptions of 60%. GAL accepted the gearing assumptions of 55%, conditional on the risk of GAL relative to HAL being reflected in the cost of debt. GAL noted that based on the cost of debt assumed in the initial proposals, reducing GAL's notional gearing from 60% to 55% has perversely decreased the pre-tax WACC by 6bp, which was contrary to the expectation that the tax-adjusted WACC would be higher with more equity in the capital structure.

6.3 BA and the ACC considered the CAA's decision to lower the gearing ratio to 55% for GAL was excessively conservative and that the CAA should retain a 60% gearing ratio.

Independent advice from PwC

6.4 PwC advised that the gearing assumptions in the initial proposals remained appropriate because they were consistent with its views on the risk of the airport operators and their capacity for debt financing.

Discussion of the issues

6.5 The CAA continues to consider that the different risk profile between the two airports warrants different gearing assumptions. The notional capital structure approach continues to ensure that financing is a matter for the company, and investors bear the cost and risk of an

inappropriate financial structure.

6.6 The CAA notes the airlines' concerns that at the CAA's 55% gearing assumption is excessively conservative. The CAA also notes that GAL's actual gearing is approximately 60%, and a 5 percentage point margin between actual gearing and notional gearing clearly shows that the choice of financing is for the company and that it bears the risk. Furthermore, the CAA notes that gearing reflects the underlying risks of the business (both systematic risks and non-systematic risks). The discussion on the beta shows that systematic risks of the two airports are different. The non-systematic risks highlighted by GAL also suggest that a slightly lower gearing assumption than Q5 and HAL is appropriate.

6.7 The appropriate gearing assumptions need to strike a balance between ensuring a robust notional capital structure and an efficient notional structure from which the benefits can be passed to passengers.

- A gearing figure which is too low means that passengers do not benefit from the airport operators ability to issue debt (which is cheaper than equity).
- A gearing figure which is too high means that unless the regulated company can match the gearing assumption it cannot match the WACC. This could encourage an inappropriate risky financial structure and make it difficult for the CAA to protect passengers from the negative consequences of that structure.

6.8 A high gearing assumption might only be achievable if the CAA also assumed that its notionally financed airport operator provided its creditors with credit enhancements such as granting creditors with security over assets and other contractual ring fence conditions. Assuming security over assets would be inconsistent with and could frustrate the Department for Transport's policy that it would want to see a movement to a regulatory ring fence over time (including the prohibition of granting security over assets).

6.9 Ultimately, the choice of gearing is a matter of judgement. The CAA places some weight on the status quo to avoid unnecessary uncertainty. However, GAL's relative risk exposure is higher compared to HAL, specifically with respect to exposure to demand

risk, implying a relatively smaller capacity for debt financing. The systematic element of the relatively higher risk can be seen in the higher beta assumption for GAL compared to HAL.

6.10 The CAA sees no merit in changing the gearing assumptions from the initial proposals.

Final proposals

6.11 The CAA proposes to use gearing of 60% and 55% for HAL and GAL respectively.

Cost of debt

Initial proposals

6.12 The cost of debt consistent with the initial proposals WACC was 2.9% for HAL and GAL.

Reponses

HAL

6.13 For the cost of debt, HAL stated that PwC and CAA underestimated the cost of debt by over one percentage point because, in its view:

- PwC underestimated the cost of HAL's existing debt by 30bps;
- PwC's estimation focused on a single point in time (30 March 2013) which was significantly lower that previous years;
- PwC's approach was overly reliant on forward rates and did not fully consider how Quantitative Easing (QE) was distorting the market. Furthermore, PwC's forward market adjustment was based on an erroneous relationship and underestimated the cost of debt by 40bps;
- PwC's overall approach deviated from the Competition Commission's (CC) most recent WACC determination (Bristol Water, 2010);
- the split between existing debt and new debt was arbitrary;
- the estimation of issuance costs was flawed and ignored market data (HAL estimated that this would adds c30bps to the cost of debt); and

- the CAA's financeability tests were inconsistent with the cost of debt.

6.14 Combining all these points, HAL estimated that the appropriate cost of debt was 4.1%.

GAL

6.15 GAL estimated the appropriate cost of debt for Q6 to be 3.2%, and considered that the CAA's estimate was too low (2.35 to 3.05%). GAL stated that HAL and GAL should not have the same cost of debt, highlighting the following:

- although GAL has less debt than HAL relative to the RAB, GAL has a lower credit rating on senior debt (BBB+ compared with A-). GAL considered that the CAA had given no recognition to the rating differential despite PwC acknowledging that it existed;
- the spreads on GAL debt in the market were 30bps wider than equivalent HAL debt;
- GAL had a smaller and less regular issuance programme, which significantly increased the costs of issuance (as a proportion of the capital raised) compared with HAL;
- the balance between embedded and new debt was incorrect given GAL's Q6 investment aspirations, with more weight needing to be given to embedded debt; and
- the cost of the embedded debt was incorrectly calculated with no allowance being made for hedging costs, despite these being a requirement of the banking market to arrange debt finance at the time of issuance.

Airlines

6.16 CEPA, on behalf of BA, stated that the basis for reducing gearing from 60% to 55% and adding a premium to the cost of debt was unsound with no basis for either a lower gearing or a higher cost of debt for GAL compared to HAL. CEPA considered that GAL's size was significant enough not to require a specific small company adjustment to the level of gearing and an additional uplift for debt issuance costs.

6.17 The ACC supported the use of a floating cost of debt, indexed on market data and recommend a cost of debt of 2.5% as set out by

CEPA in its assessment of the current cost of debt under the indexation methodology.

Independent advice from PwC

6.18 PwC updated its estimate of the cost of debt in light of the responses to the consultation and more recent market evidence.

6.19 Consistent with its previous report, PwC's overarching cost of debt approach was based on both embedded[20] and new debt as well as the underlying debt arrangement and commitment fees. PwC did, however, in light of responses change the way it calculated some of the embedded debt costs (inter alia, non-sterling bonds) and used more up-to-date market data.

Embedded debt

6.20 PwC used evidence on yield to maturity (YTM) at issuance on GBP denominated bonds for HAL and GAL since Q5 to estimate the cost of embedded debt. It also benchmarked it to the traded yield on comparable BBB+/A- indices at the time. Its analysis suggested a revised range for HAL and GAL of 3.15% to 3.65% for embedded debt - which was around 15bps higher at the top end compared to its initial report (primarily as a consequence of exclusion on non-GBP denominated bonds for HAL).

New debt

6.21 For new debt, PwC continued to focus on spot[21] yield on benchmark indices (rated BBB+ and A-) and traded yields on (GBP denominated) bonds for HAL and GAL. PwC took the same approach as for its initial report but updated the calculations for more recent market evidence.

6.22 Given its focus on spot yields, PwC incorporated an adjustment to reflect likely trends in corporate debt costs over Q6, as assessed from forward rates on government bond yields, of around 70bps. To estimate the overall uplift for corporate yields to adjust for trends in forward rates, PwC combined

[20] PwC use the term embedded debt to mean the debt the notionally financed airport would have taken out before the start of Q6. It does not mean a pass-through of HAL or GAL's actual cost of debt.

[21] The spot yield is the YTM based on the spot price. The spot price is the price that is quoted for immediate settlement.

- the difference between the yield on current 10-year Government bonds and the 10-year forward rate for June 2016 which was around 90bps; and
- a coefficient of 0.8 resulting from PwC's regression analysis to determine the relationship between yields on corporates and benchmark Government bonds; to suggest
- an uplift of around 70bps (implied forward rate adjustment of 90bps multiplied by regression coefficient of 0.8).

6.23 Incorporating the 70bps expected uplift in yields on corporate, PwC estimated a real cost of new debt range of 2.2% to 2.9%[22] based on benchmark indices. This was consistent with an estimate of around 2.6% from the yields on HAL and GAL's traded bonds (1.9% plus 70bps uplift). At the top of the range this estimate was around 70bps above PwC's initial report reflecting the market wide movements and were consistent (in fact slightly above) the recent historical averages.

6.24 In deciding on the relative positioning of HAL and GAL within the proposed range for the cost of new debt, PwC also undertook some further analysis to reflect the impact of risk differential across the two airport operators on the cost of debt financing. PwC used a number of benchmarks, which suggested a difference on average of around 25bps between the two airport operators. PwC incorporated this differential through adjusting the top and bottom end of the ranges for new debt by 25bps for HAL and GAL respectively to estimate a cost of new debt range of 2.20% to 2.65% for HAL and 2.45% to 2.90% for GAL.

Overall cost of debt before fees

6.25 Combining the embedded debt and new debt in equal proportions implied a real cost of debt range of 2.68% to 3.15% for HAL and 2.80% to 3.28% for GAL (excluding an allowance for fees). This compared to 2.2% to 2.9% for HAL and GAL in PwC's initial report and reflected:

- the broader movements in yields on corporate bonds since the publication of the initial proposals including updating its forward-

[22] Estimated as 1.5% to 2.2% plus the 70 basis point uplift. Note: PwC estimated the regression in relation to nominal bonds and then subsequently apply the uplift to real estimates.

looking adjustment (+c10 to 20bps);

- the amendments proposed in PwC's underlying analysis following the commentary from various stakeholders, most notably the method of estimation of the cost of non-GBP denominated bonds for HAL (+c10bps); and
- in respect of new debt only, to reflect the differences in risks between the two airport operators, bringing down the top of the range for HAL by 25bps and bringing up the bottom of the range by 25bps for GAL.

6.26 PwC noted in its assessment that for GAL the CAA might consider alternative weightings for embedded and new debt, as the timing of debt issuance was driven by the CC's decision on splitting up BAA group and the airport operator did not have any debt financing needs for Q6. For HAL, PwC considered that the choice of weighting was a judgement for the regulator and presented the effect of alternative assumptions.

6.27 The CAA notes that HAL's RAB is forecast to remain relatively constant over Q6 and therefore new debt will only be required to replace maturing debt. Assuming an average maturity of 10 years (consistent with HAL's actual finance), means that on average 25% of debt will need to be replaced during Q6 for the notionally financed airport operator. This is rounded up slightly to reflect the idea that some existing debt is floating rate debt. Therefore an alternative assumption of 70% existing fixed rate debt (for simplicity called embedded debt) and 30% new debt and floating rate debt (for simplicity called new debt).

Figure 6.1: PwC's estimate of the cost of debt excluding fees

	HAL	GAL
50% embedded/50% new	2.68% - 3.15%	2.80% - 3.28%
70% embedded/30% new	2.87% - 3.35%	2.94% - 3.43%

Source: PwC report

New issue premium

6.28 PwC did not incorporate an explicit allowance for new issue premium (NIP) – other than the allowance already reflected in the YTM at issuance used for the purpose of estimating the cost of embedded

debt. The YTM at issuance reflects the actual fixed coupon payments that the issuer will have to make compared to the actual proceeds. It therefore automatically includes any premium that the issuer might have to pay. Once the bond is in the secondary market, the YTM does not affect how much the issuer has to pay on the existing bond because that is a fixed coupon. (The YTM from the secondary market reflects how the market views the issuer and give an approximate indication of how much the issuer might have to pay if it were to issue new bonds).

6.29 PwC did not discern any significant difference between the yields to maturity on issuance of HAL and GAL bonds to benchmark indices at the point in time at which HAL and GAL bonds were issued. This evidence on HAL and GAL's bonds suggested they have been efficiently financed compared to underlying benchmarks and PwC considered that conceptually any difference in yields on existing bonds and the new issue would be transitory and corrected within a short span of time in the secondary market to reflect the arbitrage opportunity (and hence implicitly partially reflect the NIP).

Fees

6.30 PwC continued to use a 10bps allowance for other debt arrangement and commitment fees reflecting the book-runner fees paid to banks on bond transactions and other related fees paid on an on-going basis (consistent with evidence from stakeholders). Consistent with its initial report, PwC also provided a 5bps additional allowance to GAL to reflect its smaller issuance sizes and infrequent issuance program.

6.31 On the assumption of a 50/50 split between of existing and new debt PwC's overall cost of debt estimate ranged between 2.78% to 3.25% for HAL and 2.95% to 3.43% for GAL, respectively. Compared to the initial proposals the revised top of the range was 25bps higher for HAL and around 38bps for GAL.

Overall cost of equity

6.32 On the assumption of a 70/30 split between of existing and new debt, PwC's overall cost of debt estimate ranged between 2.97% to 3.45% for HAL and 3.09% to 3.58% for GAL, respectively. Compared to the initial proposals the revised range was 45bps higher for HAL and around 53bps higher for GAL.

Figure 6.2: PwC's estimate of the cost of debt including fees

	HAL	GAL
50% embedded/50% new	2.78% - 3.25%	2.95% - 3.43%
70% embedded/30% new	2.97% - 3.45%	3.09% - 3.58%

Source: PwC report

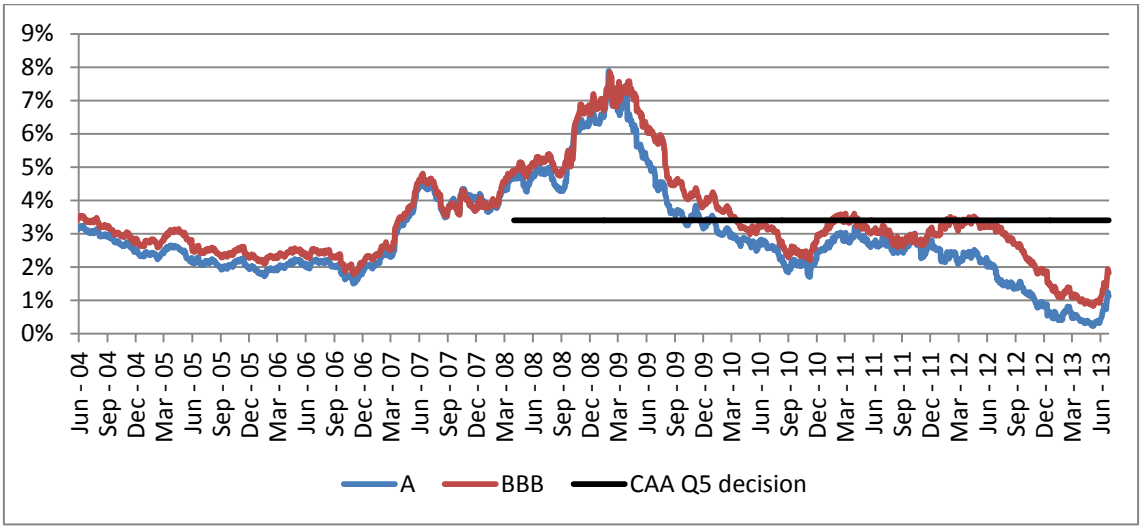
6.33 The CAA notes that increasing the weight placed on embedded debt from 50% to 70% increases the cost of debt by 15 to 20bps.

Discussion of the issues

Understanding recent market conditions

6.34 In addition to the responses to the consultation and PwC's report the CAA has also reviewed some of the underlying market data.

Figure 6.3: A and BBB benchmark bond indices[23] (real[24])



Source: CAA analysis based on data supplied by PwC.

6.35 The market data shows that in the period up to mid 2007, A and BBB rated real[24] corporate bond yields were on average approximately 2.5%. Yields then markedly increased and peaked at around 8% and averaged approximately 5% over a 2-year period before falling back down to average just below 2.5%. More recently (the 9 months up to

[23] Bank of America Merrill Lynch index for sterling, non-gilts,10 to 15 year maturity, redemption yields for A and BBB rated bonds.

[24] After deducting inflation. The daily inflation estimate was derived from the a simple average of daily difference between nominal and index-linked gilts for 10 and 15 year maturities.

June 2013) yields have been below 2%.

6.36 The CAA notes that the Q5 cost of debt allowance of 3.4% (before fees) was consistent with actual benchmark yields over the Q5 period to date. The average of the A and BBB bond rated indices between 1 April 2008 and 30 June 2013 was 3.39%.

6.37 The CAA noted in its initial proposals that current market interest rates were low. HAL noted that the Q5 decision was also made at a time of low interest rates. The CAA has calculated average real debt yields for A and BBB rated bonds for the periods preceding the Q5 decision and now.

Figure 6.4: Average of A and BBB benchmark indices (real) for selected time period

	'Before Q5' Up to 31 March 2008	'Current' Up to 30 June 2013	Reduction (percentage point)
1 year period	4.05%	1.32%	2.73
2 year period	3.15%	2.14%	1.01
3 year period	2.86%	2.28%	0.58

Source: CAA analysis based on data supplied by PwC.

6.38 The data shows that the period leading up to the Q6 review can be characterised as a lower interest rate environment than the period leading up to the Q5 review, although the precise result depends on the period over which the comparison is made.

6.39 Based on the analysis above, the CAA concludes that the Q5 decision appears broadly correct in hindsight. The CAA also concludes that the current environment is characterised by lower interest rates, compared to the period preceding Q5.

Estimating the cost of debt

Benchmark indices

6.40 Some respondents were critical that PwC had placed too much reliance on spot data at March 2013 in its initial report. These criticisms were two-fold:

- March 2013 was not representative of typical market conditions and therefore a poor basis on which to forecast debt costs (notwithstanding the forward-looking uplift); and

- that placing reliance on a single data point (rather than some sort of longer average) was inappropriate.

6.41 In respect of the first point, PwC has updated its work and used a June 2013 spot rate. In respect of the second point, PwC included in its analysis some longer run averages. Table 8.2 of PwC's updated report shows that the spot rate on 27 June 2013 is higher than the 6-month, 1-year and 2-year averages. More importantly, the CAA has used evidence on longer run average benchmark yields in its final proposals to reduce the dependence on the choice of data cut-off date.

6.42 PwC estimated the average real[25] yield on benchmark indices for A rated and BBB rated bonds. These varied between 1% to 3.4% for A rated and 1.7% to 4% for BBB rated bonds. The lower end of the ranges reflected the latest 6-month average and the higher end of the range reflected the 5-year average. June 2013 spot rates were within, but towards the bottom of, these ranges at 1.5% (for A rated bonds) and 2.2% (for BBB rated bonds).

HAL and GAL's actual bonds

6.43 HAL and GAL have raised finance through the issue of corporate bonds. From discussions with HAL, bondholders and debt analysts the CAA understands that the sterling market is not sufficient for HAL to meet all its actual financing needs. Furthermore, those discussions also suggested that it is unlikely that the sterling market would be sufficient for the CAA's notionally financed HAL (60% gearing, c£8bn debt). In contrast, the CAA understands that the sterling market is probably sufficient for GAL's actual and notional debt requirements at the moment.

6.44 A view has to be formed on the likely cost of non-sterling bonds for HAL. One approach would be to take the YTM of non-sterling bonds issued by HAL and add currency swap/hedging costs. (PwC's initial report did not include the swap/hedging costs and therefore underestimated the cost of non-sterling bonds). An alternative approach is to assume that the all-in cost of non-sterling bonds is the same as the cost of sterling bonds. The logic here being that HAL would issue bonds in whatever market was the cheapest and

[25] PwC assumed inflation of 2.8%.

therefore, the cost of bonds, once the swap/hedging costs are taken into account should be approximately the same in all markets into which HAL issues. Hence the cost of the sterling bonds are used as an estimator of the cost of non-sterling bonds.

6.45 PwC and the CAA have used HAL and GAL's actual bond data as a source of evidence. However, it does not mean that the actual cost of debt is a pass-through, nor does it mean that HAL and GAL will always get an allowance to cover their embedded debt costs. Rather, it is useful actual market data on the investors' required returns for airport assets.

6.46 PwC has compared yields to maturity on issuance of HAL and GAL's actual bonds to benchmark indices and has shown that they are broadly equal. This provides two useful pieces of evidence. First, it enables the HAL and GAL's bonds to be used as evidence (i.e. they are not obviously inefficient) and second it provides useful evidence on new issue premia (discussed below).

6.47 However, caution still needs to be applied when using the actual bonds. Compared to the CAA's notionally financed airport operators, HAL and GAL have more complex financial arrangements with security and other credit enhancements and achieve a higher level of gearing. As noted above, HAL's actual gearing is around 78% and this would suggest that at notional gearing of 60% the cost of debt might be lower for the notionally financed airport operator than HAL's actual bonds suggest. (For GAL the actual gearing of 62% is closer to the notional gearing of 55%).

6.48 PwC estimated the YTM on issuance on HAL and GAL sterling bonds to be in the range of 3.15% to 3.65% real. The low end of the range was driven by recent bonds with a maturity of less than five years while the higher end reflected older and longer maturity bonds.

6.49 PwC also estimated the YTM on the bonds in the secondary market over the past 2 years. Depending on the time to maturity and the period over which PwC averaged these real yields they varied between 1.3% and 2.4% for HAL and 1.2% and 2.4% for GAL. June 2013 spot rates were broadly in the middle of these ranges at 1.8% for HAL and 2.0% for GAL.

Incorporating a forward-looking adjustment

6.50 To estimate the forward-looking cost of debt PwC combined spot rates (from benchmark indices and HAL and GAL's actual bonds) with a forward-looking adjustment. PwC estimated this adjustment by examining the forward curve derived from government bonds and the relationship between government and corporate bonds. PwC estimated the uplift to be 70bps.

6.51 Combining the forward adjustment of 70bps with the spot rates from benchmark indices gave PwC a forward-looking cost of debt of 2.2% to 2.9% and combining it with HAL and GAL bonds gave forward-looking cost of debt of 2.6%.

Notional debt portfolio

6.52 The CAA's approach to calculating the cost of debt assumes that an efficiently financed company issues debt over a number of years. The average remaining maturity on HAL's bonds is around 10 to 12 years and is slightly longer for GAL. However, any bank debt would generally have a shorter maturity of around five years.

6.53 In the CAA's Q5 STAL decision, a split of 50/50 between historical fixed rate debt, and historical floating rate and new debt was assumed. Making a simplifying assumption such as this reflects the CAA's approach to set a simple notional capital structure rather than a complex structure such as those seen at HAL and GAL.

6.54 However, in response to initial proposals, both HAL and GAL thought the CAA should give greater weight to historical fixed rate debt. The benefit of CAA's 50/50 assumption is its simplicity. However, there is merit in considering the appropriateness of a different weighting. For example, if the RAB is constant over the Q6 (e.g. HAL), debt has a 10-year life and all historical debt is fixed rate then the appropriate split might be 75/25 in favour of historical debt. However, taking into account a small proportion of floating rate debt the CAA therefore considers that a 50/50 split and a 70/30 split are the limits of a suitable approach to blending. Given the 50/50 split produces a lower cost of debt than 70/30, the CAA concludes that it should at the bottom of its range, use a 50/50 split and at the top of the range use a 70/30 split.

6.55 GAL has also noted that the current financial arrangements, their timing and maturity are a direct consequence of the regulatory

decision to break-up BAA. The CAA would normally consider that the actual financing is a matter for the company and specific issues such as this need not be taken into account in the WACC estimate. However, given that the GAL disposal arose from the CC's market investigation there is some merit in GAL's argument. However, the timing of the disposal was a matter for the owners (it was sold before the CC reached its decision), the choice of financing (i.e. acquisition financing replaced in due course by bonds and bank debt) and the tenor of that financing was to a large extent at the discretion of management. This discretion can be seen by a comparison to the sale and financing of STAL. STAL was sold as part of the same regulatory decision, but sold three years later than GAL. Manchester Airport Group has financed STAL from a group perspective with corporate bank debt. While some of these differences may reflect the different nature of the asset, they also reflect choices by management.

HAL/GAL differential

6.56 The underlying business risks differential between HAL and GAL (as noted in Chapter 7) also affects the level of gearing and the cost of debt. The CAA has selected a notional gearing structure that has a gearing ratio of 55% for GAL compared to 60% for HAL. This difference in gearing reflects but might not fully capture the difference in underlying business risks. For example, HAL's financing achieves a rating of A- at gearing of 67%[26] while GAL achieves a rating of BBB+ at actual gearing of 62%.

6.57 The CAA considers that it could also be appropriate for GAL to receive a slightly higher cost of debt than HAL to reflect this. PwC estimated that this difference is 25bps and applied this to the cost of new debt only. The CAA considers applying 25bps to only new debt might be appropriate because:

- in part the difference in risk is captured by the gearing differential; and
- a comparison of yields between HAL and GAL showed it to be less than 25bps and possibly 14 to 15bps.

6.58 However, there is also evidence to suggest that the GAL cost of debt should not be higher than HAL for example:

[26] HAL also achieves a rating of BBB at gearing of 78%.

- the financeability assessments do not suggest a significant difference;
- GAL's embedded debt is cheaper than HAL's (see Figure 6.6); and
- GAL's advisers Oxera estimated that the appropriate cost of debt including fees for GAL was 3.2% (and this is not inconsistent with PwC's estimate for HAL).

6.59 The CAA concludes that while there are theoretical reasons why GAL's cost of debt should be higher than HAL's, in practice GAL's actual cost of embedded debt is lower than HAL's. The CAA concludes therefore that the allowance for HAL and GAL's cost of debt (including fees) should be the same.

INFLATION

6.60 When converting nominal yields to real yields PwC assumed an inflation rate of 2.8%. The CAA has examined inflation forecasts from a variety of sources including the Office of Budgetary Responsibility, Consensus Forecasts and HM Treasury's survey of independent forecasters, which suggest that RPI inflation over Q6 is expected to be in the range 3.0% to 3.4%. Furthermore, the CAA's price cap modelling assumes inflation in the region of 3.0 to 3.1%. Therefore, the CAA considers that there are reasons to expect that inflation could be more likely to be above PwC's assumption than below it (c10 to 20bps). The CAA has taken this into account when assessing the appropriate point in the range for the cost of debt.

ADDITIONAL CAA ANALYSIS

6.61 The CAA has undertaken some additional analysis of PwC's data to cross-check PwC's range. The CAA has analysed bond indices and actual HAL and GAL bonds.

6.62 The CAA estimated the cost of debt using the CC's Q5 STAL approach. The CAA has used the underlying data from PwC's updated report on average real yields of A and BBB rated bond indices to provide evidence as to the cost of debt. The one year average is used to represent the floating and cost of future new debt and the 9 year average is used to represent the historical fixed cost of debt. If these were combined 50/50 the blended average would be 2.0% to 2.6% and if combined 70/30 in favour of historical debt then the blended average would be 2.5% to 2.9% (before fees).

Figure 6.5: Real cost of debt estimated from historical averages

	1 year average to June 2013. Used to estimate historical floating rate and new debt	9 year average to June 2013. Used to estimate historical fixed rate debt	Overall cost of debt blended	
			50/50	30/70
A	1.1%	2.9%	2.0%	2.5%
BBB	1.8%	3.4%	2.6%	2.9%

Note: Daily inflation assumption derived from gilts.[24]

Source: CAA analysis of data provided by PwC.

6.63 The CAA has used the YTM at issuance on outstanding HAL and GAL bonds calculated by PwC to provide evidence as to the cost of debt.

Figure 6.6: Average real yields to maturity on issuance of HAL and GAL bonds for bonds which were in issue at June 2013

%	HAL	GAL	Overall
Investment Grade			
A-	3.1	-	
BBB+	-	2.9	
BBB	3.7	-	
Weighted average investment grade	3.3	2.9	3.2
Sub-investment grade	3.3		
Weighted average - all grades	3.3		3.2

Note: the CAA has estimated the real yields by deducting 3% inflation from PwC's estimate of the nominal yields.

Source: CAA analysis of PwC report.

6.64 The CAA notes that the YTM on HAL's actual bonds is 3.3% and on GAL's actual bonds is 2.9%. Ordinarily, the CAA would expect the sub-investment bonds (BB) to have a higher YTM than the investment grade bonds (BBB), it is therefore somewhat surprising that it appears HAL's sub-investment grade bonds (BB) were issued at a yield lower than some of its investment grade bonds (BBB). This apparent anomaly could be explained by timing of issuance.

6.65 Figure 6.5 suggests that the historical fixed rate debt of a notionally financed company with a credit rating of BBB would cost 3.4%. The CAA notes that this is slightly more than HAL's embedded debt cost

(3.3%) and this suggests that an embedded debt allowance in this region is appropriate and reflects the mid-point in PwC's estimate of HAL's embedded debt costs.

6.66 The CAA notes that GAL's actual embedded debt costs are 2.9% and that this is below the 3.4% historical fixed rate debt of a notional company with BBB rated debt. This can probably be explained by the timing of the issuance and the slight different in rating.

6.67 Considering the costs of HAL and GAL's actual debt (2.9% to 3.3%) and the longer run averages for A and BBB bonds rated bonds (2.9% to 3.4%), the CAA concludes that the cost of historical fixed rate debt is in the range 2.9% to 3.4%. The CAA notes that GAL's actual cost of debt is slightly lower than HAL's probably due to the timing of the issuance. The CAA therefore concludes that the appropriate point estimate for historical fixed rate debt is 3.3% for HAL and 3.1% for GAL, and that this should represent 70% of the notional debt portfolio.

6.68 PwC estimated that the cost of new debt and floating rate debt was in the range 2.2% to 2.9% and that GAL's cost was likely to be slightly more expensive (c25bps). The CAA concludes that the appropriate cost of new and floating rate debt is 2.5% for HAL and 2.75% for GAL and that this should represent 30% of the notional debt portfolio. The CAA's estimate for HAL reflects the mid-point of PwC's estimate of the cost of new debt (2.6%) reduced slightly for a higher inflation forecast. The CAA also notes that this is consistent with its own 1 year average for BBB benchmark bonds (1.8% (Figure 6.5) uplifted to 2.5% by applying PwC's forward-looking adjustment of 70bps). The CAA's estimate for GAL is 25bps higher reflecting the slightly higher risk.

6.69 Combining these estimates, the CAA concludes that the appropriate cost of debt before fees is 3.05% for HAL and 3.0% for GAL. The CAA has taken into account the slightly higher risk of GAL, but this has been offset by evidence that GAL has been able to access the finance markets slightly cheaper than HAL (even when differences in credit ratings are taken into account).

6.70 The CAA notes that these point estimates sit within the ranges recommended by PwC.

NEW ISSUE PREMIUM AND FEES

6.71 The cost of debt in the initial proposals included fees of 15bps for HAL

and 20bps for GAL. The higher fees for GAL reflected the fixed cost nature of these fees being spread over a smaller debt base. In its response to the initial proposals HAL argued that the fees should be in the region of 30bps higher. PwC's updated report suggested fees of 10bps for HAL and 15bps for GAL. The reduction reflected the removal of the NIP.

6.72 There are two main areas of disagreement between HAL and PwC: NIP and debt platform maintenance costs.

6.73 The NIP reflects the observation that when issuing new debt the issuer has to offer a slightly higher coupon (yield) than the bonds already in the market. There is some economic logic to this - the more debt that is issued the greater the returns that bondholders require. Once the new bond is issued and as investors seek to arbitrage, yields on the existing bonds would be expected to increase slightly and the yield on the new bond would fall and the two will converge.

6.74 YTM on issuance of HAL and GAL bonds includes any NIP. PwC compared these YTM on issuance to the benchmark bond indices and did not discern any obvious premia. PwC has included in its estimate of the embedded cost of debt the YTM on issuance for HAL and GAL bonds. Therefore, if NIP does exist it is already substantially included in the cost of debt because 70% of the Q6 cost of debt is driven by the YTM on HAL and GAL's bonds at issuance. In respect of the remaining 30% (the new debt), the CAA considers that if any NIP exists on the new debt then it is unlikely to have a material effect on the WACC.

6.75 No allowance for NIP was made in Q5. In light of PwC's advice the CAA concludes that no further allowance for NIP is required.

6.76 Excluding the new issue premia, HAL considers that its debt platform costs are in the region of 5 to 7bps, plus a revolving debt facility of 17 to 20bps. Overall the range equates to 22 to 27bps. The CAA considers that in part this reflects HAL's complex financing structure and that the CAA's simpler notional structure would incur lower fees. PwC did not include the costs of the revolving debt facility in its cost of debt because it considered that they should be included in the finance department's operational costs and therefore covered by the opex allowance. HAL stated that these costs were not included in opex and the CAA has found no evidence to the contrary.

6.77 Taking into account evidence from the airport operators and PwC's analyses the CAA considers that the appropriate allowance might be slightly above PwC's estimate (10bps for HAL and 15bps for GAL) but not as high as HAL suggests. The CAA considers that a small contribution (c5bps for HAL and GAL) to platform costs is appropriate as even a notional company would incur them. Furthermore, the CAA considers that due to the fixed nature of some of these fees regardless of the level of debt, the allowance for GAL when expressed as a percentage and included in the cost of debt might be slightly higher than the allowance for HAL.

All-in cost of debt

6.78 PwC's updated report suggested a range for the cost of debt of 2.78% to 3.45% for HAL and 2.95% to 3.58% for GAL. The lower end of these ranges reflect the lower end of PwC's ranges and assume a 50/50 split in the debt portfolio, while the upper end of the ranges reflect the upper end of PwC's range and assume a 70/30 split in the debt portfolio.

Figure 6.7: Cost of debt range including fees

Cost of debt including fees	**HAL**		**GAL**	
	low	high	low	high
PwC range	2.78%	3.45%	2.95%	3.58%
CAA estimate				
Historical fixed rate debt (70%)		3.30%		3.10%
New debt and floating rate debt (30%)		2.50%		2.75%
Cost of debt excluding fees		3.05%		3.00%
Fees		0.15%		0.20%
Cost of debt including fees		**3.20%**		**3.20%**

Source: PwC report and CAA analysis.

6.79 The CAA notes Oxera's submission on behalf of GAL which concluded that the appropriate cost of debt including fees for GAL was 3.2%. Based on the analysis above, the CAA concurs that 3.2% is appropriate.

6.80 In respect of HAL, the CAA considers that the appropriate cost of debt is 3.2% including fees, having reviewed the evidence provided by all parties and its own analysis.

6.81 The CAA considers that these costs of debt represent the cost of BBB/BBB+ rated debt and are consistent with its financeability testing in the final proposals documents.

6.82 The CAA notes that while there might be a risk differential between HAL and GAL and that theoretically this might be reflected in the cost of debt, this is offset because GAL's embedded cost of debt is lower than HAL's. The CAA concludes that for Q6 the gearing and beta differentials sufficiently take into account the difference in risk.

CHAPTER 7

Estimating the WACC: cost of equity

Total market returns, risk-free rate and the equity risk premium

Initial proposals

7.1 In the initial proposals the CAA used PwC's recommended total market returns (TMR[27]) of 6.25% to 6.75%, its risk-free rate (RFR) of 0.25% to 0.75% and therefore an ERP[28] of 6%. The CAA also noted that these were current rates but that the PwC's current TMR was not significantly different to longer run rates.

7.2 The CAA noted that the low short-run RFR therefore did not have a significant impact on the cost of equity, and therefore the choice of current rates compared to long-run rates was more of a conceptual issue than a practical issue.

Responses

HAL

7.3 HAL used a TMR of 7%, a RFR of 2%, and an ERP of 5% consistent with its submissions before the initial proposals.

7.4 NERA noted that PwC concluded that TMR of 6.25% to 6.75% appeared to be lower than Q5 (6.8%). NERA noted that PwC's conclusion was based on a review of forward-looking evidence as well as PwC's reading of changes in regulatory precedent. NERA considered that it identified the following errors and inconsistencies in PwC's approach to estimating TMR:

- PwC appeared to misinterpret recent evidence on regulatory precedent, which led to the unjustified conclusion that there was a downward trend in regulatory allowances of TMR over time. By

[27] Instead of TMR, PwC uses the term Total Equity Returns or TER. For its purposes the CAA considers that the terms are interchangeable.

[28] Instead of ERP, PwC uses the term Equity Market Risk Premium or EMRP. For its purposes the CAA considers that the terms are interchangeable.

contrast, NERA's analysis showed that regulatory estimates of TMR had been broadly stable over the past 5 years;

- PwC's simple Dividend Growth Model (DGM) model was flawed and contained a number of well documented errors that would lead to downward biases in results; and
- PwC ignored recent published market evidence based on more sophisticated DGM models provided by Bank of England and Bloomberg which supported a figure of at least 7% for forward-looking TMR.

7.5 NERA considered its view was shared by most UK regulators who have recently set their allowances for TMR at or above 7% (for example Ofgem allowed 7.25% for TMR at its most recent RIIO GD1 and T1 review).

7.6 On behalf of HAL, Europe Economics argued that current yields on gilts did not reflect the underlying RFR, because of distortions occurring due to QE. This was because the Bank of England did not buy gilts through its QE program in order to achieve a risk-free return. Rather, it bought them to provide a monetary stimulus. This demand for gilts was in addition to the demand that would exist in order to achieve a risk-free return, and pushed up the price of gilts and therefore lowered yields. Europe Economics noted that this point has been explicitly recognised in recent regulatory determinations, which have set RFRs in excess of the gilt yield prevailing at the time.

7.7 Europe Economics estimated the RFR by using PwC's approach, but updating it for the latest market data. Europe Economics considers that based on ILGs the range was now between 0.46% and 0.90% whereas, inflation adjusted nominal yields suggested a range within 0.8 and 1.4%. The mid-point of the latter range (Europe Economics noted that PwC gave more weight to nominal gilt rate) was 1.1%. Applying a confidence error of 0.25 (consistently with PwC's methodology) Europe Economics noted would result in a RFR range of 0.85% to 1.35%. Europe Economics noticed that even the top end of the range suggested by PwC in April 2013 was below the low end range supported by the more recent market evidence.

7.8 Europe Economics considered that PwC's approach of applying an uplift to current yields given the difference between current spot and

forward yield curves might prove problematic given that the forward curve was itself calculated on the basis of the spot curve, and distortions caused by QE might have affected the shape and position of the spot curve.

7.9 NERA considered that it would be more appropriate for PwC and the CAA to take a long-run view on both ERP and RFR. NERA considered that this view has been shared by all other UK regulators who have used more long-run evidence to determine the RFR. E.g. the CC in its Bristol Water (2010) decision explicitly set its allowance above recent market evidence implied by forward rates for gilts because it considered there were biases in the gilts market affecting both the short and long end of the yield curve.

GAL

7.10 In submissions before the CAA's initial proposals, Oxera, on behalf of GAL estimated the WACC based on TMR, of 7.25%, a RFR of 1.75% and an ERP of 5.5%. In its response to the initial proposals neither GAL nor Oxera commented on these components, however in demonstrating its other concerns Oxera used the same assumptions as the CAA's initial proposals. However, the CAA has not interpreted this to mean GAL agrees with initial proposals on these components.

7.11 Using PwC's methodology, Oxera estimated the RFR to be 1.2% to 1.8% using more up-to-date market data (7 September 2013).

Airlines

7.12 Consistent with its submission before the initial proposals CEPA, on behalf of BA, continued to use TMR of 6.5 to 6.75%, a RFR of 1.5 to 1.75% and an ERP of 5%. LACC broadly agreed.

Independent advice from PwC

7.13 PwC's approach for estimating the cost of equity was consistent with its previous report; where it initially looked at evidence on TMR and then segmented these returns into component parts based on the CAPM framework (i.e. the RFR) and the ERP. PwC considered that compared to its component parts, the TMR was typically more stable over time. PwC referred to a number of different sources of evidence on the TMR, including analysis of ex-post returns, forward-looking assessments and regulatory evidence. PwC noted that since the publication of its initial report, it had not seen any new evidence on

historical estimates for TMR published by the sources quoted in its initial report, which suggested a slight decline in long-term returns over time.

7.14 In relation to forward-looking estimates for TMR based on the DGM, PwC's analysis suggested slightly higher estimates more recently but they were well within its proposed range of TMR of 5.75% to 6.75% (which are in turn consistent with a two-stage DGM analysis of 5.75% to 6.50%) – which was lower than the range for comparable TMR estimates at the time of the Q5 decision. PwC noted that this was indeed consistent with trends in historical TMR estimates. Furthermore, PwC noted that regulatory evidence continued to support a range of 5.0% to 7.0%, however, accounting for the more recent decline in TMR estimates, PwC considered that a range of 6.25% to 6.75% continued to be appropriate.

7.15 PwC analysed the component parts of the TMR under its preferred current market approach, which focussed on spot estimates implied in the current market conditions uplifted for trends in forward rates over the next 3 to 5 years, and a long-term returns based approach. PwC also cross-checked its current market approach estimates with more recent historical averages for consistency. Since the publication of its initial report, yields on 10 to 15 year maturity ILGs and government bonds had markedly increased - although the increase was more pronounced for ILGs. Analysis of RFR based on 10 to 15 year ILGs suggested a range of 0.12% to 0.40% (which was above recent 1 to 3 year historical averages) - estimated as spot estimates of -0.38% to -0.10% plus an uplift of around 0.5% reflecting the expected reversion in yields based on forward rates. Similarly, (nominal) 10 to 15 year maturity government bonds suggested a range of 0.7% to 1.3% - based on spot estimates of around 2.6% to 3.2%, an expected reversion in yields of around 90bps as some of the factors influencing current yields unwind over time and inflation adjustment of 2.8%.

7.16 Combining the evidence on ILGs and (nominal) government bonds PwC suggested a range of 0.5% to 1.0% (with a mid-point of 0.75%). PwC considered that This allowed for future increase in yields during Q6, as suggested in current forward rates. Overall, this suggested a 25bps increase compared to estimates in its initial report based on the current market approach. PwC's estimate under the long-term returns based approach remained unchanged, by these relatively small short-

term movements.

7.17 On the ERP, PwC noted that it was careful to use appropriate assumptions across its two approaches that were consistent with its underlying RFR assumptions. PwC noted that it had not seen any new evidence or empirical analysis on the ex-post ERP estimates since the publication of its initial report (across its quoted sources) – thus it considered the proposed estimate of 5.0% continued to be appropriate. On ex-ante analysis, PwC updated its applied ERP estimates based on the DGM approach which suggested a range of 5.2% (using 15 year government bonds) to 6.0% (using 10-year government bonds), around 50bps lower than its proposed estimates in the initial report – driven primarily by an increase in yield on government bonds.

7.18 Overall, PwC considered a point estimate of 5.75% as appropriate under its current market returns based approach, which was around 25bps lower than the point estimate of 6.0% used in its previous report, but when combined with its assumption on the RFR of 0.5% to 1.0% yielded a consistent TMR range of 6.25% to 6.75%. PwC considered that the decrease in ex-ante ERP estimate, whilst reflected in the downward trend in the DGM implied ERP, was to some extent also driven by the mechanical adjustment to the estimate to ensure consistency with broader market return expectations.

Discussion of the issues

7.19 The CAA notes that the estimation of the TMR, the RFR and the resulting ERP is technical and detailed. In order to supplement the submissions by stakeholders and their consultants and PwC's work, the CAA has analysed the impact of the different assumptions in aggregate. This avoids the selective analysis of individual components and focuses on the overall impact of the submissions.

Figure 7.1: Assessing the impact of different TMR, RFR and equity risk premium assumptions

%	final proposals	initial proposals	HAL	GAL	BA high	Q5 high
Total market returns	6.75	6.75	7.00	7.25	6.75	7.00
Risk-free rate	1.00	0.75	2.00	1.75	1.75	2.50
Equity risk premium	5.75	6.00	5.00	5.50	5.00	4.50
Equity beta - HAL	1.10	1.10	1.10	1.10	1.10	1.10
Equity beta - GAL	1.12	1.12	1.12	1.12	1.12	1.12
Post-tax cost of equity - HAL	7.33	7.35	7.50	7.80	7.25	7.45
Post-tax cost of equity - GAL	7.44	7.47	7.60	7.91	7.35	7.54
Difference in pre-tax WACC - HAL	0.00	0.01	0.09	0.24	(0.04)	0.06
Difference in pre-tax WACC - GAL	0.00	0.02	0.09	0.27	(0.05)	0.06

Source: CAA analysis

7.20 The analysis shows that for all the discussion and analysis of individual components, if the CAA were to use HAL's preferred TMR, RFR and ERP assumptions (rather than PwC's recommendations) the pre-tax WACC would be higher by 9bps. A similar analysis using BA's preferred assumptions would lead to a pre-tax WACC that is 4 to 5bps lower than PwC. If the CAA used the initial proposals assumptions or the Q5 assumptions, then the WACC would be 6bps higher than PwC. The CAA considers that all these differences are within the margin of accuracy of estimating the cost of equity.

7.21 This analysis shows that, while there is still significant debate around the RFR, all submissions are consistent with TMR in the range 6.75 to 7.25%.

7.22 Only GAL's estimate which uses the highest TMR of 7.25% would lead to a materially different WACC (c25bps) than using PwC's assumptions. The CAA notes that GAL's assumption is consistent with Ofgem's 2012 determination, but it would not be correct to say that there is regulatory consensus on this issue - for example in ORR's June 2013 draft determination it used a range of 6.25 to 6.75%. Ofcom is currently using TMR assumption of 6.3% (comprising RFR of 1.3% and ERP of 5%). The CAA notes that PwC examined a range of evidence including its own dividend growth model estimates, which

supported a TMR assumption of less than 7.25%.

7.23 The CAA continues to consider that a total market return in the region of 6.5 to 7% is appropriate and consistent with its Q5 decision. The CAA considers that the benefit of focusing on the TMR and taking a longer run view of equity returns provides stability in this key element of the CAPM.

7.24 The CAA notes the difficulty in estimating the RFR. Index-linked gilts markets are segmented by pensions regulation and also affected by the ongoing consequences of recession and QE. On the other hand, using long-run rates also has its difficulties as the basis for the estimation because it is not clear whether and when the economy might return to such rates. However, starting with TMR, the role of the RFR is to split the TMR into the proportion to which the beta is applied and the proportion to which the beta is not applied. The WACC is less sensitive to the RFR, especially when the equity beta is in the region of 1.

7.25 On balance, the CAA concludes that TMR is towards the top, and possibly at the top of PwC's range (6.75%). The cost of equity is relatively insensitive to any reasonable RFR and ERP assumptions as long as together they add up to 6.75%. In the cost of equity calculation, the CAA proposes to use a TMR of 6.75%, a RFR of 1%, and therefore an ERP of 5.75%.

Beta and equity risk

Responses

7.26 HAL engaged NERA to provide a review of the risk assessment in the CAA's Q6 initial proposals for HAL. NERA's June 2013 report[29] provided responses to the CAA's comments on NERA's arguments related to systematic risk and non-systematic risk in NERA's January 2013 report and provided an empirical review of the CAA's proposed relative risk ordering including a review of the cyclical volatility of outturn returns for different regulated companies.

7.27 NERA considered the CAA's representation of the treatment of systematic risk was incomplete; especially demand risk, which NERA

[29] NERA, A review of the Risk Assessment in the CAA's Initial Proposals for Q6 - A Report for London Heathrow, June 2013.

identified as the most relevant beta risk factor, was not included. NERA concluded that HAL was more exposed than other utilities due to higher correlation between demand for air transport services and the business cycle. In addition, NERA argued that the form of the price control (price cap) provided no protection from demand risk for HAL unlike other UK regulated companies. NERA noted that its conclusion of higher betas of price cap regulated companies relative to revenue cap regulated companies was well documented in the academic and regulatory literature.

7.28 NERA also considered that HAL faced other cyclical risks: pension costs, operating leverage and input price risks. NERA indicated that HAL was exposed to the cost of repairing the deficit of its defined benefit pension scheme, and HAL did not yet have a mechanism in place that allows it to pass on part of its pension costs, which were highly cyclical in nature. NERA also discussed operating leverage[30] and input price changes as potential drivers of beta risk. NERA argued that HAL was risky because of its inability to significantly change its cost base in the face of a demand shock. With regard to input price risks, NERA considered that its analysis showed that HAL was exposed to risks associated with labour, material unit costs, and capital input prices.

7.29 In addition to the cyclical risks NERA identified above, NERA also argued that the CAA ignored the effect of traffic forecasting error, which was specific to companies regulated under a price cap regime. NERA noted that its findings suggested that the unsystematic traffic forecasting error was likely to be strongly pro-cyclical even when accounting for asymmetric shocks. NERA mentioned that traffic risk had been a major contributor to HAL's overall low profitability over the past two control periods, and argued that traffic risk should be considered as a beta risk, because the length and depth of the recession has been a major factor in HAL's traffic volume performance.

7.30 NERA stated that, based on academic literature, asymmetric risks (both systematic and unsystematic risks) affect investors' return

[30] NERA use the term ‘operating leverage’ to mean the measurement as the ratio of fixed costs to variable costs. It measures the degree of 'commitment to fixed production charges' in a company's cost base.

expectation, and a premium is required to compensate investors for holding securities with negatively skewed returns.

7.31 NERA argued that there was a potential shortcoming of the CAA's methodology which relied on the CAPM, and the CAA assumed away asymmetric risks, without providing a reason that 1) the asymmetric risks do not exist, and 2) investors do not require compensation for being exposed to such risks.

7.32 NERA also indicated that the effect of return asymmetry on a regulated utilities' cost of capital has been recognised by various UK regulators including Ofgem, Ofwat and the CC.

7.33 NERA undertook a review a review of regulatory statements on relative risk as well as an empirical review of differences in outturn volatility between the different regulated sectors as a plausibility check of the CAA's relative risk ordering, presented in the CAA's Q6 initial proposals.[31] NERA argued that:

- the CAA significantly understated the beta risk faced by HAL;
- the CAA's estimate of HAL's beta was out of line with almost all regulatory decisions for UK industries; and
- HAL warranted a beta allowance that was more line with the beta allowance for GAL and NERL, rather than Network Rail and conventional utilities.

7.34 NERA stated the reasons were:

- HAL was exposed to demand risk, the most significant beta risk faced by HAL, and HAL has no explicit demand risk sharing arrangements;
- NERA's empirical analysis of the cyclicality of returns showed that returns of both HAL and GAL moved broadly in line with GDP, whereas a conventional utility regulated under a revenue cap were unaffected by the business cycle. Therefore, it was highly implausible to assume that HAL's beta was closer to a conventional utility facing no demand risk;
- Network Rail bears almost no demand risk, and derived the vast

[31] CAA – Economic regulation at Heathrow from April 2014: Initial Proposals; Figure 9.4, p.144.

majority of its income from fixed charges. NERA considered that this arrangement effectively shielded Network Rail's revenue from the impact of underlying demand volatility;

- NERL was partly protected from demand risk and revenue volatility due to its volume risk sharing mechanism. Based on the regulatory regime, HAL was exposed to significant more volume risk than NERL by definition. NERA's empirical analysis of the outturn returns does not support a significant difference in beta risk between NERL and HAL.

7.35 In response to the CAA's observation in the initial proposals that a company with gearing as high as 82% would not appear to consider itself a high risk, HAL quoted NERA's report which showed that the 10 largest regulated companies in the water sector had gearing levels which differed by as much as 26 percentage points (56% to 82%) despite the fact that the companies operated in the same sector and were therefore exposed to comparable business risk.

7.36 In respect of MARs, HAL considered that there was widespread agreement that MAR in excess of 1.0x was required in order to incentivise shareholders to reinvest in the business and forego other potentially more attractive investments. HAL set out an analysis which it considered demonstrated that MARs for recent UK regulated utility transactions have sometimes exceeded 1.0x. However, it also noted that airport operator MARs were notably lower than those for water and waste water, as well as power and gas distribution and transmission companies. To HAL, this suggested higher perceived risk, particularly demand risk (beta risk), and thus returns expectations.

7.37 HAL considered that PwC had understated the value of the comparator airport betas because it had used gross debt not net debt in the calculations.

GAL

7.38 Oxera considered that the conclusion of the CAA and its advisers that market developments since February 2006 have had zero impact on systematic risk and the WACC was not a credible interpretation of the evidence. Oxera noted that the transactions suggested a MAR of less than one, suggesting that this meant the forward-looking view of GAL is that it was riskier than implied by the Q5 WACC.

7.39 Oxera considered that PwC and the CAA had dismissed its arguments that systematic risk had increased for erroneous reasons. Oxera contended that systematic risk at GAL had increased because of demand risk and operational gearing.

7.40 Oxera calculated that traffic volatility at GAL during Q5 was more than double its level in Q4 and that this increase in volatility was greater than that at HAL or STAL. Oxera considered that the historical data was therefore consistent with an increase in risk both relative to the previous assumption for GAL and relative to the assumptions for HAL and STAL. Oxera noted that as data on Q5 volatility was not available at the time of the Q5 determination, it could not have been reflected in the disaggregation of the BAA Group beta into estimates for the designated airports.

7.41 Furthermore, Oxera considered that the risk analysis for Q5 was tied to an estimate of the BAA Group asset beta, and therefore the latest relevant date against which to assess changes in risk was February 2006, the cut-off date for estimation of the BAA Group beta. Oxera considered that at that time the prospect of the three largest London airports being in separate ownership was at best a remote possibility. Oxera thought that the range of outcomes is self-evidently wider today than in the period leading up to February 2006.

7.42 Oxera and GAL undertook a forward-looking analysis of a range of credible but low probability scenarios faced by the three designated airports over the period 2014 to 2019, to understand the range of potential outcomes for profitability. Oxera considered that this analysis suggested an increase in systematic risk for GAL of 15 to 25% relative to the period preceding Q5.

7.43 Oxera concluded that the CAA and its advisers could not dismiss the evidence on the increase in demand risk on the basis that this was known and incorporated in the asset beta estimate at the time of the Q5 review.

7.44 Oxera considered it is highly unlikely that all of the increase in risk reflected greater exposure to diversifiable risk and that GAL's asset beta was now in the same position relative to HAL and STAL as was assumed in the Q5 determination. It saw two main drivers of risk, both of which included systematic risk (as well as non-systematic risk):

- more widespread management by airlines of yields and route capacity, which redistributed systematic risk from airlines to airport operators;
- increased competition between the airport operators, which meant that there was a greater risk that the airport operators would be unable to price to the cap if faced with a negative systematic demand shock. Oxera noted published research supports a positive relationship between competition and systematic risk.

7.45 Oxera also considered that GAL's cost of capital has been increased by the heightened competitive pressure, despite being subject to regulation. Oxera considered that in an unregulated setting, the impact of competition was to increase the operational leverage of the industry and the sensitivity of profits to systematic demand shocks. Oxera considered that with a regulated price cap, greater competition meant that there was a greater risk that the regulated airport operators would be unable to price to the cap if faced with a negative demand shock. Oxera concluded that expected profitability, weighted across different scenarios for demand, was therefore lower and operational leverage was higher.

Airlines

7.46 BA noted that Europe Economics, on behalf of HAL, proposed an equity beta of 1.36 for HAL which was higher than the equity beta for BA, which, as an airline, faced more demand volatility that HAL, and would typically be expected to have higher equity beta. BA also considered that the evidence, both empirical, from HAL's behaviour, and from the capital markets and ratings agencies did not support an equity beta above 1.

7.47 BA disagreed with the CAA's initial proposals that there has been little material change in HAL's risk and therefore its equity beta is of a similar value (0.9 to 1.15) to Q5. BA contended that HAL was less risky now than in Q5, and that there have been a series of regulatory changes proposed for Q6 that either further reduce risk, and/or transfer risk from the equity beta to other parts of the regulatory settlement.

7.48 In the absence of publicly quoted UK listed airports, BA reviewed comparator airports and suggested that this showed that the equity beta has fallen, on average, by around 0.1 since the Q5 decision,

although if Copenhagen and Zurich were excluded (thinly traded and 'potentially extraordinary circumstances') the downward trend was greater than 0.1.

7.49 BA considered that the introduction of a core and development approach to capex would reduce risk.

7.50 BA considered that risk could be split into two components – risk associated with volatility; and risk associated with uncertainty. BA considered that it would be hard to conceive of a stricter test for HAL's finances than the current recession. Over this period, both HAL, and the ratings agencies have noted that HAL has performed exceptionally well. BA re-iterated the evidence that:

- HAL's earnings before interest, taxation, depreciation and amortisation (EBITDA) growth put it in the top quartile of Financial Times Stock Exchange (FTSE) non-financial companies' performance.
- in the face of the recession, the maximum reversal of HAL's EBITDA was -1.4%, significantly better than the index-weighted average of -12.3% (by comparison, BA's worse reversal was in 2009, which saw a 64.8% decline in EBITDA).
- BA concluded that it was clear from the data that HAL profitability outperformed the market when times were good and when times were bad.

7.51 BA considered that even against the perfect firestorm of the recession HAL continued to display less volatility of earnings and less uncertainty than the FTSE100. BA considered this in itself implied an equity beta of less than 1, but also implied, given that this is relatively new information to the market caused by HAL's robustness over the recession, that HAL's risk was lower now than when the WACC was set for Q5.

7.52 BA also re-iterated its five tests, and considered that the CAA had not given them due consideration. BA considered that the 'five tests' provide clear, uncontestable and independent evidence from HAL's own behaviour, the markets, and the independent ratings agencies that HAL's equity beta must be less than 1.

7.53 BA considered that the CAA was double counting demand risk, and

that allowance was given in both the equity beta and the 'shocked' passenger forecasts.

7.54 BA stated that the CAA's initial proposals were 'over-generous' to GAL with respect to the relative systematic risk. CEPA stated that there was evidence to suggest that the airport was not as risky (in relative terms) as the CAA's analysis suggested and it was not clear that GAL was significantly more risky than HAL. BA did not view GAL as a 'small' company in terms of RAB. CEPA's estimated that the equity beta for GAL is 1, reflecting reduced risks in Q6.

Independent advice from PwC

7.55 PwC's analysis of betas benchmarked Q5 beta estimates and looked at market evidence on factors that could affect the evolution of systematic risk exposure for airports as well as broader trends in comparator airport betas since then. PwC noted that it was clear that the absolute level of volatility for airports was higher during Q5 as evidenced by volatility in demand[32], this reflected inherent risk exposure for these airports from operating during a recession, however, this was also true for the wider market which went through a period of significant market volatility. PwC commented that while *absolute* risk had markedly increased over Q5, investors' view of HAL and GAL's *relative* risk positioning compared to the market had not necessarily worsened, and in fact it could be argued that it had actually improved for example as reflected in HAL and GAL's resilient performance in the challenging macroeconomic conditions during Q5.

7.56 PwC also considered a number of other factors including impact of competition and operational gearing on systematic risk profile. On the former, while this might specifically impact GAL's ability to price to the cap, PwC did not consider the impact to be material (and considered it to be a 'point-in-the-range' argument), whereas on the latter PwC had not seen any quantitative evidence of increased operational gearing in Q5.

[32] Although as set out in its initial report PwC noted that compared to the time of the Q5 decision for HAL, current ATMs were broadly comparable. ATM capacity is also unchanged. This suggested to PwC that HAL was in broadly a similar position today compared with its position in 2008. Similarly for GAL, the ATMs and passenger numbers were not significantly different from their underlying estimates at the time of the Q5 decision.

7.57 PwC's updated analysis of equity and asset betas across comparator airports was consistent with its conclusions in the initial report, in that on average the (equity and asset) betas estimates were broadly similar (even slightly lower) compared to the time of the Q5 decision. In forming an overall view on the appropriate trends in betas across comparators, PwC gave more weight to the notion of betas remaining unchanged as opposed to declining over time – as there were a number of moving parts underlying the risk benchmarking across comparator airports and HAL (such as the differences in regulatory framework which imply uncertainty in the relative positioning of risk) and GAL (differentials in approach to regulation as well as the impact of competition and restricted ability to price to the cap which potentially implies higher risk exposure). Moreover, PwC's preferred approach was still to look at the average across the wider benchmark group (as opposed to specific comparators) as, in PwC's view, it was unlikely to be distorted by any airport specific factors.

7.58 Overall, PwC continued to consider that the range for the equity and the range for the asset beta used in Q5 continued to be appropriate.

Discussion of the issues

7.59 The CAA continues to consider demand risk (also called traffic risk or volume risk) is a systematic risk and that airport operators are exposed to demand risk in a way that water and energy are not. All other risks being equal, the CAA considers that airport operator betas should be higher than the conventional revenue cap regulated companies. The CAA considers that HAL and GAL's resilient performance in economic downturn during Q5 demonstrated the limited effect of downside risks.

7.60 The CAA considers pension cost risks are largely a company specific risk, i.e. unsystematic risk. The risk can be mitigated by choice of scheme (i.e. defined contribution or defined benefit), through the airport operators' management and investment schemes, and through the choice of in- or out-sourced labour amongst other things. The CAA concludes that pension risk does not warrant a specific allowance or adjustment to the beta used in the initial proposals. Furthermore, the CAA notes that it has included pension deficit recovery costs in the opex allowance.

7.61 NERA raised the concept that traffic forecasting error (as distinct from

traffic risk) created a systematic risk for airport operators. It is difficult to ascertain whether the difference between forecast and actual traffic is a forecasting error or underlying traffic risk. Furthermore, it is not clear that traffic forecast error is related to the economic cycle, and if it is, then it is related to where in the economic cycle the CAA makes its decision - something that is diversifiable from the investors' perspective (i.e. by holding other regulatory assets which are on a different decision cycle). To the extent that traffic forecasting risk is systematic in nature, the market data on which the beta is based does probably already incorporates it.

7.62 Under the CAPM framework, investors only require compensation for bearing systematic risk. Allowance is not given for unsystematic risk, (diversifiable risk). In the initial proposals the CAA acknowledged the drawbacks of the CAPM but noted that it is widely used in commercial, finance and regulatory practices. The CAA has considered but rejected modifying in respect of the skewness of returns. Similarly in the Q5 review, the CC considered but rejected modifying it in respect of Fama & French's multi-factor model.[33] A modified CAPM can create issues such as over-fitting and time periods dependency.

BETAS OF COMPARATOR AIRPORTS

7.63 There are many different ways of calculating a beta, for example CEPA calculated 36 different betas for Fraport alone. Assumptions need to be made as to the data frequency, the time period to review, how gearing is calculated, against what market the covariance is calculated and whether or not to use a debt beta, amongst other issues. To supplement the academic and technical debate over the merits of the approaches, the CAA has sought to examine the outputs and see where the weight of evidence points. In effect this means taking averages of the different methods. In the following table the CAA has focused on Fraport, AdP and an average for nine airports (which included Fraport and AdP)[34] because taken together these appear to be the best proxies available.

[33] For example, paragraph 7, Appendix F, Competition Commissions Q5 recommendations for Heathrow and Gatwick. Found at http://www.caa.co.uk/docs/5/ergdocs/ccreport_appf.pdf.

[34] The other seven airports are Kobenhavns Lufthavne (Copenhagen), Flughafen Wien (Vienna) Flughafen Zurich, Auckland International Airport, Aeroporto di Firenze (Florence), Gemina (Rome) and Sydney Airport.

Figure 7.2: Various estimates of comparator airport asset betas

Consultant	Method	Fraport	AdP	Ave for 9 airports
PwC	net debt, spot, 28/6/13	0.61	0.63	0.56
PwC	net debt, 6m ave, 28/6/13	0.60	0.66	0.57
PwC	gross debt, spot, 28/6/13	0.53	0.59	0.53
PwC	gross debt, 6m ave, 28/6/13	0.53	0.62	0.54
Europe Economics	5yr	0.56	0.71	n/a
CEPA*	mkt cap, domestic index, 1yr	0.45	0.47	n/a
CEPA*	mkt cap, domestic index, 2yr	0.49	0.52	n/a
CEPA*	mkt cap, domestic index, 5yr	0.54	0.60	n/a
CEPA*	36 methods - average	0.51	0.51	n/a
	Simple average of above	0.54	0.59	n/a
	Average (weighting each consultant equally)	0.55	0.61	n/a

* CEPA's estimates did not assume a debt beta. To ensure consistency with the CAA's approach, the CAA adjusted CEPA numbers (c0.3 to 0.4) to take into account a debt beta of 0.1. The adjusted numbers are shown in the table.

Source: PwC, CEPA and Europe Economics.

7.64 One technical point worth further consideration because it was raised by HAL is whether gross debt or net debt should be used in the calculation of the beta. In theory a company needs access to either cash balances or an overdraft facility on demand. This means that net debt is probably the better measure. However, if a company is holding more cash than it needs to operate then this surplus cash should be ignored.[35] It can be seen from the above table that the choice of net debt rather than gross debt increases Fraport's beta by around 0.07 to 0.08. This effect is greater than that for AdP and the average of all airports. This suggests that Fraport is holding relatively more cash than other airports (where it impacts the beta by around 0.03 to 0.04) and suggest it possibly holding surplus cash. The CAA considers that the beta for Fraport probably lies somewhere between the net debt

[35] Surplus cash will depress the company beta (because it is a very low risk investment). This means that the airport beta is higher than the company beta. However, by excluding the surplus cash from both debt and equity means that gearing will increase slightly. These points work in opposite directions.

and the gross debt calculations.

7.65 PwC also calculated the beta for the nine comparator airports over a longer period. On a gross debt basis PwC estimated spot (June 2013) and 1-, 2- and 3-year average betas, which averaged for the nine airports between 0.53 and 0.55. The overall range of individual airports was 0.42 to 0.72.

7.66 PwC's preferred approach was to look at the average of all the airports, and the CAA agrees that this has merit because it reduces dependence on a single particular airport and any distortion from unique features of that airport. The CAA considers that it is also appropriate to consider whether any of the airports are likely to be better comparators than others. AdP (which owns Charles de Gaulle) and Fraport (which owns Frankfurt) are the two most obvious comparators for HAL. However, as noted in the initial proposals, these are airport groups which own other airports and in the case of Fraport a ground handling business.

7.67 PwC estimated that Fraport's beta is in the region of 0.53 to 0.55 and AdP's beta is in the region of 0.59 to 0.60.[36] The CAA notes that in the CC Q5 recommendations, the CC disaggregated BAA plc's beta of 0.52 into HAL (0.47), GAL (0.52) and all other BAA businesses (0.61), based on demand risk, riskiness of airline customers and operation leverage. It then placed a range around these to reflect the uncertainty. The ranges were 0.42 to 0.52 for HAL and 0.46 to 0.58 for GAL.

7.68 Europe Economics undertook an analysis which disaggregated AdP and Fraport betas, into service lines e.g. aviation, retail, rail etc. Europe Economics then re-aggregated these estimates for an overall HAL asset beta in the range 0.50 to 0.68 and concluded that this was consistent with its previous estimates of HAL's beta.

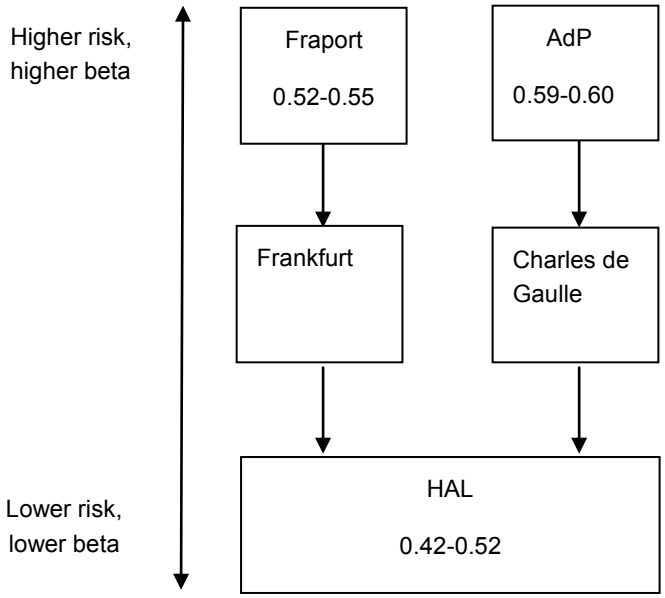
7.69 The CAA notes that this approach does not address the issue that within these groups there are different airports that are likely to face different demand risks. For example, Fraport owns or manages 13 airports in 4 continents. Fraport's statutory accounts in 2012 show that it served 188 million passengers of which 57 million (30%) went through Frankfurt. For AdP, Charles de Gaulle is one of three airports

[36] Both these ranges are consistent with the averages presented in Figure 7.6.

and comprised 61 million (69%) of the total 88 million passengers in 2012. Fraport, AdP and BAA plc all have/had in common a hub airport (Frankfurt, Charles de Gaulle and HAL) which is/was part of a wider group. For the same reason that HAL was considered the lowest risk in the BAA plc portfolio in the Q5 review, the CAA considers that Frankfurt is likely to be lower than the average risk of the Fraport group and Charles de Gaulle lower than the average risk of the AdP group because they are the hub airports in their respective groups. Therefore, the CAA considers that Frankfurt and Charles de Gaulle will have lower betas than the overall group to which they belong.

7.70 HAL considered that the price control designs at Frankfurt and Charles de Gaulle reduced those airports' risks relative to HAL because they have revenue, not price, caps. BA considered that the price control design at these airports increased those airports risks relative to HAL because they were on a dual till basis. The CAA is cautious to be overly precise about calculating HAL's beta from Fraport and AdP's beta, but considers that HAL has lower systematic risk than Frankfurt and Charles de Gaulle because of the strong demand for HAL coupled with it operating closer to capacity; a position which is consistent with the CAA's discussions with aviation sector investors. This relationship can be captured in the following diagram.

Figure 7.3: HAL's beta in relation to Fraport and AdP



Source: CAA analysis based on PwC report.

7.71 The beta estimate for Fraport is 0.52 to 0.55. As noted above given it is likely that Frankfurt is lower risk than Fraport. PwC examined traffic volatility and concluded that Frankfurt's traffic volatility was greater than HAL's and that this suggests that HAL is lower risk than Frankfurt. Combining these points, the above analysis suggests that HAL's beta is likely to be lower than 0.52 and, therefore, when choosing a point in the range, the CAA should be not choose a point at the top of the range.

7.72 While there is some evidence in Figure 7.2 that supports an asset beta for HAL as low as 0.42, the weight of evidence from comparators as set out above suggests that it is unlikely to be below the mid-point (0.47) and likely to be in the region of 0.5.

7.73 Unfortunately, this approach does not assist with positioning GAL relative to Fraport or AdP, other than, as previously recognised GAL is exposed to slightly more risk than HAL.

7.74 PwC's empirical analysis showed that equity betas, although volatile during the financial crisis have since declined or remained broadly stable across a majority of international comparator airport. Having considered all the factors mentioned above and the market conditions, the CAA is not convinced that there has been a change in the systematic risk profile since Q5. The CAA has not found strong evidence to deviate from the range in its Q5 decision on equity beta, nor any evidence to deviate from the range in its initial proposals.

7.75 In addition to resetting of traffic forecasts and other building blocks every five years, the CAA has considered the protections that the price cap mechanics provide the airport operators.

- The price cap is defined in terms of RPI inflation and therefore protects the airport operator against unexpected movements in inflation.
- Pension deficit repair costs are included in the opex allowance.
- There is a security cost pass-through mechanism if security costs increase passed a threshold due to changes in legal requirements.
- There is a rates cost sharing mechanism for HAL.

OTHER RECENT REGULATORY DECISIONS AND PROPOSALS

7.76 The CAA has reviewed other sectoral regulators publications. The

CAA's initial proposals were criticised by HAL and GAL for placing HAL and GAL's beta and WACC too close to NGET. It is debatable whether a comparison should be made of betas or WACC. The advantage of examining betas is that it that the analysis is not complicated by views on other components. The CAA calculates from NGET's price control that Ofgem used an asset beta of 0.44,[37] compared to 0.50 for HAL and 0.56 for GAL.[38] The CAA's asset beta for HAL is 14% higher than NGET and its asset beta for GAL is 27% higher than NGET. In Chapter 8 this difference has been quantified by comparing like-for-like vanilla WACCs. In effect, the CAA estimate of HAL's WACC is 40bps higher and its estimate of GAL's WACC is 65bps higher than Ofgem's estimate of NGET's WACC.

7.77 Shortly after the initial proposals, ORR published its Draft Determination, from which the CAA has estimated the asset beta to be in the range 0.40 to 0.44,[39] and ORR's point estimate for the WACC was consistent with an asset beta near the top of this range (c0.43). Examining asset betas, ORR's Draft Determination places Network Rail (assuming no government support) in almost the same position as NGET and therefore, HAL and GAL betas are approximately 14% and 27% greater than Network Rail, respectively. Comparing WACC's on a like-for-like basis, HAL is 63bps and GAL is 88bps higher than Network Rail.

Actual gearing as an indicator of asset risk

7.78 NERA's report showed that the 10 largest regulated companies in the water sector had gearing levels which differed by as much as 26 percentage points (56 to 82%). The CAA considers that this evidence supports its views as set out in the initial proposals. The CAA considers that the choice of gearing is a matter for the company and its appetite for risk. However, one would not expect a high risk asset to be financed with a highly geared structure. If management considered that the cashflows from the underlying asset were risky

[37] To ensure consistency with the CAA proposals, a debt beta of 0.1 was used by the CAA in this calculation.

[38] The CAA does not need to reach a definite view on the point estimate for each component, however these asset beta figures are consistent with the asset beta range and the CAA's point estimate for the WACC.

[39] To ensure consistency with the CAA proposals, a debt beta of 0.1 was used by the CAA in this calculation.

then it would be cautious about exacerbating that risk with a highly geared structure (i.e. incurring inflexible interest and capital payments rather than more flexible dividend payments). If it overlaid too much financing risk on a risky asset then it would create bankruptcy risk. NERA's evidence from the 10 biggest water companies suggest that the most debt a company is willing to place on a water asset is 82% of RAB (although many have a lower risk appetite and select a gearing below this). Furthermore, NERA's evidence that the highest geared water company is at 82% - the same as HAL[40] - does not support the argument that the HAL asset is substantially riskier than water assets. For the avoidance of doubt, the CAA does consider the HAL asset to be riskier than water assets, but notes that this evidence confirms the CAA's view that HAL is not as risky as HAL's submissions suggest.

7.79 HAL investors considered that its actual gearing structure revealed only the investors' appetite of risk. The CAA agrees that gearing does in part reflect the investors' appetite for risk, but can also give an indication of the level of risk of the underlying asset.

CREDIT RATING REPORTS

7.80 HAL was critical of the CAA for using credit rating reports as a source of evidence for the assessment of risk. The CAA considers that such reports are a useful source of evidence because, as part of assessing the risk of debt default, the rating agencies assess the riskiness of the underlying asset. While the credit rating agencies assess risks in slightly different ways, they all broadly consider the risk of the underlying asset, the risk of the financial structure and the particular bonds issue. Furthermore rating agencies have expertise in assessing risk across a wide variety of airports in many different countries.

7.81 As noted in the financeability section of the final proposals for HAL, Fitch and Moody's both have published short notes following the initial proposals. The CAA's interpretation of these notes is that if the final decision was the same as the initial proposals there would not be a downgrade for HAL, although there would be limited scope for HAL to absorb any downside risks. The CAA concludes from these notes that the WACC for HAL should be no lower than the 5.35% used in the initial proposals. The CAA concludes that credit rating agencies and

[40] At 30 June 2013, HAL had group gearing of 83%, junior gearing of 78% and senior gearing of 67%.

their reports continue to be a useful source of evidence in the assessment of risk and the WACC.

TRAFFIC FORECASTS AND THE COST OF CAPITAL

7.82 BA considered that the CAA had double counted traffic risk by allowing for it in both the shocked traffic forecasts and the cost of capital. This is incorrect because 'shocked' traffic forecast and the cost of capital capture two different things.

7.83 The CAA sets a per passenger yield cap, which requires the sum of all the building blocks (the revenue allowance) to be divided by the expected traffic. If a traffic forecast other than the expected traffic is used then the airport operator would not be expected to earn its revenue allowance. So, if shocks were not included in the traffic forecast, even before the Q6 started, the CAA would be expecting HAL not to earn its revenue allowance. The 'unshocked' traffic forecasts are a biased forecast of traffic.

Figure 7.4: Illustrative example of traffic forecasts and WACC

	Passenger numbers	Per pax price (revenue allowance = £1,000)
Revenue allowance		
Traffic forecast excluding shocks	100	£10.00
Expected shocks	(20)	-
Traffic forecast including shocks	80	£12.50

Source: CAA analysis

7.84 In the above example, the expected traffic excluding the effects of shocks is 100 passengers, but shocks of minus 20 passengers are expected. Therefore, overall, it is expected that 80 passengers will use the airport. If the unshocked forecasts are used in the price cap calculation (price cap = £10), and actual passenger numbers turn out as expected, then total revenue earned will be £800 (80 passengers x £10). This is £200 less than the revenue requirement, and therefore it would be expected that the airport operator would not earn its revenue requirement.

7.85 The cost of capital is an allowance for risk. Risk is the concept that things turn out to be different from expectations. The cost of capital includes an allowance for uncertainty, it assumes that the traffic

forecast around which this uncertainty exists is the expected traffic. The cost of capital does not include an allowance for biased traffic forecasts (i.e. in the above example it does not include an allowance to make up for the expected loss of £200). The cost of capital includes an allowance that reflects the risk[41] that actual traffic might be different to the expected traffic of 80 passengers.

7.86 It is appropriate to include expected traffic shocks[42] in the traffic forecasts and not the cost of capital. Neither the initial proposals nor the final proposals include an allowance to make up for biased traffic forecasts in the cost of capital. There is no double counting.

MARKET OT ASSET RATIOS

7.87 The market to asset ratio (MAR) is the ratio of the market value of the regulated company to the regulatory asset base (RAB) value. A MAR greater than 1 suggests that the market values the company at a value greater than the RAB, and a ratio less than 1 suggests that the market values the company at a value less than the RAB.

7.88 All respondents noted that MARs should be interpreted with caution. However, respondents interpreted them to support their views that the cost of capital was too low or too high. By comparing airport operator MARs to other utilities HAL and GAL considered that they showed the WACC was too low. By comparing to 1, the airlines thought that it showed the WACC was too high. The CAA agrees that MARs should be interpreted with caution. By comparing the airport operator MARs to other sectors with higher MARs starts to make inference about whether other sectors have got it 'right' or 'wrong'. This does not take the discussion forward. By comparing the MARs to 1, ignores the idea that a small modest premia might be desirable. The CAA considers that the MARs calculated in respect of HAL disposals (1.09 to 1.14) are within a range that does not give the CAA concern that the current WACC is too high or too low.

7.89 The CAA notes that during Q5 equity investors bought into HAL at a premium to the RAB. Furthermore, during Q5 HAL invested in £5 billion in capex. The CAA considers that this evidence combined

[41] Under a CAPM framework the cost of capital captures the systematic risk that actual traffic turns out to be different to expected traffic.

[42] The traffic forecast at both HAL and GAL include expected shocks, although the precise modelling techniques in which shocks are incorporated differ.

suggests that the Q5 WACC was not significantly lower than that required by investors. For one to believe that the Q5 WACC was materially too low, one would have to assume that investors who bought into HAL during Q5 had a high expectation of a significant increase in the WACC (even after allowing for the effect of reduced corporate tax rates and lower debt costs).

7.90 For GAL, the MARs are in the region of 0.86 to 0.89 for the BAA disposal and in the region of 0.93 to 1.04 since. The lower MAR on disposal by BAA may well reflect the financial market conditions at the time and also the forced nature of the sale. (While STAL was also a forced sale, by appealing the CC decision, BAA might have been better able to control the timetable and minimise the effect of a forced sale.)

7.91 However, notwithstanding the MAR on the BAA disposal, some of the MARs on subsequent GAL transactions were at or below 1. This potentially suggests that the GAL WACC compared to the HAL WACC does not fully capture the risk differential between the two assets. The CAA's final proposes are to increase the WACC differential between the two airport operators from Q5: 29bps (the effective differential once the ARR was applied) to 35bps in these final proposals.

BA'S FIVE TESTS

7.92 The CAA considered BA's five investor tests for its initial proposals and for the final proposals. While the CAA might not completely agree with the five tests, the CAA sees merit in some of the points raised.

7.93 Test 1 - profit performance during Q5. The CAA noted that both HAL and GAL were robust to the difficult conditions of Q5 (ash cloud, BA cabin crew strike, economic recession, Air Passenger Duty). BA noted the growth of HAL's EBITDA and considered that this demonstrated a low risk business. The CAA notes, however, that with an increasing RAB over Q5 (and therefore increase allowed returns and depreciation) it is to be expected that EBITDA would increase. HAL considered that EBITDA did not grow enough for the level of capex.

7.94 Test 2 - gearing. The CAA noted in the initial proposals and final proposals that a high level of actual gearing while maintaining investment grade ratings suggests that investors do not view the airport as risky as the submissions by HAL and its advisers would suggest.

7.95 Test 3 - finance. The CAA noted in the initial proposals and re-iterates here that during Q5 HAL and GAL have both been able to raise substantial finance in the debt markets.

7.96 Test 4 - use of cash. BA noted that a large proportion of capex was covered by operating cash flows and that this meant the business was not excessively risky. The CAA agrees that HAL and GAL are not excessively risky, but one would expect operating cash flows to fund a significant proportion of capex, because those cash flows represent allowances for depreciation, the cost of equity and the cost of debt. It is not unexpected that depreciation is reinvested in capex and any further capex is funded at the notional gearing ratio. For HAL that means 40% is financed through equity, and the cheapest form of equity is retained profits. BA pointed out that in the first four years of Q5 one third of the new debt was for the benefit of the group and not HAL specifically.

7.97 Test 5 - wider systematic risk. BA noted that increased prices would magnify risk for airlines and have consequences for end users. The CAA agrees that the resulting prices are a key consideration in the CAA decision, which it must make consistent with its new primary duty to passengers and cargo.

7.98 In respect of BA's five tests the CAA agrees that aspects support the view that HAL is a relatively low risk asset. BA suggested that this evidence shows that HAL must have an equity beta below one. The CAA assessment of BA's five tests and the other evidence set out above is that the equity beta at gearing of 60% is in the region of 0.9 to 1.15.

THE COST OF EQUITY

7.99 The CAA considers that the underlying exposure to systematic risk of HAL and GAL is broadly unchanged from its Q5 decision. The CAA has reached this decision by considering the risks of the airports now and whether or not risk has changed over Q5.

7.100 The CAA considers that macroeconomic conditions, as noted by PwC might indicate the returns on assets have fallen slightly, and if HAL and GAL's relative risk to the economy has remained unchanged then this would lead to a slight reduction in the cost of equity. The CAA also considers that the appropriate cost of equity should not be too focussed on the short term, but that the long-term perspective is also

important. The CAA therefore proposes that the post-tax cost of equity for HAL should be the same as Q5 at 7.33%.[43] This is consistent with the CAA's initial proposals and PwC's range of 5.68% to 7.61% and reflects the 85th percentile in that range.

7.101 The position for GAL is slightly more complicated because the CAA has reduced gearing from 60% to 55%. The Q5 decision for GAL included a post-tax cost of equity of 7.87% (at gearing of 60%). If a purely mechanical approach is taken, the Q5 post-tax cost of equity at 55% gearing would be 7.32% and the pre-tax WACC would have increased by 3bps to 6.53%.

7.102 PwC recommended and the CAA concurs that the total risks for GAL suggest that an appropriate level of gearing for Q6 (55%) should be marginally lower than Q5 (60%). The intention of reducing the gearing is to increase slightly the allowed returns for GAL compared to what otherwise it would have been, and consistent with this, the CAA has chosen a slightly higher cost of equity of 7.43% (compared to 7.32%). Overall, the pre-tax WACC is 5bps higher than it would have otherwise been. The post-tax cost of equity of 7.43%[44] represents the 86th percentile in the range of 5.68% to 7.71%.

Taxation

7.103 Other than Oxera on behalf of GAL, all respondents accepted the CAA's proposed tax rate. Oxera noted that the tax allowance in the initial proposals was effectively applied to real returns while actual Corporation Tax was applied to nominal returns (i.e. including inflation). If this difference in tax was not accounted for in other components of the allowed revenue calculation, Oxera considered that there would be an inconsistency in the calculation of the regulated price. This in turn would mean that the forecast post-tax return for GAL would be significantly lower than the post-tax WACC in the initial proposals. Oxera suggested increasing the tax allowance.

7.104 Over multiple quinquennia the CAA has applied the statutory tax rate to real returns. The statutory tax rate has continued to decrease over this period and therefore because the WACC is set ex-ante basis, the

[43] This post-tax cost of equity is consistent with of TMR of 6.75%, a RFR of 1%, an ERP of 5.75%, an asset beta of 0.50 and an equity beta of 1.10.

[44] This post-tax cost of equity is consistent with of TMR of 6.75%, a RFR of 1%, an ERP of 5.75%, an asset beta of 0.56 and an equity beta of 1.12.

decline in tax allowance (in the WACC) has lagged behind the decline in the actual tax rate paid by the airport operators. This approach has benefited airport operators.

7.105 Furthermore, by the CAA applying the statutory rate the airport operators have benefited from capital allowances (the tax equivalent of deprecation) typically being in excess of regulatory depreciation and the airport operator has paid tax at a lower effective rate than the statutory rate. In effect, Oxera's argument is that capital allowances do not increase with inflation while regulatory depreciation does increase with inflation. The CAA's approach to the difference between capital allowances and regulatory deprecation has, historically, been to the benefit of the airport operators. To move away from this approach now that it may no longer benefit GAL appears inconsistent and therefore inappropriate.

7.106 The CAA has reviewed GAL's statutory accounts and notes because of trading losses GAL is not paying Corporation Tax. Furthermore, because it is allowed to carry forward those losses to offset future tax charges it is not clear that GAL will be making Corporation Tax payments in the near future. It would appear inappropriate to increase the tax allowance in the WACC as suggested by Oxera in light of this.

7.107 Since the CAA's initial proposals the Chancellor has not made any statements with regard the likely Corporation Tax rates. Consistent with its initial proposals, the CAA proposes to use 20.2% tax for Q6. This represents 21% for 2014/15 followed by 20% in subsequent years. The CAA will continue to monitor any guidance or statements from the Chancellor on this issue before its final decision.

Overall cost of equity

7.108 Applying the tax rate (20.2%) to the CAA's post-tax cost of equity, the point estimates for the pre-tax cost of equity are 9.2% for HAL and 9.31% for GAL.[45]

[45] This compares to PwC's range for the pre-tax cost of equity of 7.11% to 9.54% for HAL and 7.11% to 9.66% for GAL.

CHAPTER 8

Estimating the WACC: conclusions

Point in the range

Initial proposals

8.1 The CAA concluded that the range estimated by PwC for the cost of capital was the appropriate range. The CAA then chose a point in that range based on:

- the concept of asymmetric costs of getting the point estimate wrong; and
- the concept that returns within the year can be reinvested in order for the airport operator to earn its WACC.

HAL

8.2 HAL submitted a paper by Europe Economics[46] that looked at the issues around selecting a point in the range. The paper noted several reasons why it might be appropriate to select a point other than the mid-point in the range.

- The best estimate of a WACC component might not lie at the mid-point in the range. The range might reflect the evidence, but all pieces of evidence and therefore all parts of the range might not be equally authoritative.
- The appropriate WACC might lie above the best estimate of the overall WACC.
  - For the asymmetry arguments put forward in the initial proposals, Europe Economics noted that regulators often consider that it is worse in the long-run, for consumers, if a determined WACC is too low than if it is too high. If it is too high (and all other parts of the price control are precisely correct), the consumers lose out from higher prices but gain from some inefficiently high-quality and inefficiently early innovation and investment. Conversely, if the determined WACC is too low, consumers gain from lower

[46] Europe Economics: Choice of WACC range percentile for Q6 August 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

prices but miss out from the foregoing and retarding of innovation and investment. Europe Economics noted the work of Professor J.A. Hausmann, which it thought confirmed that the welfare losses from foregone and delayed investment in regulated services far outweigh the gains from lower prices.

- Financeability. In a competitive market a company failure or withdrawal is replaced by another supplier. Company failure in a competitive environment might be an efficient outcome. But if the correct cost of capital led to the failure of a regulated airport operator (where there are barriers to entry) there may be transitional costs on consumers. Europe Economics noted that the regulator is likely to use its tools to minimise the transitional costs, but reflecting the desirability of avoiding such disruption, Europe Economics thought that it might be appropriate for a regulatory price cap to take some account of whether it allows regulatory functions to be financed in practice.

Airlines

8.3 BA stated that the CAA should select the mid-point of the range where there are uncertainties, consistent with approaches taken by other regulators and taking account of the actual risks and consequences.

8.4 CEPA considered that selecting a point estimate towards the top of the range as the CAA did in its initial proposals was not justified and added a further layer of 'headroom' beyond that already factored into the constituent WACC component values underlying the consultant's ranges.

8.5 CEPA considered that the generosity of the CAA's preferred ranges could be seen in their large sizes compared to those calculated by CEPA, (GAL 57% wider and 42% wider for HAL) and their upwards skew (while both ranges had a low value below CEPA's, their top ends were much higher). This gave the top ends of the PwC values a potentially speculative interpretation, that CAA might take care to not put so much weight on.

8.6 Furthermore, CEPA considered that picking a value high in the ranges exaggerated the headroom already factored into the individual parameter range of values. Given that CEPA contended that there was headroom in both the lower bound and upper bound of these estimates, using a point estimate from the upper end of the already

inflated range would give airport operators a doubly generous buffer, at the expense of passengers and the airlines.

8.7 CEPA considered that the CAA's justification for choosing a point estimate towards the upper end of the range was flawed in three respects:

- it ignored the role of airlines on customer experience;
- it exaggerated the impact of under-investment; and
- it was not based on evidence.

THE ROLE OF AIRLINES

8.8 CEPA contended that while the CAA considered the ultimate impacts on passengers, it ignored the countervailing impact on consumers intermediated via airlines. CEPA considered that as passenger demand at the airports was not perfectly inelastic, airlines could not pass on all of any increase in charges to customers and therefore airlines must bear some of the cost themselves. CEPA thought that this would inevitably affect their ability to invest in new routes and aircraft, both of which improve passenger experience and might be adversely affected in such a low-margin business. CEPA argued that a more holistic view of the balance of risks might not have led the CAA to be so generous and to realise that this adjustment to the WACC partly served to push the risk of underinvestment by airport operators at airports onto underinvestment by airlines at airports.

EXAGGERATED IMPACT OF UNDER-INVESTMENT

8.9 CEPA contended that during Q5 HAL had forecast 35% RAB growth over the price control and GAL had forecast 33% growth. This level of investment intensity provided a stronger narrative to select high Q5 percentiles at the 77th percentile for HAL and the 75th percentile for GAL. However with HAL's RAB projected to shrink by 2.1% over Q6 and GAL's to grow by only 3.1% in five years, the story clearly had materially changed.

LACK OF EVIDENCE

8.10 CEPA contended it was not clear whether CAA had sought any empirical support for the link CAA's consideration of the balance of risks points to setting a high WACC but the choice of the 75th and 80th percentiles appeared entirely arbitrary beyond having used

similar levels for Q5. CEPA estimated that every percentile was worth £9.72 million per year at HAL and £1.91 million per year at GAL.

8.11 BA also submitted a paper by Professor Sudi Sudarsanam[47], which sought to argue that the CAA should not select a point estimate towards the top of the range. The paper noted that one justification for a high percentile was that the traditional CAPM may neglect additional risk premium equity investors may expect as compensation for bearing asymmetric or skewness risk. Professor Sudarsanam did not believe the conceptual and empirical points of view supported the case for using a high percentile. In his evaluation a high percentile was considered likely to have disincentive effects on the investment programmes of the airline users of Heathrow and Gatwick.

8.12 The ACC disagreed with the CAA's approach of choosing point estimates from the top quartile of PwC's recommended ranges. The ACC considered that the approach will not mitigate the risks of underinvestment or service quality reduction, and instead will simply create windfall profits for GAL. The ACC considered that 'the CAA should use the mid-point of the ranges, a fair approach to balancing the interests of the airport owner and passengers.'

Discussion of the issues

8.13 The CAA considers that the appropriate point estimate for the WACC from the overall range is ultimately a matter of judgement.

8.14 The CAA disagrees with CEPA that the ranges identified for individual components are too wide. The CAA considers that the ranges are only as wide as they need to be to reflect the range of evidence. For example, the range for the cost of equity in the initial proposals and the final proposals is significantly narrower than that used in the Q5 decision, and this reflects the general agreement around the TMR. In contrast, the range for the cost of debt reflects the uncertainty around future debt market conditions. Overall, the width of the WACC range for the Q6 final proposals is very similar to that used in Q5, albeit being driven by different components.

8.15 Ultimately a point estimate for the WACC has to be used in the price cap calculation, and the CAA followed a multi-step process;

[47] Professor Sudi Sudarsanam: Review of CAA's choice of high percentile WACC from a range in its initial proposal for cost of capital for HAL and GAL, June 2013. Published at http://www.caa.co.uk/default.aspx?catid=78&pagtype=90&pageid=67.

- first, ranges were identified for each component where it is appropriate given the evidence;
- second, the ranges for the cost of debt, the cost of equity and the WACC were estimated from the component estimates;
- third, point estimates for the cost of debt and the cost of equity were provisionally selected from those ranges;
- fourth, the point estimate of the WACC was calculated from the provisional point estimates of the cost of equity and the cost of debt; and
- finally, the WACC point estimate for the WACC was assessed against the range for the WACC.

8.16 The CAA considers that the adding of steps 3 and 4 above to its initial proposals' approach adds robustness to its WACC point estimate. The additional steps ensure that there are robust and clear estimates for the cost of debt and the cost of equity.

8.17 By taking this multi-step approach the CAA attempts to avoid any double counting of uncertainty. In this respect the CAA disagrees with CEPA that it has included headroom in both the component estimates and in the selection of the point estimate. It is not possible to differentiate between judgements on the evidence and any tendency to incorporate headroom when CEPA compared its ranges with those of PwC.

8.18 The CAA agrees with Europe Economics in respect of two explanations of why it might be appropriate that the point estimate higher than the mid-point: the best estimate might not be the mid-point and the asymmetric costs of getting the point estimate wrong. The CAA disagrees that it should aim up for reasons of financeability as the concerns about transitional costs in the event of corporate failure are best addressed by other tools such as the financial resilience and continuity of service licence conditions.

8.19 Significant capex compared to the RAB might be a genuine reason to aim up, significant relates to both the monetary value and its importance to the passenger. Therefore, just because the monetary value of capex compared to the RAB might not be as high as in Q5, it does not mean that the capex is less important than Q5.

8.20 The CAA considers that a point from the range is ultimately a judgement and the concepts that guide that judgement are qualitative in nature. The following are the key concepts that are relevant to the CAA's judgement.

- Whether the best estimate is the mid-point or that there is a reason why it might differ. For example, the CAA considers that the total market return is probably towards the top of the range suggested by PwC (and consistent with most other regulators). The CAA also notes that compared to the initial proposals, PwC has narrowed its cost of debt range, by increasing the lower end by more than it increased the top end.
- Asymmetry of cost of getting the estimate 'wrong'. While the magnitude of capex relative to the RAB in Q6 might be lower than Q5, there are some projects at both airports which are critical to passengers for example the completion of Terminal 2 by HAL and common bag drop facilities at check-in and stand re-configuration by GAL.
- The concept that returns earned during the year can be reinvested in order that the WACC is earned for the year. (In effect, a lower return can be given that the WACC in order for the airport operator to earn the WACC).
- The consistency of the CAA's WACC proposals with the credit rating metrics as set out in the final proposals document.
- The greater flexibility that the licence based regime introduces.

8.21 Considering these concepts, the CAA concludes that the appropriate point estimate are:

- 5.6% for HAL. This is 29bps (Q5: 38bps) from the top of the range and represents the 79th percentile (Q5: 77th); and
- 5.95% for GAL. This is 36bps (Q5: 47bps) from the top of the range and represents the 76th percentile (Q5: 75th).

8.22 The differential between HAL and GAL is 35bps (compared to 30bps for Q5 and the Q6 initial proposals.). The CAA considers that this WACC differential is appropriate because it reflects a better understanding of the relative risks of the two airport operators now that they are under separate ownership. Evidence includes market data

on:

- the MARs (GAL MARs are noticeably lower than HAL);
- a significantly lower level of actual gearing at GAL than HAL; and
- the credit rating assessment of business risks and therefore the credit rating differential of the actual finance.

8.23 The CAA's discussions with bondholders and investors in the aviation sector suggested that a differential of approximately 30bps was consistent with their assessment of the relative risks of the airports. As noted in Chapter 7, the CAA considers that the differential should be increased by 5bps to reflect the reduction in the assumed level of GAL's gearing.

Summary of range

Figure 8.1: Summary of CAA's range

	HAL	GAL
Gearing	60%	55%
Pre-tax cost of debt	2.78-3.45%	2.95 - 3.58%
Total market return	6.25 - 6.75%	6.25 - 6.75%
Risk-free rate	0.5 - 1.0%	0.5 - 1.0%
Equity risk premium	5.75%	5.75%
Asset beta (number)	0.42 – 0.52	0.46 – 0.58
Equity beta (number)	0.9 – 1.15	0.9 – 1.17
Post-tax cost of equity	5.68 – 7.61%	5.68 – 7.71%
Tax rate	20.2%	20.2%
Pre-tax cost of equity	7.11 – 9.54%	7.11 – 9.66%
Pre-tax WACC	4.51 – 5.89%	4.82 – 6.31%
CAA point estimate pre-tax WACC	5.60%	5.95%
CAA point estimate vanilla WACC	4.85%	5.10%

Source CAA analysis of PwC's report

8.24 The bottom of the ranges reflect PwC's 50/50 assumption in respect of embedded and new debt. The top of the range reflects PwC's 70/30

assumption in favour of embedded debt.

Figure 8.2: Comparison of final proposals to Q5 decision

%	HAL	GAL
Q5 WACC decision	**6.20**	**6.50**
Reduction in Corporation Tax	(0.40)	(0.43)
Reduction in cost of debt	(0.20)	(0.20)
Reduction in GAL gearing	n/a	0.08
Q6 final proposals	**5.60**	**5.95**

The effect of the ARR is included in the estimates of the changes in components
Source: CAA analysis

8.25 The comparison to Q5 is complicated by the ARR. In Q5 the ARR was used to adjust the point estimate of the WACC before applying the adjusted figure (6.01% and 6.30%) to the RAB. For Q6, the CAA has taken into account the ARR in its choice of a point in the range for the WACC.

8.26 When the headline WACC is compared, the final proposals for Q6 are lower than the Q5 decision because of the reduction in Corporation Tax (c40bps) a reduction in debt costs (c20bps) (consistent with the wider economic environment). For GAL this is slightly offset by an increase due to a lower gearing assumption (8bps).

8.27 The CAA's final proposals are 25bps and 30bps higher than initial proposals for HAL and GAL respectively. As set out in Figure 8.3, this reflects an increase in the cost of debt assumption for both, a slight increase in the post-tax cost of equity and the effect of the gearing adjustment to GAL.

Figure 8.3: Final proposals compared to initial proposals

%	HAL	GAL
Initial proposals	**5.35**	**5.60**
Increase in cost of debt	0.18	0.17
Increase in cost of equity	0.07	0.10
Effect of GAL gearing	n/a	0.08
Q6 final proposals	**5.60**	**5.95**

Source: CAA analysis

8.28 The detail of why the cost of debt assumption has increased is set out in Chapter 6, but in summary it is because of:

- the technical corrections by PwC to its underlying yield calculations (+c10bps);
- placing greater weight on longer-run averages (+c10 to +20bps);
- placing slightly greater weight on the fixed rate historical debt (70% rather than 50%) (+c.20bps) and placing slightly less weight on very recent market conditions; all partially offset by
- an increase in forward-looking inflation expectations (-c.10 to -20bps).

8.29 The detail of why the cost of equity assumption has increased is set out in Chapter 7, but in summary it is because of matching the Q6 cost of equity to the headline Q5 cost of equity.

Comparison to other sectors

8.30 The CAA's final proposals for a pre-tax WACC of HAL and GAL are 5.60% and 5.95% respectively. These translate into vanilla WACCs of 4.85% and 5.10% respectively.

8.31 In its NERL CP3 determination the CAA assumed a headline WACC of 7% (vanilla WACC of 5.7%), but applied the lower ARR of 6.76% (vanilla: 5.54%).

8.32 In its Draft Determination the ORR assumed a headline vanilla WACC of 4.31%. However, it used a lower 'semi-annual' WACC of 4.22% to reflect the concept that returns can be reinvested.[48]

8.33 Ofgem used a headline WACC of 4.55% in its Electricity Distribution price control. In the excel models used by Ofgem to calculate the price controls, the closing RAB each year is discounted by the WACC, before applying the WACC to the simple average of the opening and adjusted closing RAB.[49] Ofgem describe this as the NPV-neutral RAB

[48] Paragraph12.77 and 12.78 of http://www.rail-reg.gov.uk/pr13/PDF/pr13-draft-determination.pdf.

[49] For example see rows 13 to 32 of the RAV&Return sheet found at the following link http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/RIIO_ET1_FP_FinancialModel_dec12.xlsm.

base. While the method is different to ORR, the effect is almost identical. On the assumption that the asset base is broadly stable, the effective WACC being applied to a simple average of the opening an un-adjusted closing RAB (i.e. the CAA method of averaging the RAB) is 4.45% (i.e. 10bps lower than the headline WACC).

8.34 The CAA has calculated the appropriate values for the comparators to its proposals.

Figure 8.4: Comparison of CAA's final proposals to other regulators' determinations, draft determination and views

Regulator	Sector	Status	Date of decision	Appropriate comparative
Ofgem	Gas Distribution	Determination	2012	4.11%
ORR	Network Rail	Draft Determination	2013	4.22%
Ofgem	Gas Transmission	Determination	2012	4.30%
Ofgem	Electricity Transmission - National Grid	Determination	2012	4.45%
Ofgem	Electricity Distribution	Determination	2009	4.59%
Ofcom	MCT	Determination	2011	4.60%
Ofgem	Electricity Transmission - Scottish	Determination	2012	4.68%
CAA	**HAL**	**final proposals**	**2013**	**4.85%**
Ofcom	Openreach	View	2013	4.90%
CAA	**GAL**	**final proposals**	**2013**	**5.10%**
Ofwat	WASC	Determination	2010	5.10%
CAA	NERL	Determination	2010	5.54%
Ofcom	Rest of BT (not price controlled)	View	2013	5.70%

Source: CAA Analysis

8.35 In response to initial proposals, both HAL and GAL argued that the CAA had placed them too close to regulated utilities and in particular

NGET. This updated analysis shows that other than Water, which is yet to publish its views on the upcoming price control, GAL's WACC is greater than all utilities but less than NERL.

8.36 HAL, which the CAA considers is of lower risk than GAL, has a WACC that is greater than all energy price decisions (including two Scottish Electricity Transmission decisions), which have an uplift WACC to reflect the significant level of capex compared to RAB.

8.37 The CAA notes that in this updated hierarchy HAL is 40bps above NGET and GAL is 88bps above NGET.

8.38 Based on the evidence received, the CAA considers that these WACC differentials are consistent with the CAA's understanding of the risk differentials between the regulated industries.