Appendix A

GAL Cost of Debt

British Airways has previously expressed its preference for the use of _relevant_ benchmark indices for establishing an appropriate estimate of the cost of debt. The CAA and PwC seem to have put greater weight on an analysis of traded bonds for the designated airports. The main appendix on the cost of debt in BA's response to the CAA's Final Proposals at LHR focussed in particular on the CAA and PwC's analysis of the cost of debt for HAL. While there were more noticeable errors for HAL than GAL the findings are also pertinent to estimating a reasonable cost of debt for GAL.

Embedded Debt

The fact that GAL has a much smaller portfolio of outstanding bonds has resulted in fewer obvious errors in the analysis of GAL's embedded debt. At the beginning of both 2011 and 2012 GAL issued two sets of long dated bonds[1].

Issue Date	Maturity[2] Date	Tenor	Size £(m)	Coupon
23/02/2011	02/03/2026	15.0	712	6.125
23/02/2011	02/03/2041	30.0	712	6.5
13/01/2012	23/01/2037	25.0	726	5.75
13/01/2012	23/01/2024	12.0	726	5.25
Weighted average		20.51		5.90

Applying the CAA's inflation estimate with no further adjustments results in a real embedded debt cost of debt of 2.9%. The CAA, presumably influenced by the positioning of GAL's embedded debt cost estimate relative to HAL's (which is considered to be less risky), elect to inflate this estimate to 3.1%.

Unjustified Upward Adjustment against GAL's Bond Issuances

The primary cost of debt appendix included earlier in this document shows emphatically that the cost of debt for HAL has been overestimated due to methodological and mathematical errors. 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[3]

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[1] Note that of the two sets of issuances on the same day, the longer dated, in both cases, was more expensive.
[2] These dates differ from those shown in page 32 of PwC's report. It appears PwC used legal final maturity instead of expected final maturity (the same error does not appear to be present for HAL's bonds)
[3] Page 51 CAA technical appendix on the cost of capital.

As GAL's actual cost of debt is higher than HAL's there is no need to 'aim up' for GAL's cost of embedded debt. Furthermore, the range within which the CAA appears to be comfortable adjusting estimates is mis-specified. The inappropriate choice of benchmarks in PwC's analysis (discussed in detail in main Cost of Debt appendix) is every bit as applicable to Gatwick. Using an inappropriate reference benchmark, the CAA believed that GAL was issuing debt with extraordinarily low coupons:

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 differe[ce] in rating[4].

This apparent discount is however artificial. Its falsity is highlighted by a time series of GAL's 10-15 year maturity bonds plotted against applicable benchmark yields. The iboxx BBB sterling non-financials index and Bloomberg BBB Bloomberg GBP Utilities index are displayed against GAL's comparable bonds below.
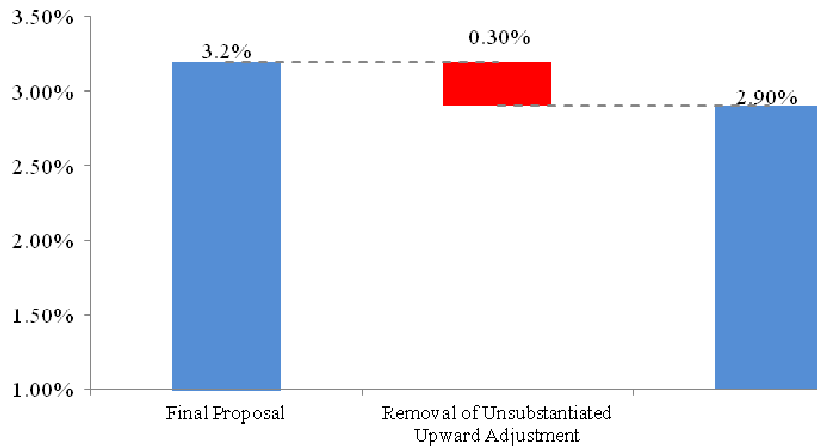
<u>GAL 10-15 year maturity Bonds yields vs Benchmarks[5]</u>
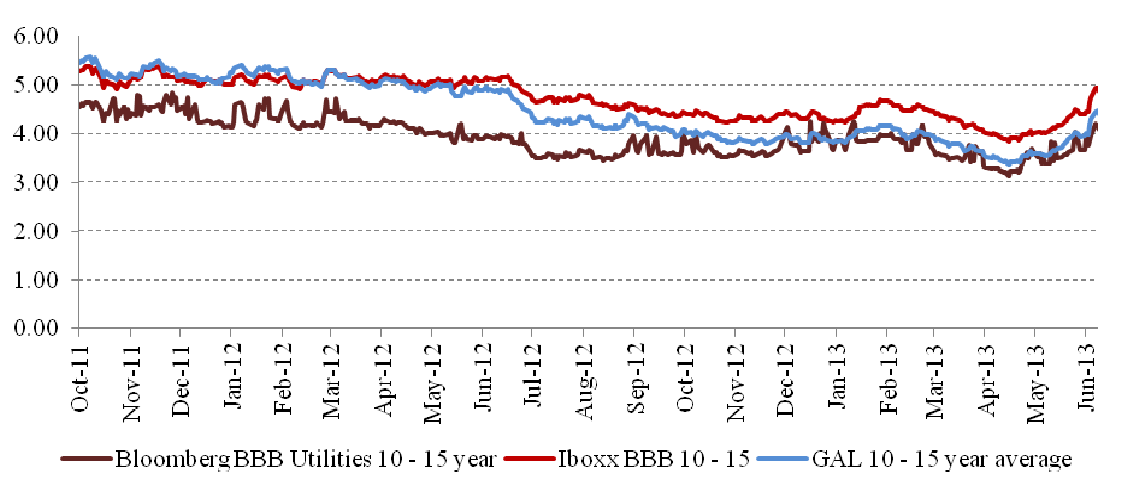
GAL's bond yields are generally higher than the comparable utilities index but slightly lower than or in line with the broad basket of corporate bonds that do not include financials. This is where one would expect GAL's bonds to trade. Elevated financing costs for financial institutions are the sole cause for the apparently anomalous low debt costs achieved by GAL. The two primary justifications for inflating GAL's embedded debt costs were their positioning relative to HAL and their seemingly discounted prices relative to broader benchmarks. Both of these rationalisations have been shown to be misguided.

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[4] Page 51 CAA technical appendix on the cost of capital.
[5] Average of GAL's two shorter tenor bonds average tenor during period shown is 12.5 years.

Long Dated Financing Skewing Results

The graph showing GAL's bonds trading in line with benchmark indices included only GAL's 10-15 year maturity bonds. GAL also decided to issue extremely long dated financings. When using primarily fixed rate instruments, minimising interest rate risk dictates that a company should have a mix of debt tenors. It is GAL's prerogative to deviate from this mixed profile, a deviation based, presumably, on a supposition that interest rates are likely to rise in the future. If the CAA bases the cost of debt on prevailing market conditions in relevant periods then there is potential for GAL to benefit from locking in rates at these levels. It is not however reasonable to expect airlines and passengers to pay for such a wager. If the CAA decides that it will match the maturity profile of the designated airports' debt, it must for consistency's sake rule out the passing on of higher embedded debt costs in future reviews. The CAA has stated:

..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[6]

This then implies that the costs of issuing longer tenor debt should not be passed on to passengers. A plot of GAL's 25-30 year tenor issuances shows that there is certainly a consistent premium for longer tenor debt.

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[6] Page 48 CAA technical appendix on the cost of capital.
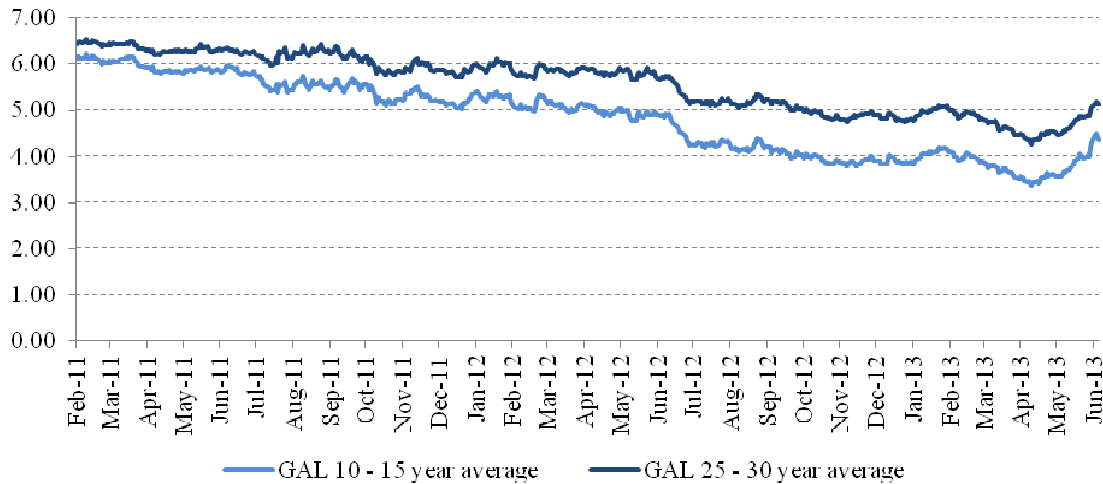
In order to reveal a more fitting depiction of what debt for a notional efficiently financed airport would have cost, it is necessary to adjust for tenor. GAL issued its very long tenor debt on the same day it issued more typical tenor debt. In both instances the size (measured by face value) was the same for the very long and moderate tenor debt. It is therefore reasonable to simply remove the long dated bonds to estimate what a more normal tenor portfolio of debt would have cost. Removing the very long tenor issuances leaves the following sub-set.

| Issue | | Tenor | Size | Coupon |
Date	Date		£(m)	
23/02/2011	02/03/2026	15	712	6.125
13/01/2012	23/01/2024	12	726	5.25
Weighted average		13.5		5.7

This reduces the weighted average coupon by 20 basis points and allows a corrected estimate of GAL's real cost of embedded debt to be posited – at 2.7%. Note that this embedded debt estimate has a premium relative to HAL which is to be expected given the rating differential.
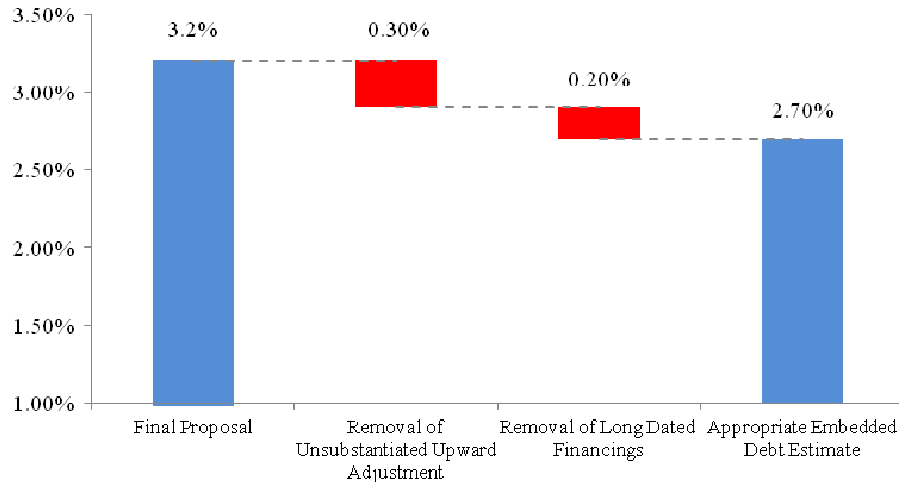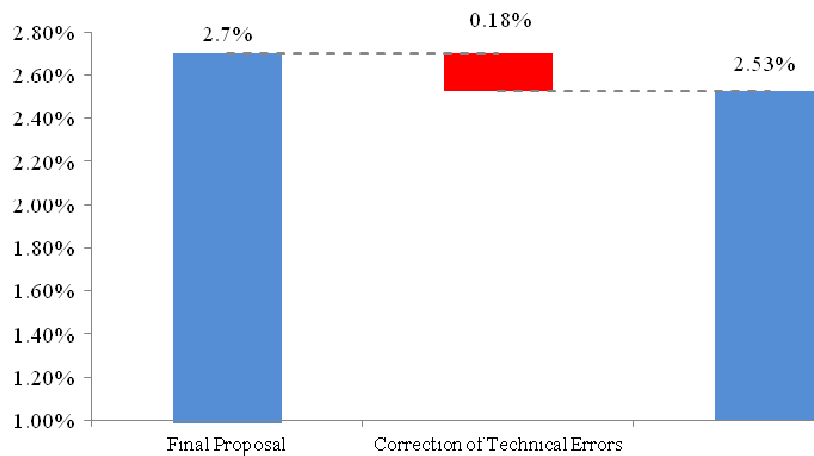
New Debt

For new debt the technical errors discussed in detail in the main Cost of Debt appendix are equally applicable. PwC use both an assessment of traded bond yields and a cross check with benchmark indices to estimate the cost of new debt. Once spot estimates are established yields are increased using a method which uses a forward rate multiplied by a coefficient that serves to proxy for the tendency for credit spreads to tighten as government bond yields increase.

To briefly reiterate the issues with PwC's and the CAA's approach[7]:

- The nominal average for GAL's and HAL's traded bond yields is miscalculated and should be 4.6% instead of 4.7%

- The CAA uses 2.6% as a mid-point between PwC's 2.2% and 2.9% range subsequently adding 0.25% to account for GAL's increased riskiness. The correct mid-point is 2.55%. Given that GAL's new debt estimate is given to two decimal places it is not sensible to round less precisely than this during calculation steps.

- PwC's analysis suggests a lower range for HAL with a 25 basis point premium added to give a range for GAL. The mid-point of PwC's disaggregated GAL specific range is 2.675.

- Based on traded yields of GAL's bonds shown in the PwC report the average of the nominal yields in isolation, though not stated is 4.65%

- There is no mathematical basis for a downwards adjustment of only 0.1% (or 0.05%) to account for the difference in the inflation forecasts between PwC (2.8%) and the CAA (3.0-3.1%). The downwards adjustment should be at least 0.2%.

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[7] This topic is discussed in more detail in the Cost of Debt appendix relating to HAL's debt

The highest justifiable range for GAL based on PwC's analysis is 2.5% to 2.65% not 2.75%. Correcting these technical errors in isolation results in a 17.5 basis point reduction in the estimate for new debt.

In their analysis PwC artificially impose a yield differential on new debt issued by GAL. The analysis on HAL's debt in the previous appendix makes clear that this is not necessary. HAL and GAL's traded bond yields as of 18th of October 2013 are shown below.

GAL			
	10-15 years	15+ years	Average
Spot	4.1	4.7	4.4
6 month average	4.0	4.8	4.4
1 year average	4.0	4.8	4.4
2 year average	4.4	5.2	4.8

HAL A-			
	10-15 years	15+ years	Average
Spot	3.7	4.3	4.0
6 month average	3.5	4.3	3.9
1 year average	3.5	4.3	3.9
2 year average	3.9	4.7	4.3

As can be seen here, if traded bonds are put in to comparable maturity buckets using the same procedure as used by PwC there is structurally a 40-50 basis point yield differential between the two airports. It is surely preferable to use this empirical difference in bond yields than to impose a theoretical estimate.

GAL does not have outstanding debt with less than 10 years to maturity. It has, by now, been well established that longer tenor debt is generally more expensive. Averaging across maturity buckets implies that a lack of short dated paper increases borrowing costs. This has

no economic logic. The incremental yield differential across maturity buckets in HAL's bonds allows an estimate of what shorter dated paper for GAL would cost[8].

HAL A -	<5 years	5-10 years	10-15 years	15+ years	Average
Spot	1.4	3.5	3.7	4.3	3.2
6 month average	1.5	3.4	3.5	4.3	3.2
1 year average	1.7	3.4	3.5	4.3	3.2
2 year average	2.2	3.8	3.9	4.7	3.7

GAL[9]	<5 years	5-10 years	10-15 years	15+ years	Average
Spot	*1.8*	*3.9*	4.1	4.7	3.6
6 month average	*2*	*3.9*	4	4.8	3.7
1 year average	*2.2*	*3.9*	4	4.8	3.7
2 year average	*2.7*	*4.3*	4.4	5.2	4.1

This gives a nominal cost of new debt estimate of 3.8%. Following PwC's procedure with forward rates and subtracting the CAA's 3% inflation rate gives a real cost of new debt of 1.5%.

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[8] While this is a simplistic adjustment, it is conservative. If GAL's credit risk is deemed to be greater than HAL's then theoretically the shape of the shorter maturity end of the borrowing term structure should be steeper for GAL since the risk of default is greater and thus the benefit of being exposed for less time is commensurately greater. This approximation should therefore, if anything, overestimate the cost of GAL's short term borrowing.

[9] Italicised figures are estimates of what short dated GAL bonds would cost based on the relative pricing of HAL bonds in different maturity buckets.
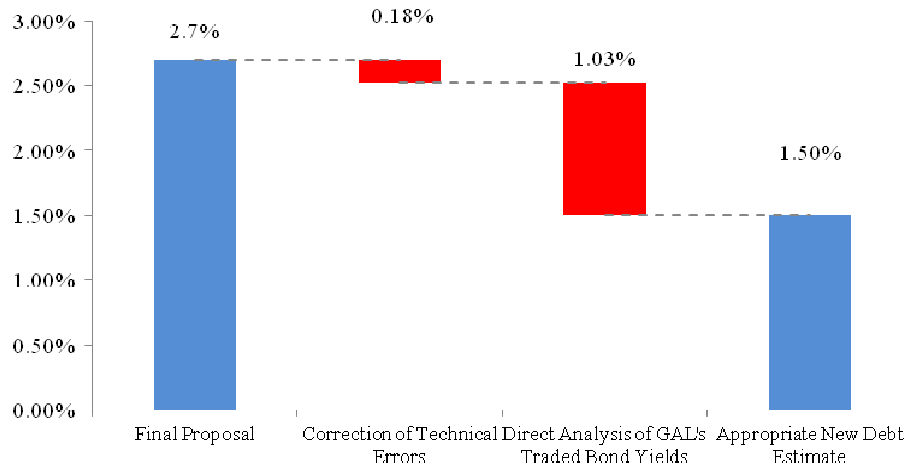
Estimating the Cost of Debt for GAL Conclusion

The errors and misjudgements in the estimation of GAL's cost of debt are to a large extent by-products of the mistakes in the analysis of HAL's debt. A direct analysis of GAL's comparatively straightforward financing structure produced counter intuitive results when compared to a similar investigation of HAL's financing arrangements. The perceived anomalies are proved entirely rational. Attempts by PwC and the CAA to establish cogent arguments for inflating GAL's cost of debt to bring them in line with expectations relative to HAL were misplaced. Making the required amendments to the cost of GAL's debt produces a considerably more reliable estimate.
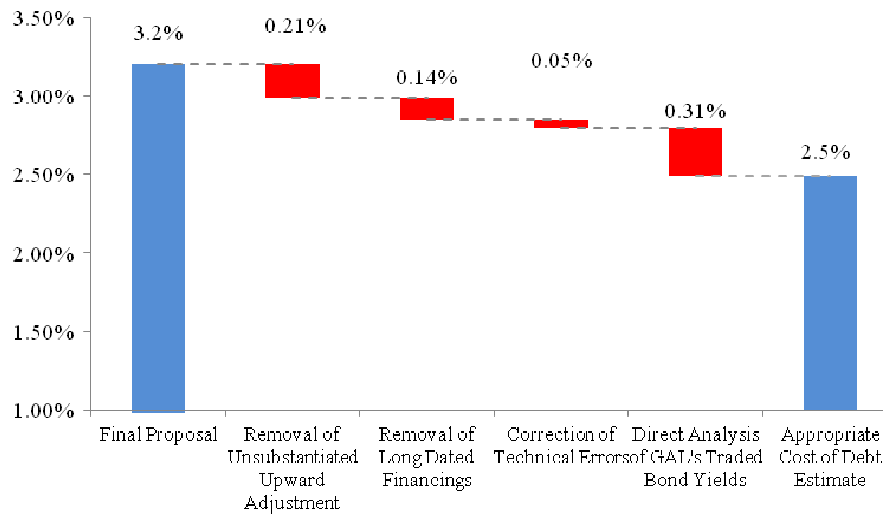
Adjusted proposals for BA's estimate of GAL's cost of debt are shown below.

	GAL	
	CAA	BA
Embedded Debt	3.20	2.70
New and Floating Debt	2.70	1.50
Cost of Debt ex Fees	3.05	2.34
Fees	0.15	0.15
Total Cost of Debt	3.20	2.50[10]

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[10] Rounded up from 2.49

Appendix B

A response on the choice of cut-off date for the CAA Final Proposals

Note prepared for British Airways[1]

October 2013

In arriving at the cost of debt estimates, the PwC analysis on market evidence uses data up until the 27 June 2013.[2] PwC state that:

'Our approach to the assessment of the cost of new debt continues to focus on spot estimates, adjusted for expected interest rate changes implied from forward markets.'[3]

PwC then use the spot rate on A and BBB rated debt to arrive at a cost of new debt of 4.3% (A rated) to 5.0% (BBB rated) in nominal terms[4]. A forward adjustment is applied for an expected changes in interest rates (c.70bps), before the RPI inflation assumption of 2.8% is deducted to convert this into a real range of 2.2% (A rated) to 2.9% (BBB rated). This estimate was 70bps higher at the top end than their previous report[5]. A differential was then applied to take into account the difference between HAL and GAL.

The CAA in their analysis adopted the range produced by PwC. The CAA then use what they refer to as the mid-point in this range less an adjustment for differences in inflation assumptions between PwC and the CAA as the cost of new debt for the purposes of the CAA's assessment of the WACC for HAL and GAL (with a 25bps upward adjustment for GAL)[6]. PwC's use of spot estimates therefore directly feeds in to the final cost of new debt estimate.

We see two problems with this approach, in that:

1) there is too great a reliance on a particular spot rate given the movements in both forward and spot rates; and

2) the date chosen corresponds to the highest data point observed for the cost of debt and forward estimates for the calendar year so far, shown in Figure 1 overleaf (i.e. the black line).

This note therefore focuses on the cost of debt, and in particular the cost of new debt.

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[1] This note has been commissioned by British Airways. However, the views expressed are those of CEPA alone. CEPA accepts no liability for use of this note or any information contained therein by any third party. © All rights reserved by Cambridge Economic Policy Associates Ltd.

[2] See Section 2.2 of PwC's October report.

[3] p29 PwC (2013) Estimating the cost of capital for the designated airports, October 2013.

[4] p36 PwC (2013) Estimating the cost of capital for the designated airports, October 2013.

[5] p40 CAA (2013) Estimating the cost of capital: a technical appendix, October 2013.

[6] We discuss this in another CEPA technical appendix on issues arising from the CAA's estimate on the cost of debt.

PwC and the CAA use 10-15yr indices in their cost of debt analysis,[7] which we find to be appropriate. We do not know the components from the indices used by PwC[8], but our understanding is that the indices include bonds issued by financial institutions, which we believe is less appropriate than a measure of non-financial corporates. The purpose of our analysis is not to attempt directly to make an adjustment to PwC's figures but simply to show the flaws in relying on a spot rate and particularly one that, it turns out, was at a peak. In our analysis, we apply a forward rate adjustment using nominal gilts and the 0.8 coefficient that was used in the CAA Final Proposals and updated PwC paper, as this adjustment is consistent with the PwC approach. We discuss the use of this coefficient later in this note. The index shown is based on the average of iBoxx 10-15yr A and BBB rated non-financial corporate bond indices deflated using breakeven inflation[9].

Figure 1: Real cost of debt forward estimates
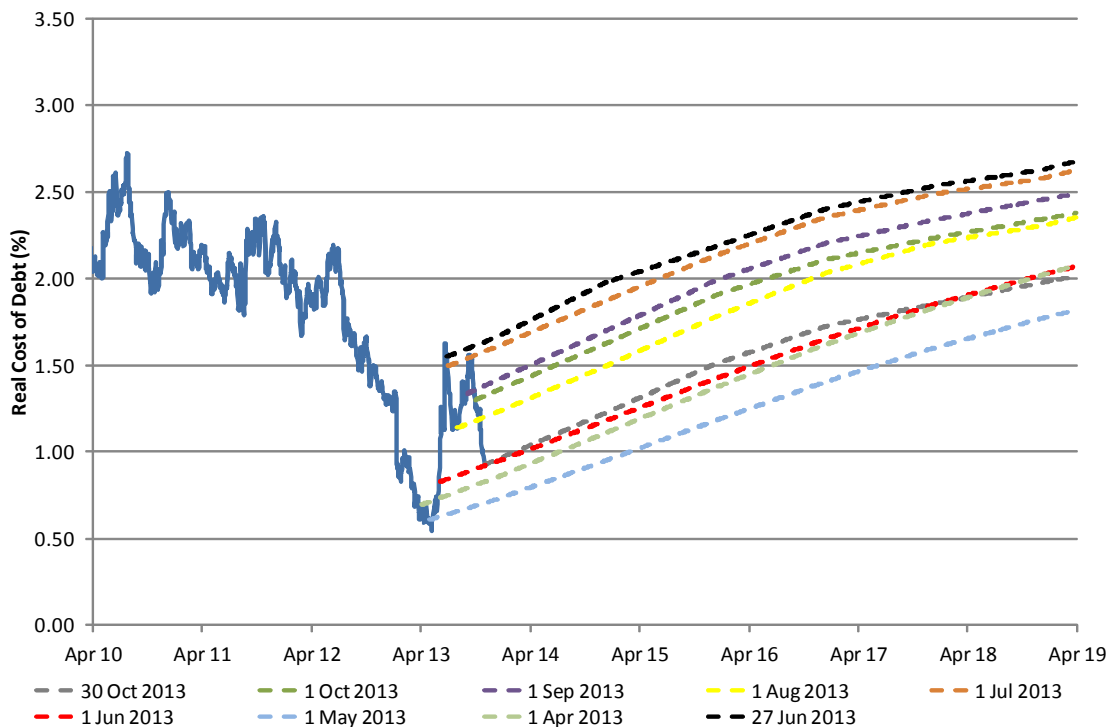
Source: Markit, Bloomberg, Bank of England, CEPA analysis

The data cut-off for the PwC report was 27 June 2013, so we include this data point in our analysis. This appears as the highest line in the figure above. The line for the 1 April 2013 is our closest data point to the initial PwC report (data cut-off 28 March 2013). The current figure for the real cost of debt for Q6 is 67bps below the corresponding estimate from 27 June 2013 and is just 10bps above the estimate from 1 April 2013. As such the original PwC estimate for the cost of debt ought logically to have been adopted with a very minor adjustment if the cut-off point for PwC's analysis had been the end of October 2013 rather than 27 June 2013. At 1.64%, this is significantly below the allowance for the cost of new debt that the CAA proposes to make.

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[7] See Table 7.3, PwC (2013) Estimating the cost of capital for the designated airports, October 2013.

[8] The indices used are not specifically identified in the PwC report from October 2013.

[9] This is the Bank of England ten year breakeven inflation measure, taking the difference between nominal gilts and index-linked gilts in order to arrive at an inflation assumption. Breakeven inflation has been used by the CAA in their cost of debt analysis (see the CAA technical annex on the cost of capital, p43) and is supported by regulatory precedent (for example, its direct use in the Ofgem cost of debt model).

The volatility within this data series was part of our rationale for adopting cost of debt indexation. To avoid placing too much weight on any one spot rate, we look at a range of estimates since April 2013.

The table below illustrates what market data showed on the cost of debt using different dates since April 2013. The first column uses the average of spot rates from iBoxx 10-15yr A and BBB non-financial corporate indices in addition to a forward adjustment (with coefficient of 0.8) based on gilt forwards to estimate the real cost of debt for each day of the Q6 period. We then take an average of these daily estimates over the Q6 period as an estimate for the cost of new debt. The averages for Q6 are shown to have been 2.31% on 27 June 2013 but the average using estimates between April and October 2013 is just 1.82%. This is again significantly lower than the allowance for the cost of new debt that is actually proposed by the CAA.

The second column shows what the indices indicate would be the all in cost of debt should the data analysis be based on a ten-year trailing average. This approach calculates the ten year trailing real cost of debt rate at each day in the Q6 period. We then average these rates over the Q6 period. The latest estimate would suggest a 2.23% overall real cost of debt (including both new and embedded debt), 5bps above the average of estimates over the previous six months, but 22bps below the estimate on 27 June 2013.

Table 1: Estimates over time for the cost of debt

Estimate date	Real spot cost of debt for Q6 based on forward estimates (cost of new debt)	Real ten year average cost of debt over Q6 based on forward estimates (overall cost of debt)
April 2013	1.54%	2.18%
May 2013	1.34%	2.12%
June 2013	1.58%	2.20%
July 2013	2.25%	2.43%
August 2013	1.92%	2.31%
September 2013	2.09%	2.37%
October 2013	2.00%	2.35%
Average Apr-Oct 2013	*1.82%*	*2.28%*
Current (30 Oct)	1.64%	2.23%
27 June 2013	*2.31%*	*2.45%*

Source: Markit, Bloomberg, Bank of England, CEPA analysis
Note: we use the first available data point within each month

The real cost of debt ten year trailing average is an estimate of the overall cost of debt as this incorporates both embedded (c.75% weighting) and new debt (c.25% weighting). Heathrow and Gatwick's total cost of debt figures excluding fees are over 70bps above the current ten-year rolling average figure for Q6 of 2.28%. For Heathrow in particular, given the higher percentage of new debt to be used relative to the iBoxx non-financial corporates indices (70% embedded, 30% new debt in the CAA Final Proposals)[10] and the better credit rating, outperformance of this benchmark should be expected. With a fee allowance of 15-20bps, this suggests the premium cost of debt given to Heathrow and Gatwick is over 85bps[11] over the benchmark which we think HAL should be outperforming. For Gatwick, with a slightly lower credit rating and longer debt life, a slightly higher figure than the benchmark may be appropriate, though not nearly as high as their allowances in the CAA final proposals[12].

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[10] We discuss the proportion of embedded and new debt in the CEPA annex on issues with the CAA approach to the cost of debt

[11] For utility companies regulated by Ofgem, the allowance in the index has headroom which is used to compensate the companies for fees.

[12] Forward estimates in gilts are applied to the cost of debt for corporates using a 0.8 coefficient in this analysis (i.e. for every predicted 1.0% rise in gilts, the cost of debt for corporates increases 0.8%). As gilt yields are predicted to rise, the larger the coefficient, the greater the expected rise in the cost of debt for corporates. PwC initially used a 0.6

We think that using the average figures over the previous six months in Table 1 (i.e. 1.82% for the cost of new debt and 2.28% for the overall cost of debt) would be the appropriate estimates to take from this analysis rather than simply using the spot rate on 27 June 2013.

The estimate for the cost of new debt over Q6 as estimated on 30 October 2013 is only slightly above the corresponding estimate from 1 April 2013. Therefore if PwC were to adopt the same approach (i.e. with a reliance on spot rates) and update their analysis, very little of the 70bps increase in their updated October 2013 paper would remain.

Using an average from 1 April to 1 October 2013 of our benchmark indices would lead to estimates of a cost of new debt of 1.82% and an all in cost of debt of 2.28%. We might expect HAL to be slightly below these benchmark figures and GAL slightly above these, should the CAA wish to reflect the differences in their credit rating. The purpose of this analysis though is not to specify the appropriate point estimate for the cost of debt, but to highlight the flaws with the approach taken by PwC and its results used by the CAA. Despite this, the magnitude of the difference between our benchmark and the allowances granted by the CAA is alarming and should invite the revisiting of market evidence on the cost of debt.

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coefficient rather than the updated 0.8 coefficient. If this 0.6 coefficient were to be used, the real cost of debt estimated would be lower.

Appendix C

Issues arising in relation to the CAA's estimation of the cost of capital

Note prepared for British Airways[1]

October 2013

Introduction

The CAA have stated that they have used a figure of 3.0-3.1% for RPI over the 2014-19 period in their modelling in the Final Proposals stage. This gives rise to three concerns:

1. the CAA uses the low end of their range of 3.0-3.4% together with a high percentile choice from the WACC range;

2. the CAA adjusts the PwC range without correcting for the difference in inflation and so overstate the real WACC, and further when using consistent inflation assumptions, the CAA's overall WACC estimate does not fall within the range estimated by PwC; and

3. both the CAA and PwC may be overestimating the WACC given their technical approach to deflating nominal yields.

1. The inflation assumption

From our analysis (set out in Annex 1), the CAA's stated RPI range of 3.0-3.4% appears justified.

The table below shows how different inflation assumptions would affect the PwC cost of capital range, using a simple deduction of inflation assumptions from the implied nominal rate.

Table 1: Impact on real cost of capital estimates

	HAL	GAL
PwC real WACC; 2.8% inflation (PwC)	4.50-5.80%	4.80-6.20%
PwC real WACC; 3.0-3.1% inflation (CAA modelling/ lower bound)	4.25-5.55%	4.55-5.95%
PwC real WACC; 3.3-3.4% inflation (CAA upper bound)	3.95-5.25%	4.25-5.65%
CAA point estimate of the real WACC	*5.60%*	*5.95%*

Note: simply deducting inflation rate from the implied nominal rate in the PwC October 2013 study, not using the Fisher equation. Inflation rates taken for the adjustment are midpoints i.e. 3.05% and 3.35%. No adjustment has been made to the proportion of embedded debt assumed by PwC.

As can be seen from this evidence, the CAA point estimate is above the range implied by the upper bound of inflation for both airports and above the range from using the lower bound

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inflation estimate for HAL and at the very top of this range for GAL. Using the upper bound estimate of inflation leads to a real WACC of 4.60% for Heathrow (versus 5.60% in the Final Proposals) and 5.00% for Gatwick (versus 5.95% in Final Proposals) if mid-points are taken.

2. Implications of inconsistent inflation assumption

British Airways' response to the Q6 Initial Proposals contained a paper by CEPA and a paper by Professor Sudarsanam[2], both of which criticised the lack of evidence behind the point estimate being taken from the 75th percentile of the PwC cost of capital range for GAL and the 80th percentile for HAL[3]. These notes were prior to the statement of the use of different inflation rate assumptions between the CAA and their consultants, PwC.

The CEPA report in June 2013 noted the differences in RAB growth between Q5 and Q6 (GAL: +33% Q5, +3.1% Q6; HAL: +35% at Q5, -2.1% Q6) and stated that it may be appropriate to use a point estimate towards the top end of the range if there was high investment relative to the assets which in our opinion was not the case in Q6.

What percentile of the range was chosen in real terms?

The CAA states that the 76th percentile was chosen for GAL and the 79th percentile for HAL[4]. This is taken from the CAA range contained within the technical annex paper[5].

Table 2: CAA WACC point estimate from CAA range

	HAL		GAL	
	Low	High	Low	High
Gearing	60%	60%	55%	55%
Risk-free rate	0.50%	1.00%	0.50%	1.00%
Equity Risk Premium	5.75%	5.75%	5.75%	5.75%
Equity Beta	0.90	1.15	0.90	1.17
Cost of Equity	5.68%	7.61%	5.68%	7.73%
Pre-tax CoD	2.78%	3.45%	2.95%	3.58%
Tax rate	20.2%	20.2%	20.2%	20.2%
Pre-tax CoE	7.11%	9.54%	7.11%	9.68%
Pre-tax WACC	4.51%	5.89%	4.82%	6.33%
CAA point estimate	5.60%		5.95%	
Percentile	*79th*		*76th*	

Source: CAA, CEPA analysis

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[2] Sudarsanum, S. (2013) Review of choice of high percentile WACC from a range in its initial proposal for the cost of capital for HAL and GAL, June 2013. CEPA (2013) WACC value selection above the midpoint of a range and the risk of double compensation, June 2013. Both of these reports were used in British Airways' response to the CAA Initial Proposals.

[3] In the Q5 determination, the 75th percentile for GAL had been used, in addition to the 77th percentile for HAL.

[4] Para 8.21, CAA (2013) Final Proposals: Cost of Capital technical annex.

[5] Figure 8.1, CAA (2013) Final Proposals: Cost of Capital technical annex.

The pre-tax WACC range has a higher upper bound than the PwC report. This is due to using 70% embedded debt rather than the 50% which had been used by PwC. Without making a judgement on which is the appropriate embedded debt proportion, when looking at the percentile choice taken by the CAA, by increasing the top end of the cost of debt range relative to the PwC range, the effective percentile choice was higher.

When we compare the CAA point estimate to the PwC cost of capital parameters we find that they have selected the 79th percentile for GAL and the 87th percentile for HAL from the PwC range.

Table 3: CAA point estimate from PwC WACC range

	HAL		GAL	
	Low	High	Low	High
Gearing	60%	60%	55%	55%
Risk-free rate	0.50%	1.00%	0.50%	1.00%
Equity Risk Premium	5.75%	5.75%	5.75%	5.75%
Equity Beta	0.9	1.15	0.9	1.17
Cost of Equity	5.68%	7.61%	5.68%	7.73%
Pre-tax CoD	2.78%	3.25%	2.95%	3.43%
Tax rate	20.20%	20.20%	20.20%	20.20%
Pre-tax CoE	7.11%	9.54%	7.11%	9.68%
Pre-tax WACC	4.51%	5.77%	4.82%	6.24%
CAA point estimate	5.60%		5.95%	
Percentile	*87th*		*79th*	

Source: PwC, CEPA analysis

This is in real terms, therefore it should take into account the differences in inflation estimates between PwC and the CAA.

We now try and approximate what the percentile would be in nominal terms. The CAA's use of PwC's figures to calculate its WACC range is flawed because it fails to take account of the fact that the CAA has decided to use a different inflation assumption from that used by PwC. To address this, one could either look at everything in nominal terms or recalculate PwC's numbers using the CAA's RPI assumption.

What percentile of the range was chosen in nominal terms?

As noted previously, PwC deduct 2.8% from the nominal rate for adjusting into real terms. The CAA state that they use 3.0-3.1% as the RPI inflation assumption in their modelling, which has greater support from market evidence and recent literature although is, in fact, very much at the bottom of the range that they consider to be appropriate.

Table 4: PwC pre-tax WACC estimates

	HAL		GAL	
	Low	High	Low	High
PwC range real	4.51%	5.77%	4.82%	6.24%
Inflation adjustment	2.8%	2.8%	2.8%	2.8%
PwC range nominal	7.31%	8.57%	7.62%	9.04%

Source: PwC, CEPA analysis
Note: uses 50% embedded debt and 50% new debt, as per PwC's report.

We can now look at what the CAA point estimate corresponds to in nominal terms using consistent inflation assumptions, so we are comparing on the same basis. We take an inflation assumption of 3.05% and use both the Fisher equation and a simple addition of the inflation rate to adjust the real point estimate into nominal terms for the pre-tax WACC.

Table 5: CAA point estimates in nominal terms

	HAL	GAL
CAA point estimate real	5.60%	5.95%
Inflation adjustment	3.05%	3.05%
CAA point estimate nominal (simple addition)	8.65%	9.00%
CAA point estimate nominal (Fisher equation)	8.82%	9.18%

Source: CAA, CEPA analysis
Note: inflation adjustment uses Fisher equation rather than simple addition as with Table 3

As we now have both measures on the same basis, we can identify where the CAA point estimate would fall in the PwC range if consistent inflation expectations were to be used. We again consider the use of a simple addition of the inflation rate to real rates before looking at this using the Fisher equation.

Table 6: Effective percentile from PwC range (simple inflation rate addition)

Nominal	HAL		GAL	
	Low	High	Low	High
PwC pre-tax WACC (50% embedded debt)	7.31%	8.57%	7.62%	9.04%
PwC WACC (70% embedded debt*)	7.31%	8.69%	7.62%	9.13%
CAA point estimate	8.65%		9.00%	
CAA percentile (using 50% embedded debt)	106th		97th	
CAA percentile (using 70% embedded debt)	97th		91st	

Source: PwC, CEPA analysis
Note: 70% embedded debt figure uses the updated CAA range for the cost of debt

Table 7: Effective percentile from PwC range (Fisher equation)

Nominal	HAL		GAL	
	Low	High	Low	High
PwC pre-tax WACC (50% embedded debt)	7.31%	8.57%	7.62%	9.04%
PwC pre-tax WACC (70% embedded debt)	7.31%	8.69%	7.62%	9.13%
CAA point estimate	8.82%		9.18%	
CAA percentile (50% embedded debt)	120th		110th	
CAA percentile (70% embedded debt)	109th		103rd	

Source: PwC, CEPA analysis

If a simple addition of the inflation rate to the real cost of capital is used, the point estimate is the 106th percentile for HAL (i.e. outside the PwC range) and at the 97th percentile for GAL based on PwC's original embedded debt proportion estimate. The results under the same embedded debt assumption from the Fisher equation are that the HAL point estimate lies at the 120th percentile of the PwC range, 35bps above the PwC upper bound when considering in nominal terms. The GAL point estimate in nominal terms is at the 110th percentile of the PwC range. Discussion of the Fisher equation compared to a simple deduction is discussed further later in this note.

Even when including the 70% embedded debt assumption, the CAA point estimate is at the very top of the range using simple addition of the inflation rate, or outside the range using the Fisher equation.

The summary of this analysis is contained within the table below.

Table 8: Percentile estimates

Pre-tax WACC range	Real or nominal	HAL	GAL
CAA	Real	79th	76th
PwC	Real	87th	79th
PwC	Nominal (addition of inflation) – 50% embedded debt	106th	97th
PwC	Nominal (addition of inflation) – 70% embedded debt	97th	91st
PwC	Nominal (Fisher equation) – 50% embedded debt	120th	110th
PwC	Nominal (Fisher equation) – 70% embedded debt	109th	103rd

Given that the different inflation assumptions are used, we think that the CAA statement on percentile choice could be misleading. We believe that the CAA has chosen outside the PwC range, certainly for HAL, and possibly for GAL (or if not then at the very top end of the range).

Appropriateness of the CAA's percentile choice

We disagree with the CAA statement that the point estimate is *'ultimately a judgement and the concepts that guide that judgement are qualitative in nature.'*[6] PwC have completed two reports on the appropriate cost of capital, looking at both qualitative and quantitative evidence. For the CAA to go against this analysis needs justification. Stating that this is a matter of judgement does not qualify.

The CAA have seemingly dismissed the aforementioned CEPA argument on the growth in RAB from Q5 to Q6, stating that *'just because the monetary value of capex compared to the RAB might not be as high, it does not mean that the capex is less important.'*[7] The subsequent discussion appears to be dealing with importance to the passenger. When determining the appropriate cost of capital, we are primarily concerned with the importance to the investor. As such, the financing amount relative to the asset is both a magnitude and risk based assessment key to determining the WACC, rather than choosing a rate based on the utility of the investment to passengers. Of course, there is a clear alignment between the needs of investors and passengers and an appropriately set WACC value should deliver both. What is not clear from the CAA position is that passengers have expressed a willingness to pay for this investment which may justify such a significant aim-up on the WACC as it being offered.

Conclusion around the percentile choice

As the CAA has chosen a point estimate at the top of the range or above the range (depending on which method is used), the breadth of the range chosen by PwC ought to have a significant impact on the cost of capital. In fact, without prejudice to the view that the CAA has already gone outside the range actually used by PwC, we think that a narrower range would have been more appropriate given the analysis conducted. This could have been done by two accepted methodologies:

- narrowing the ranges for each parameter value; or

- in deciding an overall cost of capital, the lower bound should not necessarily contain the low estimate of each parameter, nor the upper estimate be calculated on the upper bound of each input.

3. Errors in the CAA's use of PwC's figures for cost of debt

In the CEPA notes for British Airways, in getting from a nominal rate to a real rate, we have deducted the inflation rate from the nominal parameter rather than applying the Fisher equation. PwC appear to have conducted the same approach in converting to real rates. This has the effect of overestimating real rates. For example, with a 7.0% nominal yield and 2.0% inflation rate, the

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[6] CAA (2013) Final Proposals: Cost of Capital technical annex, p88.
[7] CAA (2013) Final Proposals: Cost of Capital technical annex, p87.

Fisher equation yields a real rate of 4.90% rather than the 5.00% from simply deducting the inflation rate. Other regulators, such as Ofgem for the RIIO cost of debt indexation have used the Fisher equation approach. Whilst we do not think that this necessarily merits changing the real range, we do think that it suggests the CAA should select a point estimate from the lower half of the ranges in real terms.

Further, where the CAA has purported to make an adjustment for its change in inflation assumptions (which it has not done at all in relation to PwC's overall range for the WACC as discussed above), it appears to have fallen into error. As noted, PwC use an inflation point estimate of 2.8% in their cost of debt estimate. The CAA states that they have taken this into account:

"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.[8]"

It is not, in fact, clear how this has been taken into account in choosing a point in the range as the CAA has picked a figure at or very near to the top of the range for embedded debt[9] with no explicit reference to any adjustment for differences in inflation assumptions and has explicitly made an adjustment of only 5 or 10bps in relation to the cost of new debt.[10]

In any event, however, there are issues with what the CAA has said it set out to do. Using the mid-point of its 10-20bps difference would lead to an inflation assumption of 2.95%. The CAA states however that evidence points to a range for inflation of 3.0-3.4%. The mid-point of this range is therefore 25bps above the 2.95% figure. Even if we take the 3.0-3.1% which the CAA is focussing upon[11], the corresponding adjustment should be 25bps, which is above the 10-20bps range noted by the CAA. We therefore think that on any view the CAA is not sufficiently adjusting for differences in inflation assumptions.

4. Summary

In conclusion, we find that the real cost of capital point estimate from the CAA has not taken into account the differences between their own inflation assumptions and the rate put forward by their own consultants in arriving at a real cost of capital. This has the effect of:

1. overstating the real WACC proposed by the CAA; and

2. pushing the CAA point estimate outside the PwC range when using consistent inflation assumptions[12].

There are risks to the consumer that inflation is estimated too low and thus the real cost of capital allowed is too high. This risk stems from both the market evidence on RPI inflation estimates going as high as 3.4% and the approach in deflating nominal yields potentially underestimating the true inflationary impact.

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[8] CAA (2013) Final Proposals: Cost of Capital technical annex, p49.
[9] CAA (2013) Final Proposals: Cost of Capital technical annex, para 6.67.
[10] CAA (2013) Final Proposals: Cost of Capital technical annex, para 6.68.
[11] CAA (2013) Final Proposals: Cost of Capital technical annex, p49.
[12] Using the Fisher equation for adjustment (110th and 120th percentile). If simple deduction of the rate were to be used instead, the CAA estimate is outside the PwC range and GAL near the very top of this range (106th and 97th percentiles).

Annex 1: Estimates for RPI

Introduction

There is a CPI target of 2.0% per annum set for the Bank of England, which, if credible, should contribute to expectations of CPI inflation. In a regulatory setting we are interested in the RPI inflation rate. The OBR in a working paper considered the relationship between CPI and RPI inflation, such that we can compare across both measures of inflation[13]. This working paper from November 2011 found that the difference between CPI and RPI inflation from 1989 to 2011 had averaged 0.7 percentage points, but that they expected this difference to persist at around 1.2 percentage points from 2010.

The suggested reason for this is the 'formula effect' whereby the use of the geometric and arithmetic mean for CPI leads to differences from the arithmetic mean only approach for RPI. This large contribution is expected to persist going forward, and rose from 0.5 percentage points between 1997 and 2009, to a full percentage point in 2011. A difference between the measures is also the inclusion of housing components in the RPI, but not in the CPI.

Between 1997 and 2013, the average RPI inflation rate has been 3.0%, with an average CPI inflation rate of 2.1%. More recently for the 2010-13 period, RPI has averaged 4.0% per annum, so given the forecasted rise in economic growth rates, a figure closer to this rate may be a reasonable expectation. The projected rise in economic growth is shown in the diagram below.

Figure 1: GDP projections
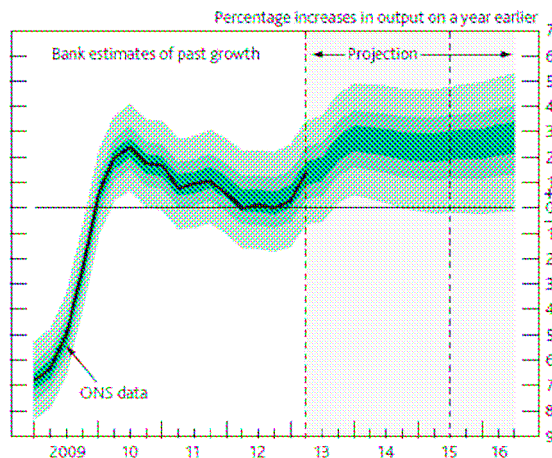
Source: Bank of England - Inflation Report August 2013.

How accurate are inflation expectations?

An argument as to why inflation expectations might not be appropriate could be that they are not accurate in predicting future rates. It should be noted that RPI expectations rose sharply

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[13] OBR (2011) 'The long run difference between RPI and CPI inflation,' Ruth Miller, November 2011.

after the Office of National Statistics (ONS) decision not to change the calculation methodology in January 2013. A report in the Bank of England quarterly bulletin, found that companies' inflation expectations tend to closely track their price setting behaviour[14]. Whilst the airports are subject to price cap regulation, it may be reasonable to assume that their suppliers may follow this pattern and wages demanded by staff will be partly led by their inflation expectations. The CAA have used a higher inflation rate for their wider modelling given this relationship, so it is only appropriate that the same inflation rate is applied to the real cost of capital as well as the rest of the price control.

A further Bank of England report in 2012 found that inflation expectations have remained relatively stable and in mid-2012 were close to their 1997-2007 average, 'suggesting that inflation expectations have not become less well anchored.'[15]

Using a five-year average, two-and-a-half years ahead for RPI inflation (i.e. from two-and-a-half years to seven-and-a-half years ahead) compared to inflation expectations, we can observe whether there is a relationship between expectations and actual inflation. Whilst there is greater volatility in the observed RPI inflation figures, expectations appear to have been relatively close to the outturn RPI inflation, especially in the period since 2008. Given the comparison uses medium-term averages, the latest breakeven inflation figures (3.2% in September 2013) are not included in the graph.

Figure 2: Breakeven inflation expectations and RPI
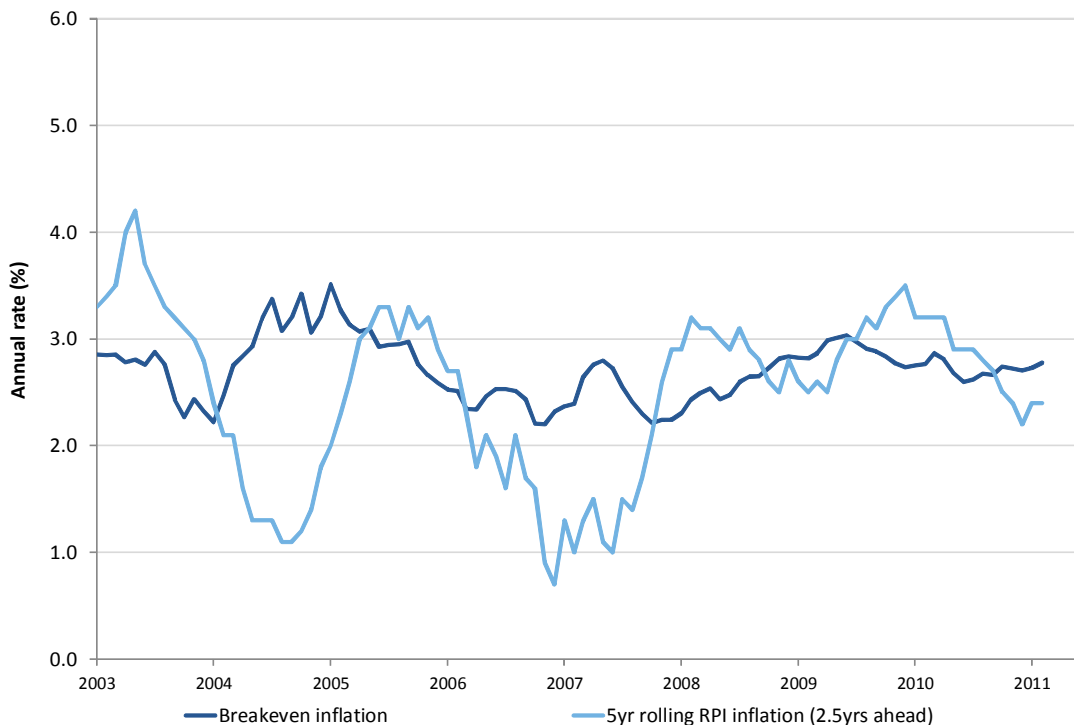
Source: Bloomberg, Bank of England, ONS

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[14] Bank of England (2013) 'Do Inflation Expectations currently pose a risk to the economy?', Becky Maule and Alice Pugh (2013Q2).
[15] Bank of England (2012) 'What accounts for the fall in UK ten-year government bond yields?', Rodrigo Guimares (2012Q1)

Given that we think it is appropriate to use inflation expectations for future inflation rates, we look at three separate forecasting sources for UK inflation rates in addition to breakeven inflation:

a) Bank of England forecasts;

b) OBR forecasts; and

c) HM Treasury Independent Forecasts.

Bank of England forecasts[16]

The evidence from the latest Inflation Report shows that rates above the 2.0% CPI inflation target are expected. The below figure shows the probability assessment that annual CPI rates will be above 2.5% for the respective quarter.

Figure 3: CPI inflation probability assessment
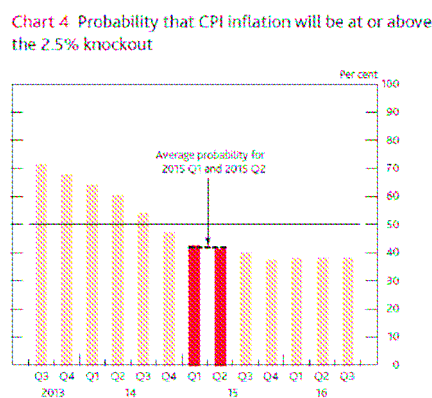
This shows that it is more likely than not that CPI inflation will be above 2.5% for 2014 and the probability of going above this rate through 2016 is around 40%. Given the discussion earlier around the RPI and CPI difference of 1.2%, this may be interpreted as similar to the probability the RPI inflation rate will be above c.3.7%. Given that the PwC inflation rate is 2.8%, this is a significant difference and is suggestive of the fact that the assumed inflation rate should be greater. When deflating the nominal yields that formed part of this analysis, the real cost of capital would then become (significantly) lower. The BoE note that there is 'considerable uncertainty about the supply capacity of the economy as demand recovers.'

Table 1: Longer term inflation expectations

	2012	2013 Q1	2013 Q2	2013 Q3
Bank/ NOP (5yrs ahead)	3.4%	3.6%	3.6%	na
Barclays Basix (5yrs ahead)	3.9%	3.6%	3.5%	na
YouGov/ Citi (5-10yrs ahead)	3.4%	3.5%	3.3%	na
5yr, 5yr forward RPI inflation	3.1%	3.4%	3.5%	3.5%

Source: Bank of England.

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[16] Bank of England (2013) Inflation report, August 2013.

Note: Final row refers to inflation implied by swaps.

In terms of CPI inflation figures, the Bank has a median projection for the end of the year of 2.4% in 2014 and 2.0% in 2015. If this difference between RPI and CPI continues to be observed, this points to an inflation rate well above the PwC assumed rate.

OBR forecasts[17]

In their latest Economic and Fiscal Outlook (EFO) from March 2013, the OBR publish their inflation forecasts for the next five years. These are provided below.
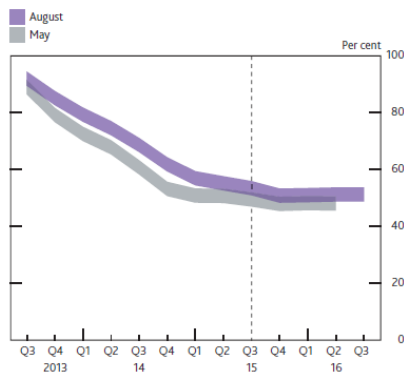
Table 2: OBR inflation forecasts

% pa	2014	2015	2016	2017	2018
RPI	2.8%	3.2%	3.6%	3.9%	4.0%
CPI	2.4%	2.1%	2.0%	2.0%	2.0%

Source: OBR

This shows that RPI rates are expected to rise to above 2.8% in the coming years, though their central predictions for 2014 are below the Bank of England estimates. The table below shows that since March, the expected rate for CPI inflation has risen.

Figure 4: Changes in probability of inflation being above the target

Chart 5.4 Probability that inflation will be above the target

Source: Bank of England

HM Treasury Independent Forecasts

HMT provide a monthly comparison of independent forecasts for the UK economy. In this, they provide inflation forecasts for both CPI and RPI. These are shown in Table 3 below.

Table 3: HMT Independent forecasts

	2014	2015	2016
CPI inflation	2.2%	2.2%	2.2%
RPI inflation	2.9%	3.3%	3.3%

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[17] OBR (2013) Economic and fiscal outlook, March 2013.

The following table shows annual RPI rates since 2010, showing that for every quarter the RPI rate has been above 2.8%.

Table 4: RPI annual inflation rates (% pa)

	2010	2011	2012	2013
Q1	3.98%	5.29%	3.77%	3.26%
Q2	5.13%	5.10%	3.11%	3.10%
Q3	4.71%	5.21%	2.92%	-
Q4	4.66%	5.11%	3.10%	-

Source: ONS

This leads us to conclude that the range of **3.0-3.4%** as put forward by the CAA in the Final Proposals document is justified. The CAA have used a rate of 3.0-3.1% in their modelling, although the figures at the top end of this range appear credible expectations. We have discussed the use of this range in the main report.