BT'S POSITION
ON THE COST OF CAPITAL
FOR BT AND OPENREACH

Report prepared by BT

with advice
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<u>**Contents**</u>

EXECUTIVE SUMMARY

Changes Since the First Consultation

1. BT is pleased to note that Ofcom has taken some account of the evidence submitted in response to the first consultation which:
   - Justifies a wider range for consideration of the appropriate WACC.
   - Indicates that the regulatory WACC be above that suggested in the first consultation.

2. Nevertheless, BT considers that the range proposed by Ofcom is still too narrow and that the mid-point of that narrow range is not in keeping with practice of the Competition Commission (CC). This will act as a distinct disincentive on BT and others to invest in NGA.

3. BT notes that the independent report by the Brattle Group confirms many of the findings and much of the analysis submitted by BT:
   - That the beta has been rising during 2007-08.
   - That against the World Index, BT has a higher beta value than against the FTSE allshare[1].
   - Most estimates of beta are now well in excess of 0.9 and close to or above the top end of the Ofcom range.

4. BT provides evidence that this materially higher beta estimate from Brattle is not associated with higher gearing in the recent past and that Ofcom should continue with a nominal gearing level and extend the range of the beta for its own forward-looking range for the review period.

5. In terms of the other parameters which enter the WACC, BT notes the wider range for the risk free rate adopted by Ofcom and the slightly higher range for the ERP. However, the latter in particular is still less than the range proposed by BT and other independent experts.

The State Of Financial Markets and Gearing

6. BT agrees with Ofcom that it would be inappropriate to rely on current rates of parameters in the CAPM formula as being necessarily indicative of those prevailing over the longer term which is customarily the basis for setting WACC. The precise value of WACC which would derive from a 'spot rate' is however very debatable as it is not possible to observe for example what the current risk premium actually is for equity.

7. Accordingly, it is not self evident that the parameter values chosen by Ofcom for its WACC estimate based on 'spot rates' are mutually consistent. It is indisputable that the current debt premium (and indeed the cost of debt) is well outside Ofcom's 'spot' estimate and the cost of equity must be higher than that of debt. Implicitly therefore, the overall cost of capital currently is very high, significantly above the 'spot' value which Ofcom presents and outside the top end of the Ofcom range for forward-looking regulatory WACC. This situation is not disputed by independent academic experts and city financial analysts.

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[1] Indeed Brattle Group undertakes considerable analysis against the allworld index but do not comment on the relevance of this for their conclusions. Nor does Ofcom appear to recognise that it placed some weight on the All World Index in the March 2007 Mobile Call Termination Determination.

8. BT agrees with Ofcom that it is appropriate to continue to use nominal gearing. Since November 2008 there was some recovery in BT's share price (although the recent value has fallen) and gearing using the market value of debt is below that of book value which is what Ofcom appears to use.

9. BT notes that Ofcom acknowledges that independent experts are not in agreement as to whether or not Openreach exhibits more or less risk than BT Group. This suggests that variation in regulatory WACC as between Openreach and the rest of BT should not be too large.

Comparison with Competition Commission

10. Ofcom suggests, but does not demonstrate, that its methodology is consistent with that of the Competition Commission[2]. BT does not agree with this proposition and has analysed the two methodologies in detail.

11. Firstly, the CC constructs its ranges quite differently from Ofcom. The ranges which Ofcom derives are unlike those of any other regulator and not in line with its previous methodology.

12. Secondly, BT does not concur that the principle of incentivisation of investment adopted by the CC is the same as proposed by Ofcom. The CC advocated an uplift above the central estimate ('mid-point') to take account of the welfare loss asymmetries associated with under- *vis a vis* over-estimation of the regulatory WACC.

13. Ofcom's analysis appears to suggest using a mid-point value for WACC while simultaneously suggesting it has up-lifted some of its parameter estimates (in particular concerning the lower value used in the range for the ERP – see A12.41 and A12.42) to lie above central estimates. On the other hand, Ofcom points to making only project-specific allowances to incentivise investment.

14. Finally, Ofcom suggests that any differences in methodology would not have resulted in a different outcome.

15. BT has prepared a detailed assessment of the CC analysis of the three airports where it did the primary research and this was subsequently adopted by the CAA. These are summarised below on a common gearing assumption of 35% in the table below and where the Regulatory WACC (final row) is set using the uplift principle set out by the Competition Commission:

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[2] Competition Commission, 2007, BAA Ltd : A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd); 23rd October 2008 Stansted Airport Ltd Q5 price control review Presented to the Civil Aviation Authority. Documents available at http://www.competition-commission.org.uk

Table 1
Comparison of Ofcom and the Competition Commission*

	Competition Commission / CAA			Ofcom
	Heathrow March 2008	Gatwick March 2008	Stansted October 2008	BT Openreach[+] December 2008
WACC Low	8.8	8.9	8.9	9.2
WACC High	10.5	10.9	11.4	10.8
Regulatory WACC	10.3	10.6	11.0	10.5

* Converted to nominal rates, re-levered for 35% gearing and rounded to one decimal place. (Note there are some rounding differences compared with Ofcom; see Appendix 1.)
[+] References to BT Openreach in this Annex pertain to the services within Openreach subject to this specific consultation.

16. The CC/CAA awarded BAA a WACC above the mid-point and on a like-for-like basis, would suggest that Ofcom set a value for Openreach of 10.5%. This would be below the top end of its range and a little below the mid-point as proposed by BT.

17. This value would take as 'reasonable' the range which Ofcom has calibrated. It is noticeable however that the upper end of the range for Stansted is considerably greater than for Openreach and since October, the higher volatility in financial markets suggests the range should *increase* and not reduce. Further, on a like-for-like basis, the CC attributed a higher Regulatory WACC to Stansted (11.0% compared with 10.5% for Openreach assuming Ofcom adopts the same underlying methodology as the CC).

18. More detailed analysis below shows that even if Ofcom adopted a wider range for the ERP (including adopting a lower bottom end value, thus taking away any implied 'generosity') – that using the approach of the CC would *still* imply an uplift above the mid-point of Ofcom's current range.

19. It is also highly plausible that the CC would take different parameter values from Ofcom – that is, it is more likely the CC would adopt estimates more in line with recent evidence and the views of other experts. This would suggest that the Regulatory WACC would be above 10.5% as shown in Table 1 above.

20. BT therefore considers that: (a) Ofcom has taken an approach which is not proven to be consistent with that of the CC; and (b) Ofcom's claim that its approach yields a point estimate for the allowed rate of return similar to that which would be obtained using a CC methodology but with different ranges is not substantiated.

Incentivisation of Investment

21. On the matter of incentivisation, Ofcom notes it has a duty to promote *efficient* investment and not investment *per se*. Unless Ofcom believes it can distinguish between investments which will be successful and those which turn out not to be, this distinction is academic – regulators can set the ground rules for the industry but not for specific commercial plans.

22. BT is not persuaded that it is not necessarily possible to make project specific adjustments even if in theory this may be an appropriate methodology to incentivise investment efficiently. It is noteworthy that the CC allowed for generic incentivisation in setting the overall Allowed Rate of Return[3]. All parties are agreed that the next phase of major NGA/NGN investment will be risky with the likelihood of much greater systematic risk as the applications running across these networks will be much more discretionary in nature and demand will be sensitive to economic variations. Ofcom's assessment for WACC for the BT Group needs to reflect this reality.

Setting a Forward-Looking WACC

23. In summary, BT sees no reason to change its central estimates and ranges submitted in its first response[4]. A comparison of these values with those provided by Ofcom are given in Table 2 below:

Table 2
Comparison Of BT And Ofcom Proposals For WACC

	Ofcom's Dec08 Assessment		BT Feb 09 Assessment	
	Range#	ARoR[+]	Range*	ARoR[**]
Openreach	9.25-10.75	Not stated	9.1-12.5	12.1
RoBT	10.25-11.75	Not stated	9.7-13.7	13.3
BT Group	9.75-11.25	Not stated	9.4-13.1	12.7

[+] Allowed Rate of Return.
Note that, since Ofcom's range is developed on an ad hoc basis, there is no reason to expect that it corresponds to a 95th percent confidence interval.
* BT's range is explicitly a 95th percent confidence interval.
** The allowed rate of return here is set at the 90th percentile.

24. Taken overall, BT is of the firm view that Ofcom's range is still too narrow. A more plausible range would have a lower value below that which Ofcom proposes and an upper level beyond the top end of Ofcom's range. Critically, the margin between these two points at the 'upper end' should be considerably greater than the equivalent margin at the 'lower end'.

25. In turn, this indicates that the mid-point of this range - and any associated uplift above the mid-point to incentivise investment - should be higher than Ofcom's equivalents.

26. It is not clear to BT to what extent (if at all) Ofcom is intending to maintain its previous practice of setting an allowable rate of return toward the upper of its

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[3] For a recent academic analysis of this approach and its relevance to rate setting, see the following publication – 'Setting the regulatory allowed rate of return using simulation and loss functions – the case for standardising procedures', Professor Ian M. Dobbs, Competition and Regulation in Network Industries, Volume 9 (2008), No. 2. .

[4] In this context BT notes that nominal interest rates have been falling in the recent past due to the Bank of England's decisions to lower interest rates and this has been to some extent reflected in bond yields. During 2009-10 inflation is likely to be very low although most commentators expect inflation in the medium term to increase and this is evidenced from implied inflation as the difference between real and forward spot rates. There is however a lot of uncertainty about the impact and duration of 'quantitative easing'; rising commodity prices, falling exchange rates suggest these downward movements could be limited. According to the Bank of England February Report, the central projections of independent forecasters predict the Bank Rate will be 3.5% by 2012 Q1. Further, as BT has stressed in the response to the First Consultation, the actual cost of debt continues to rise as debt premia are increasing to more than offset reductions in the risk free rate.

range. Simply setting at the mid-point (10% for Openreach) would imply no increase in WACC since 2005. This is inconsistent with evidence and widely held views that the cost of capital has risen significantly since then, and that all firms will find raising finance to be materially more expensive for the foreseeable future.

27. For all the above reasons, BT urges Ofcom to give careful consideration to the evidence justifying a regulatory WACC considerably above the mid-point of an appropriate range for forward-looking WACC.

28. BT notes that the CC, in its airport assessments, undertook a full simulation of the WACC and set a regulatory return which explicitly allowed for the welfare effects of setting a return which was in fact too low. The CC's approach is set out in more detail in our response to the First Consultation. A key question in applying this approach is from where in the distribution the WACC figure should be chosen.

29. The CC did not explicitly state how it chose the actual figure for WACC from the distributions of WACC it had determined for each of the airports. BT has therefore analysed the CC's findings in the airports price reviews to determine how a WACC number may be chosen from the distribution. In practice, the allowed returns for the three airports gave an implicit weighting of at least 80% to the upper value of the range of WACC (corresponding to the 95th percentile) and 20% weighting to the lower value of the range (corresponding to the 5th percentile). BT suggests that this is an appropriate minimum value to apply for this review and for the purposes of assessing the consistency of approach between Ofcom and the CC. More detail is set out in paragraphs 62 and 63 below.

30. These suggestions are provided without prejudice to BT's stance of the appropriate level of WACC to be set in the final column of Table 2 above, the reasoning for which is set out in the response to the First Consultation and expanded upon below.

Comments On Annex 12 of the Second Consultation (Cost Of capital)
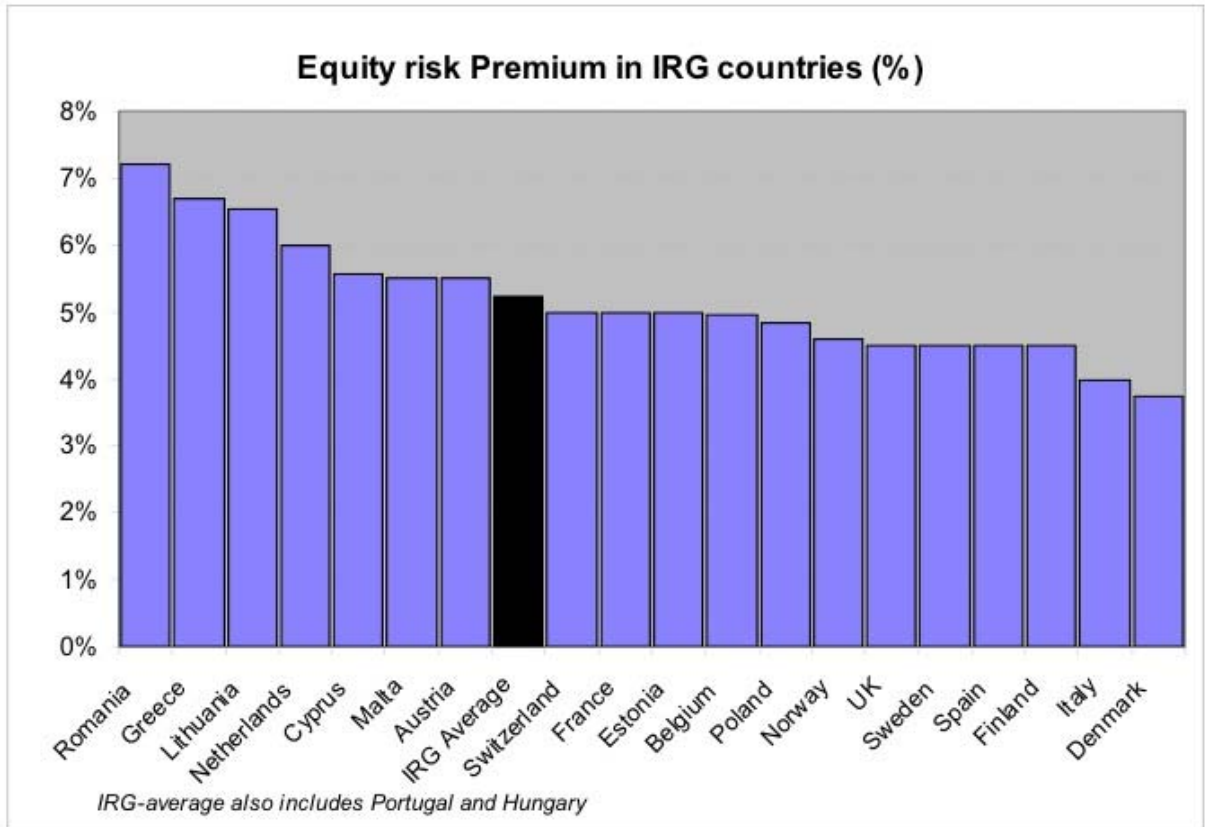
The ERP

31. While the upper end of the range for the ERP has been raised since the first consultation, in BT's view, Ofcom [A12.39] still proposes too a narrow range for the ERP. Ofcom suggests that - 'a broad range of 4 to 5% reflects a balanced view of the available evidence'. BT does not agree with this statement given that the foremost experts in the field (Professors Myers and Schaeffer respectively) recently proposed upper limits of 6.5% and 6% respectively[5].

32. In its response to the First Consultation, BT set out evidence from a number of sources that the range for the ERP should be wider than that being proposed by Ofcom and these comments still stand.

33. BT agrees with Ofcom [A12.40] that the consensus is for upward pressure on the ERP in line with increased volatility in financial markets. Given this consensus, BT suggests that the regulatory benchmarks which Ofcom cites

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[5] Referenced in BT's August submission at Table B.3.

[Figure A12.1] are not relevant to setting a forward-looking regulatory WACC for BT.

34. A comparator of Ofcom's position on the ERP against other telecom NRAs is provided in the Figure below based on the most recent benchmarking undertaken by the IRG[6]. This suggests that Ofcom is very much in the lower part of the range.

Equity risk Premium in IRG countries (%)

IRG-average also includes Portugal and Hungary

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[6] IRG – Regulatory Accounting Principles of Implementation and Best Practice for WACC calculation February 2007. Available from the ERG website.

BT Group Beta

35. BT provides detailed comments on the analysis of the Brattle Group in the section below with summary observations here.

36. While BT is pleased to see that both Brattle and Ofcom have recognised some significant upward movement in Group beta, BT considers that there remains a strong justification for adopting a range which is higher than that proposed by Ofcom. The Table below shows that most estimates of beta are between 0.90 and 1.0 above Ofcom's range of 0.85-0/95 for BT Group.

Table 3

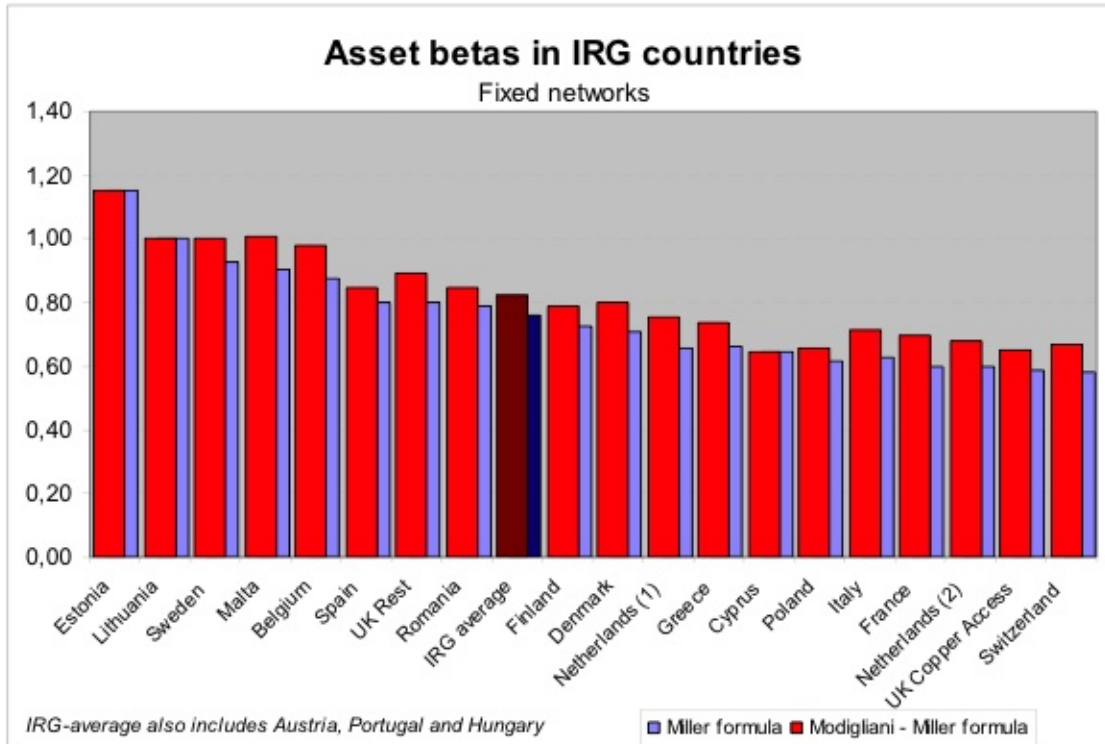| BRATTLE BETA ESTIMATES (Latest Data to 10th Oct/08)			
(a) Base Calculations (Table 1)			
	1 yr	**2 yr**	**5 yr**
All Share	0.94	0.93	0.89
All World	0.96	0.97	0.89
(b) Sensitivity Testing (Table 4) 1 yr			
	Base	**IOR**	**Robust**
All Share	0.94	0.89	0.89
(c) Exclude recent data (Table 9) 1 yr			
	15-Sep	**25-Sep**	**10-Oct**
All Share	0.86	0.89	0.93

37. Specifically, it is relevant that *current* estimates against the FTSE allshare index according to Brattle are around 0.95 and a little higher than this against FTSE allworld index. Specifically, as discussed below, Brattle computes a number of beta estimates against the allworld index but does not appear to comment on the implications of so doing. BT notes that in the Mobile Termination Review, Ofcom appeared to place at least some weight on this index[7].

38. Brattle agrees that a forward-looking range would actually have an upper level above 1.0 (subject to the issue of gearing discussed below) and that 1.0 represents an upper bound for *current* beta (Page 16 Annex 16). Ofcom's range of 0.85-0.95 does not represent a plausible *forward looking* range for Group beta unless one accepts *fully* the Brattle hypothesis regarding gearing movements. As discussed below, this hypothesis is not substantiated.

39. Further, the Brattle analysis of standard errors for beta suggests that Ofcom's range for beta is too narrow, leading to a too narrow range for WACC (in addition to the other reasons why Ofcom computes too narrow a range for WACC set out elsewhere in this response).

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[7] Mobile call termination, Statement Ofcom March 2007, paragraph A18.64.

40. BT notes that Brattle accepts that beta has risen significantly (by about 0.1) since March 2008. However, Brattle proposes two somewhat contradictory explanations for this. The first is that in response to BT's rising gearing, if a de-leveraged calculation was performed, this would result in a WACC estimate that would not be materially different from that computed using a higher beta. The second hypothesis is that the Group beta never 'really' fell significantly over the period of 2006-2007, as when adjusted for certain atypical observations, it was comparatively static.

41. On the first hypothesis, BT notes that Brattle provides little real *evidence* for this assertion and more detailed analysis by BT (section following) does not give support to it. Further, it would seem rather perverse that a *falling* share price could lead to an apparent *lowering* of BT's cost of capital – when the fall in share price has arisen from worsening market expectations of BT's financial outlook (in common with other companies). BT considers that this is untenable as a working hypothesis.[8]

42. Regarding the susceptibility of beta estimates to atypical observations, BT agrees with Brattle that estimation of a forward-looking beta is not straightforward and the best that can be done is to observe and apply reasonable judgement. The difficulty with making ad-hoc adjustments - such as by selecting certain time periods and then removing/reducing the impact of what are deemed to be atypical observations – is that this is a totally arbitrary procedure. There is nothing to say that the future will not equally include 'atypical' observations which represent a real and tangible impact on the beta value.

43. In summary, BT while is sympathetic to a degree to the second of the Brattle hypotheses, the fact remains that the Brattle estimates are considerably higher than before and cast serious doubt on Ofcom's forward looking range. The Brattle evidence on beta is currently around or even above the very top end of the Ofcom range. Further, as discussed in the technical Annexes, Brattle's estimates of the standard error for beta would point to a wider range than that set by Ofcom and implicitly also a wider range for WACC.

44. International benchmarking again suggests that compared with other telecom regulators, Ofcom's estimate is distinctly below the average as shown by the IRG study cited above and reproduced below. This diagram suggests that the beta for Openreach is the second lowest of all regulatory determinations and the BT Group value is also below average.

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[8] 'Bad news' concerning a company's future prospects will unambiguously increase its WACC, the cost of raising finance. The bad news will adversely affect share price, and hence gearing (debt/equity ratio) will increase. If this was the only effect, it would reduce the *WACC* (given the cost of equity is greater than the cost of debt. However, it is not the only effect; the concomitant increase in debt premium will necessarily more that offset this effect – and the overall *WACC* will increase.

Asset betas in IRG countries
Fixed networks

IRG-average also includes Austria, Portugal and Hungary

Legend: Miller formula / Modigliani - Miller formula

45. BT therefore suggests that the range for beta that Ofcom should adopt be at least 0.85-1.05, taking account of: (a) the evidence of the rise in beta; (b) the higher values using an All-world index; (c) the econometric evidence provided by Brattle; (d) the benchmarking of the IRG; and (e) the absence of any evidence to suggest that beta is materially different from one – a position which Ofcom strongly endorsed in 2005.

Debt markets

46. BT broadly concurs with most of what Ofcom has written here with the exception of how Ofcom has treated the upper and lower values of the debt premium and the risk free rate. In Ofcom's latest approach (and unlike in all its previous assessments), the range for the debt interest rate is computed by adding the upper bound value for the debt premium to the lower bound value for the risk free estimate, and the lower bound debt premium to the upper bound risk free value.

47. Tying the opposite ends of the ranges in this way is consistent with the assumption that debt premia will be high if the risk free rate turns out low and vice versa. There is some logic for this although it is an extreme assumption. In fact, in the current financial crisis, reductions in the risk free rate have been *more* than offset by rises in the risk premium. However, this is not necessarily always the case. Ofcom neither cites nor presents any empirical evidence in favour of such an assumption.

48. As previously remarked, in Ofcom's previous assessments, and in the assessments of all the other UK regulators (Ofgem, Ofwat, CAA, CC), ranges are computed by adding upper (respectively lower) values for debt premia to upper (respectively lower) values for the risk free rate for the debt premium. While BT has some reservations on this approach, it is at least consistent across different sectors enabling some transparency on how regulatory

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WACCs are determined. Further, as discussed below, it allows for an 80/20 rule of thumb to set the regulatory WACC.

49. In conjunction with a very narrow range for ERP, as shown below, this unusual methodology results in Ofcom deriving a much narrower range for its regulatory WACC than in other regulators assessments and in particular the CAA / CC assessments for airports.

50. BT also suggests that Ofcom's approach to setting ranges is not entirely consistent across competing technologies. Specifically, the Mobile Call Termination Statement of March 2007 showed that Ofcom set point values for the risk free rate and the ERP, and wide ranges for beta, while in this consultation, Ofcom effectively is doing the reverse.

51. The implications of this particular variation in methodology – along with differences in the approach to disaggregation – may be considerable. BT is especially concerned that mobile operators are consequentially given a WACC for call termination which is very considerably above what Ofcom appears to be proposing to determine for BT, in spite of the widely held and accepted view that the two networks are in competition with each other for voice calls. The mid-point of Ofcom's range for Rest of BT is 11.0% and this compares on a like-for-like basis with 14.1% for MNOs[9].

52. Finally, BT notes that Ofcom appears to use book rather than market valuations for debt and the two are not in general the same. Theory concerning levering and relevering equity betas is based on the use of market value based gearing (market value for debt as well as for equity)[10].

Cost of Capital Calculations

53. BT agrees with Ofcom that it is unwise to rely on spot values for regulatory WACC. Specifically, BT considers that there is the high likelihood of inconsistent values within the CAPM methodology. The problems with spot WACC estimates are set out above in the Executive Summary.

54. In particular, BT notes that Ofcom [Table A12.6] uses the top end of its ranges for the ERP and equity beta when calculating a spot rate for WACC. These are combined with a debt premium of 4.5%. However, actual debt premia have been higher than this, and the most recent quotes to the Ofcom date of 24th November which BT has been given by investment banks, suggest that the premium would be between 600bps and 900bps depending upon currency and term.

55. Taking just the mid-point of this range at 750bps would put the cost of debt higher than the cost of equity in Ofcom's Spot rate calculations. This is never going to be possible where a premium is demanded for equity over and above that for debt - and is clear evidence that Ofcom's assumption of only 5% for the equity risk premium is too low. This is an important point given that independent experts assess higher upper values for the ERP range as noted above.

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[9] Converting the 11.5% real into a nominal rate but making no adjustment for gearing assumptions.

[10] It is also worth remarking that there are issues associated with the fact that BT hedges currency risks (associated with Euro and Dollar denominated bonds) when deriving a true market valuation for BT's debt.

56. In the first consultation, BT made a number of observations on the importance of setting an appropriate range for WACC and these still stand. The issue of whether or not Ofcom can identify efficient as distinct from inefficient investment has been discussed above.

57. Ofcom [A12.116] suggests the following:

    A12.116 We estimate that a CC-style range using the CC's estimates of the risk-free rate and the ERP, but our own estimates of Openreach's equity beta and debt premium would result in a point estimate in the middle of our proposed range of 9.25 – 10.75%.
    A12.117 Therefore, we do not believe that our approach is inconsistent with that of the CC, although some care has to be taken when making comparisons between the two sets of estimates.

58. BT infers from this text that Ofcom considers that the methodology adopted by the CC would result in roughly a mid-point value of Ofcom's range i.e. 10.0%.

59. There are some difficulties of making such a translation as the CC did not use its range for the ERP (and indeed other parameters) in the manner which Ofcom proposes to handle uplift for incentivisation (although the exact way in which Ofcom proposes to deal with this issue is not clearly articulated). In all previous reviews where BT has been regulated, Oftel and Ofcom have explicitly stated the need to set a WACC above the mid-point but no such indication is provided on this occasion.

60. BT has examined all three sets of CC studies into the three airports (Heathrow, Gatwick and Stansted) and put them onto an equivalent basis to the Ofcom assessment for Openreach. The following Table provides a comparison of WACC assessments made concerning British Airports, along with the Ofcom assessment for BT Openreach. The assessments made by the BAA and the Competition Commission were originally set in real terms and these have been converted using formulae set out at Appendix 1.

61. Table 4 gives the ranges for both adjusted (35% leverage) and unadjusted pre-tax nominal WACCs for the three airports, along with the range for Openreach. Ofcom appear to propose the midpoint (say) of 10.00% but on CC principles, using the *Ofcom* ranges for key variables, it would be around 0.5% higher.

62. Note that in the CC methodology, the point in the range chosen for the airports was always *more* than 80% toward the upper value of the range. For Heathrow it was 88%, for Gatwick, 85% and for Stansted, 81% respectively. For example, in Table 4 below, the allowed rate of return for Heathrow of 9.5% corresponds to the calculation 0.12x8.1%+0.88x9.7%.

63. In what follows, we take an 80% weighting on the upper value as 'conservative' in deriving estimates based on the CC approach. That is, in Table 4, the value of 10.5% calculated for Openreach comes from putting a weight of 80% on the upper value in the Ofcom range (this is less than the

lowest uplift the CC used for any of the airports). This conservative weighting scheme is referred to as an "80/20 rule" below.[11]

Table 4
Comparison of WACCs for Airports and for BT Openreach

(a) At original gearing levels

	Heathrow	Gatwick	Stansted	BT Openreach
WACC Low	8.1	8.2	8.5	9.2
WACC High	9.7	10.1	10.9	10.8
WACC ARoR[+]	9.5	9.8	10.4	10.5*

(b) If standardise by relevering to 35% in all cases

	Heathrow	Gatwick	Stansted	BT Openreach
WACC Low	8.8	8.9	8.9	9.2
WACC High	10.5	10.9	11.4	10.8
WACC ARoR[+]	10.3	10.6	11.0	10.5

	Heathrow	Gatwick	Stansted	BT Openreach
Proportions of high and low values used for ARoR point estimate	0.88	0.85	0.81	0.80

[+] Allowed Rate of Return.
* This uses the conservative weighting of 80% on the upper value for the range, 20% on the lower value.

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[11] Whether the ranges quoted by the Competition Commission correspond to a statistical confidence interval is unclear. In the CC report on BAA (28/9/2007), submitted to the CAA, a simulation approach is used in Appendix F Annex 5 which would help to inform what a 95th percent confidence interval would be. In the rest of this Report and the Stansted report, the ranges used by the CC follow the usual procedure of taking a lower and upper value for each key parameter, and then using these to compute an upper and lower value for the WACC.

64.   Table 5 repeats Table 4, but varies the range used for ERP including in the final column, the range 'used' by the CC as suggested by Ofcom [A12.116] and as quoted above.

Table 5

Effect Of Varying The Range For ERP On WACC

1	Competition Commission / CAA			Ofcom / BT Assessments		
	2	3	4	5 BT Openreach ERP 4.5-5%	6 BT Openreach ERP 4-5%	7 BT Openreach ERP 3-5%
	Heathrow	Gatwick	Stansted			
WACC Low	8.8	8.9	8.9	9.2	8.9	8.2
WACC High	10.5	10.9	11.4	10.8	10.8	10.8
WACC Mid-Point	9.6	9.9	10.2	10.0	9.8	9.5
WACC ARoR	10.3	10.6	11.0	10.5	10.4	10.3

65. Ofcom suggests that its choice of ERP range of 4.5-5.0% is 'generous'. By taking this range, Ofcom appears to suggest that taking a regulatory allowed rate of return at the midpoint of the range then generated for WACC is reasonable, and is approximately consistent with CC methodology. That is, the allowed rate of return determined by this procedure (a figure of 10% which is the midpoint of the range in column 5 of Table 4) - is consistent with the figure that would result from the CC methodology.

66. Columns 6 and 7 of Table 5 address this question by illustrating what happens if the ERP range is widened to 4-5% and 3-5% respectively. In each case, a weighted average allowed rate of return is calculated based on the 'conservative' 80% weighting of the upper value and a 20% weighting on the lower value. The final column is probably 'as low as anyone would go' on the basis of the lower bound to the ERP.

67. Even taking the most 'pessimistic' scenario in the final column of Table 5, it would appear that the CC methodology would tend to result in a WACC at least 0.3% higher than the Ofcom mid-point estimate. Given that Ofcom seem to view the appropriate range for ERP as really being 4-5%, it would still be 0.4% higher under the CC methodology.

68. Of course the above calculation is based on Ofcom's assessment of ranges for various parameters and it is by no means certain that the CC would necessarily agree with Ofcom's other assumptions. BT has provided evidence supporting a higher and significantly wider range for the ERP - not least the unprecedented increase in volatility in financial markets since the CC examined the airports.

69. Just raising the ERP to a range of 3-6% but holding Ofcom's other assumptions as in Table 5, would increase the ARoR to 10.9% using the CC methodology. This is outside the top end of the range proposed by Ofcom and a little above the mid-point suggested by BT. As already discussed, BT considers that there is good evidence supporting an increase in the value of equity beta above the Ofcom central estimate and this would raise the mid-point further.

70. Given recent developments in financial markets, there is a strong case supporting a wider range than Ofcom proposes, and using the CC approach, this would imply setting an ARoR at or above the top end of the current proposed range by Ofcom.

71. This is a material issue in the current context of extreme volatility in financial markets. BT is one infrastructure provider which is competing for finance in global markets and is not immune from these costs whether or not it is attributed with SMP status for some of its services.

72. BT presented Ofcom with a survey of the opinions of analysts on this matter in response to the first consultation. This suggested that most analysts considered BT's cost of capital to be higher than Ofcom's estimates.

73. Other respected commentators also take this view. For example, Professor Dieter Helm argues that there is considerable pressure on companies now to de-leverage, and that the cost of equity is significantly above the allowed cost of capital[12]. He suggests that '...the credit crunch has increased the cost of capital and in some cases closed off the supply of funds altogether … the premium on debt has an implicit equity component; in other words equity risk is being placed upon the debt … companies are now having to contemplate capital expenditure at a cost of capital well in excess of the allowed cost of capital'.

Comments On Annex 16 of the Second Consultation (The Brattle Report)

Scope

74. The Brattle paper covers the following key issues:
    - An examination of BT's equity beta estimated against the FTSE Allshare index and also against the FTSE Allworld Index.
    - Consideration of the potential impact of changing leverage on equity beta.
    - Consideration of the impact of outliers.
    - Consideration of other potential statistical issues (such as heteroskedasticity, autocorrelation, thin trading bias etc.).

75. BT is broadly supportive of most of the analysis by Brattle Group and provides some commentary on the implications and findings of their Report.

Equity Beta And Choice Of Index

76. Brattle undertake considerable analysis of the impact of choosing an alternative to the allshare index but do not comment on the findings or what inferences could be drawn.

77. BT considers that the choice of index is an important matter and needs to be closely considered by Ofcom/Brattle. If BT's equity beta is estimated using a world index (such as the FTSE Allworld), estimates over recent years have been consistently and significantly greater than the estimates obtained using the FTSE All Share Index.

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[12] Time to invest: infrastructure, the credit crunch and the recession. Commentary 18th December 2008. Available at - www.dieterhelm.co.uk

78. Wright et al [2003] argued in favour of using a weighted index as better representing the portfolio of UK investors (an index computed as (2/3) FTSE All Share Index and (1/3) of the FTSE World Index minus UK). The use of such an index results in beta estimates which are higher than are obtained against the world index. BT considers that some weight should be put on this evidence and consistency maintained with previous Ofcom Determinations including the Mobile Call Termination Statement of March 2007.

Leverage And Equity Beta

79. As the Brattle report rightly notes, beta estimation presumes that the underlying data generating process features a fixed invariant beta. If one makes 'Modigliani-Miller' or 'Miller Debt and Taxes' assumptions, leverage has an impact of equity beta. In particular, ceteris paribus, refinancing that induces a higher level of gearing will induce an increase in the equity beta. By how much depends on the specific assumptions being made.

80. Of course, on a daily basis, the market value of a firm's equity fluctuates, as may also the market value of its debt. It follows that the market value based gearing of the firm also fluctuates, and one might then argue, assuming that the underlying asset beta is constant, that this in turn induce fluctuations in equity beta. If the equity beta is time varying, it follows that the basic model used to estimate beta is miss-specified. This point is seemingly recognised by Brattle (see e.g. footnote 3 on page 5 of the Brattle report).

81. Putting this point to one side, the leverage issue can be explored as follows. Firstly, estimate a simple equity beta on a give time horizon (1 year or 2 year) and compute the average market value leverage on this same time interval. If the 'observed' gearing deviates from the notional gearing set by the regulator (for BT, 35%), then re-lever the equity beta to the value it would have taken if the gearing had been 35%.

82. It is somewhat unclear from the report precisely what the Brattle sources are for debt value and hence for gearing. Theoretically, the relevant 'gearing' measure to be used in leverage / re-leverage calculations is the *market* value of the firm's debt divided by the market value of its equity stock. One issue is that much of BT's debt is denominated in dollars and euros; however BT hedges currency risk on both interest and principal. The analysis following uses estimates of the market value of debt and gearing.

83. The formulae used for re-gearing in the analysis conducted below are given in Appendix 2. Critically, it should be noted that the impact of re-levering is increased if the value assumed for the debt beta is reduced and also if the corporate tax rate is reduced. To illustrate the impact of these factors, BT has taken two extremes: for corporate taxes, the alternative assumptions are of current tax at 28% and zero tax where the latter will exaggerate the impact of re-leveraging. For debt beta, BT has alternatively assumed zero debt beta and a value of 0.53, the latter representing an estimate assuming that all of the debt premium which Ofcom attributes to BT represents systematic risk (as distinct from default risk and unsystematic risk).

84. Figures 1 and 2 present two and one year equity betas against gearing with corporate tax at 28% and high debt beta and Figures 3 and 4 present the equivalents with no tax and zero debt beta. These represent extremes within which the impact – if any – of the change in gearing might be expected to lie.
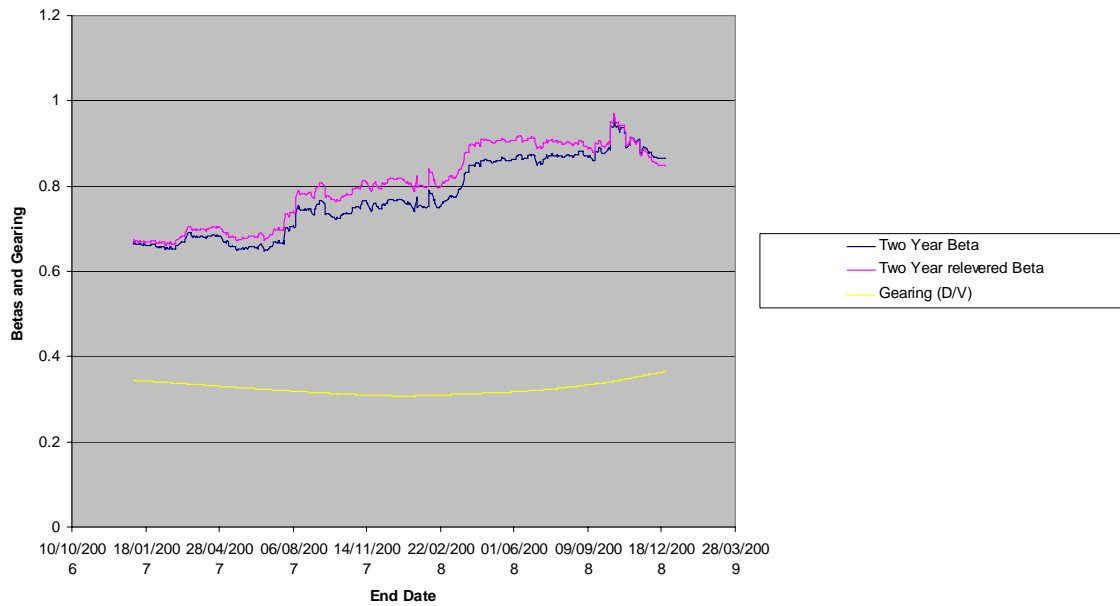
Figure 1
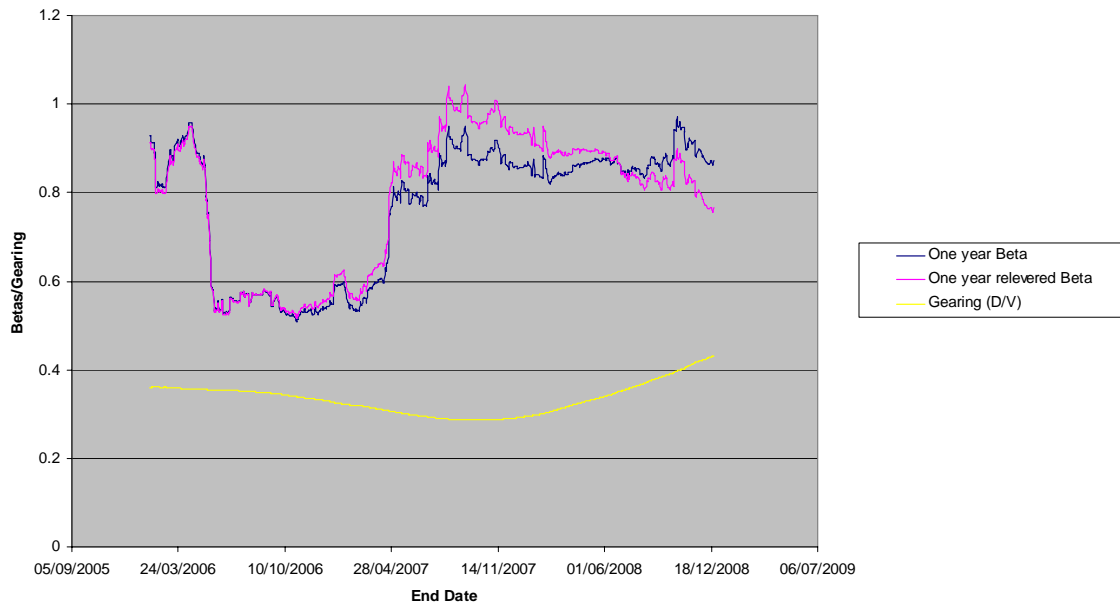**Two Year Equity Betas and Gearing ($\tau_c = 28\%, \beta_d = 0.53$)**
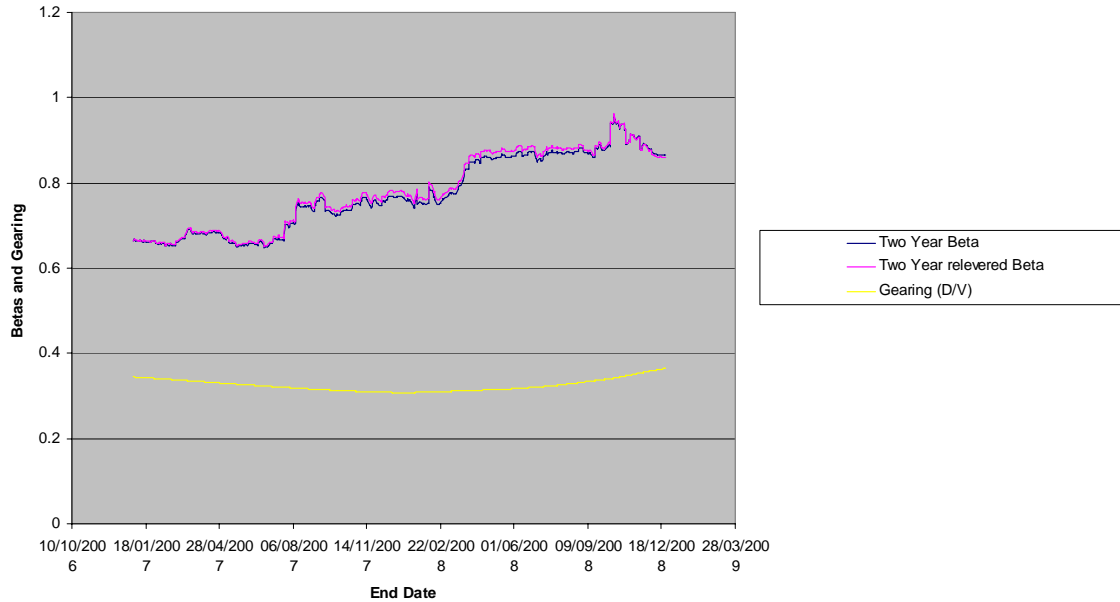
Figure 2
One Year Equity Betas and Gearing ($\tau_c = 28\%, \beta_d = 0.53$)
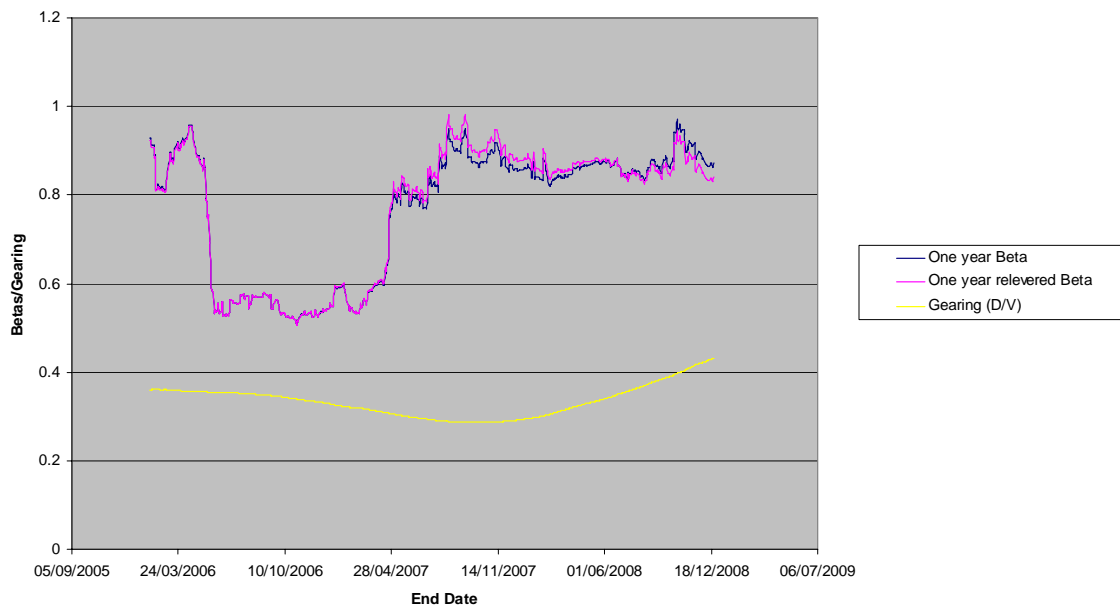
Figure 3
Two Year Equity Betas and Gearing ($\tau_c = 0\%, \beta_d = 0.0$ **)**

Figure 4

One Year Equity Betas and Gearing ($\tau_c = 0\%, \beta_d = 0.0$ **)**

85. The Figures do not suggest that the gearing impact is likely to be causally related to changes in equity beta and the only discernible difference arises for very short-term changes in the recent past as shown in Figure 4. Certainly there is little difference between the series for the period when the equity beta fell dramatically and subsequently rose during 2007.

The Impact of Outliers

86. As discussed above, BT considers that the estimates of the most recent values of beta do not appear to be materially impacted by either the exclusion of outliers or of statistical adjustment to the econometric estimation. The analysis of outliers undertaken by Brattle is reassuring in this respect. In particular, it gives no grounds for making any particular adjustment in forward-looking estimates for BT Group or Openreach beta.

87. Whilst the Brattle analysis of outliers is clearly useful in that it casts light on the robustness of results, it has to be said that, in the absence of a detailed analysis of *why* particular observations are outliers, it is difficult to appreciate what implications can be drawn from the exclusion of such outliers. Different conclusions might be drawn if share price movements are associated with events specific to BT, in contrast with events which came primarily from the broader marketplace but impacted to a lesser degree on the telecoms sector. In either case, as Brattle notes, it is not at all obvious why one might wish to exclude 'outliers' in any case.

88. There are various potential explanations for the empirical finding by Brattle that the decline in beta in 2006 could be substantially moderated by exclusion of particular outliers. For example, share price movements at this time may well have been influenced by changes in market sentiment toward BT following the TSR. BT has also had sight of some evidence that at least some other regulated infrastructure industries experienced falls in equity beta over this period with subsequent rises. Without rigorous analysis, it is not evident if there are general lessons from this which are applicable to BT.

Statistical Reliability

89. The Brattle analysis of alternative estimators for standard error for beta is useful given that the estimate used for standard error plays a role in determining the confidence interval for beta and hence for WACC.

90. BT notes (Annex 16 Appendix) that just as the outlier analysis does not materially change the central estimates, the associated study of the alternative estimates for standard errors also shows that the 'crude' OLS standard errors remain reasonable. Brattle suggests a range of 0.8-1.0 for (historic) BT Group equity beta. This is consistent with the assumption of a standard error on beta of around 0.05.

91. BT considers that this estimate is not unreasonable – depending on the estimation data window and the method used to evaluate the standard error; BT takes the view that the central estimate for beta should be higher, at least 0.95 for BT group – the corresponding confidence interval would then be 0.85-1.05[13]. However, it is worth remarking that 0.05 is probably the smallest estimate one might reasonably choose for the standard error, and hence this may not reflect a 'central estimate' for this parameter for forward-looking beta.

92. This point is not immaterial – if one were to assume a standard error of 0.1 for example, the confidence interval expands to 0.7-1.1. This then has a material impact on the range calculated for WACC (and hence a material impact on

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[13] Note that BT's own central estimate of Group beta is 0.95 as set out in the December 2008 submission in response to the first consultation Table B8.8.

the value chosen for the Allowed Rate of Return). BT therefore considers that this analysis supports a wider range for beta than assumed by Ofcom.

Calculation Of Unlevered WACC for Airports

1. It is possible to make a prediction of what the WACC would be for an unlevered (all equity) company, or for a firm with a different mix of finance to that which currently exists. The validity of the de-gearing calculation depends upon assumptions.[14]

2. To illustrate the type of computation involved, assume a Modigliani-Miller (MM) world in which there are corporate taxes. It then follows that the return on equity can be written as

$$R_e = R_u + (D/E)(1-\tau_c)(R_u - R_d) \qquad (A1.1)$$

   where R_u is the return on equity of the unlevered firm (i.e. is the WACC when there is no debt).

3. Rearranging this,

$$R_u = \frac{R_e + (D/E)(1-\tau_c)R_d}{1+(D/E)(1-\tau_c)} \qquad (A1.2)$$

   Thus, given estimates for the return on equity and the return on debt, and the WACC of an unlevered firm can be recovered.

4. This is the after corporate taxes unlevered WACC. The before taxes version is then given as $R_u/(1-\tau_c)$. Having obtained R_u using (2), it is straightforward to use (1) to get the equity return at an alternative gearing level and then compute the WACC using this. However, note that this particular re-gearing computation assumes a fixed debt rate R_d. If it is hypothesized that R_d varies with gearing, then it is necessary to specify this as a function, and then the re-gearing calculation will also be influenced by this.

5. Table A1 presents the calculations of unlevered WACC for the range of the ERP at 4.5-5%. Comparable calculations were performed for alternative ranges of the ERP.

6. Table A1 adjusts the CC real figures to nominal rates using an inflation rate of 2.8% and the same rate of inflation is used in all cases. In this Table, a nominal rate is computed by simply adding inflation onto the associated real rate, to be consistent with current regulatory practice[15].

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[14] In particular, whether a passive or active debt management policy is adopted, and whether the debt rate of interest is invariant to changes in gearing – see below.

[15] It is thus an approximation, when contrasted with the adjustment that uses the exact Fisher adjustment. Further, the tax adjustment is as per that undertaken in Ofcom's methodology. That is, to move from a nominal pre tax interest rate to a nominal post tax interest rate, one multiplies the pre tax rate by 'one minus the tax rate'.

7. To make a sensible comparison, there is a need to adjust for leverage and the last four rows present re-levered estimates which use 100% gearing and 35% gearing.

Table A1
WACC Comparisons Of Openreach with Airports

Date: Review Period	Heathrow Mar-08 2008-2013		Gatwick Mar-08 2008-2013		Stansted Oct-08 2008-2013		Ofcom – BT Openreach Dec-08 2009-2011	
	Scenario		Scenario		Scenario		Scenario	
	Low	High	Low	High	Low	High	Low	High
Inflation (CPI) %	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Risk Free real(%)	2.5	2.5	2.5	2.5	2	2	1.3	2
Risk-free rate (%) nominal	5.37	5.37	5.37	5.37	4.8	4.8	4.1	4.8
Equity risk premium (%)	2.5	4.5	2.5	4.5	3	5	4.5	5
Tax rate (%)	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Gearing (%)	0.6	0.6	0.6	0.6	0.5	0.5	0.35	0.35
D/E	1.5	1.5	1.5	1.5	1	1	0.54	0.54
Pre-tax cost of equity (%) nominal	10.58	14.65	10.93	15.58	10.83	15.28	10.38	12.57
Post-tax cost of equity (%) nominal	7.62	10.55	7.87	11.22	7.8	11	7.48	9.05
Equity beta	0.9	1.15	1	1.3	1	1.24	0.75	0.85
Cost of debt pretax (%) nominal	6.42	6.42	6.42	6.42	6.2	6.5	7	7.5
Debt premium (%)	1.05	1.05	1.05	1.05	1.4	1.7	2.0*	3.0*
Vanilla WACC (%) nominal	6.9	8.07	7	8.34	7	8.75	7.31	8.51
Pre-tax WACC (%) nominal	8.09	9.71	8.22	10.09	8.52	10.89	9.2	10.8
Post-tax WACC (%) nominal	5.82	6.99	5.92	7.26	6.13	7.84	6.62	7.77
Pre-tax WACC (%) nominal, unlevered	9.72	11.67	9.88	12.12	9.9	12.66	10.2	11.97
Post-tax WACC (%) nominal, unlevered	7	8.4	7.12	8.73	7.13	9.12	7.34	8.62
Pre-tax WACC (%) nominal, relevered to 35%	8.77	10.53	8.92	10.93	8.93	11.42	9.2	10.8
Post-tax WACC (%) nominal, relevered to 35%	6.31	7.58	6.42	7.87	6.43	8.22	6.62	7.77

Calculation of Unlevered WACC for Gearing Changes

1. There are a number of formulae that can be used in unlevering and relevering computations. Much depends of detailed assumptions, in particular concerning how the firm adjusts its leverage over time (its 'debt management policy').

2. Brattle appears to follow what might be termed the 'practitioners' approach to levering betas. That is, they use the formula:

$$\beta_u = \frac{\beta_e}{1 + D/E} \ . \tag{A2.1}$$

3. This implicitly assumes that debt beta is zero and that corporation tax does not play a role. As noted in the main text, the assumption of a positive debt risk premium is inconsistent with the assumption of a zero debt beta. Further, current Ofcom assumptions concerning the debt premium imply a significant positive debt beta, and this has a material impact on the re-gearing calculation.

4. BT assumes that the financing strategy of the firm is that it aims to maintain a fixed gearing over time. The return on equity can be written as:

$$R_e = R_u + (D/E)(1 - \tau_c)(R_u - R_d) \tag{A2.2}$$

where R_u is the return on equity of the unlevered firm (i.e. is the WACC when there is no debt) and τ_c is the corporate tax rate.

5. Using the standard CAPM formulation,

$$R_e = R_f + ERP.\beta_e \tag{A2.3}$$

$$R_d = R_f + ERP.\beta_d \tag{A2.4}$$

$$R_u = R_f + ERP.\beta_u \tag{A2.5}$$

6. Substituting these into (A2.2) gives:

$$\beta_e = \beta_u + (D/E)(1 - \tau_c)(\beta_u - \beta_d) \tag{A2.6}$$

and rearranging this:

$$\beta_u = \frac{\beta_e + (D/E)(1 - \tau_c)\beta_d}{1 + (D/E)(1 - \tau_c)} \tag{A2.7}$$

7. Thus, given estimates for the equity and debt betas, the beta of an unlevered firm can be calculated.

8. Having obtained β_u using (A2.7), it is straightforward to use (A2.6) to get the equity beta at an alternative gearing level. This is what is done in the re-gearing calculations reported in Figures 1-4. However note that this particular re-gearing computation assumes a fixed debt rate. If it is hypothesized that R_d and hence β_d varies with gearing, then it is necessary to specify this as a function, and then the gearing and re-gearing calculation will also be influenced by this. Finally, notice that (A2.7) collapses to (A2.1) when $\beta_d = 0$ and $\tau_c = 0$.