

## Cost of capital for a UK CDAS provider

### Introduction

1. This appendix sets out our approach to estimating a WACC for a major UK CDAS business. The main purpose of this appendix is to provide a figure for the cost of capital which is compared with the CDAS returns of the major providers in the main body of the report (see paragraphs 7.41 to 7.64 and in Appendix 7.1).
2. The cost of capital is defined as the opportunity cost of funds for a company, ie the expected return that is foregone by investing in the company rather than in comparable assets. For our purposes, we are interested in the average cost of capital rather than the marginal. The WACC is a weighted average of the cost of its component parts: debt and equity.<sup>1</sup> In order to use the WACC as a comparison with historical earnings before tax, the WACC is expressed in pre-tax nominal terms.
3. There are a number of techniques for assessing a company's cost of equity, but in practice, the most widely-used technique by both the CC and other regulators has been the CAPM.
4. The company's cost of capital is the investors' expected return for the company's portfolio of businesses, and if the company's businesses have different risks they will require different returns. It is necessary to estimate the cost of capital for the specific business area which is being reviewed: in this case CDAS.
5. The calculation of WACC relies on several variables which cannot be estimated with complete accuracy, and therefore we did not express the cost of capital as a single figure, but rather as a range to compare to company returns. For practical reasons we express the range of the WACC as an average over six years.<sup>2</sup>

### Summary

6. We estimated the average pre-tax WACC for a major UK CDAS provider between 2000 and 2005 to be between 8.4 and 11.7 per cent. The midpoint of this range is 10.0 per cent.
7. This was derived from an average pre-tax cost of equity of 12.0 per cent, an average cost of debt of 6.6 per cent, and gearing<sup>3</sup> of between 30 and 50 per cent. The detail of the calculations is set out in the sections below.
8. We also carried out sensitivity analysis on the results, which are set out in detail in Annex A.
9. We also estimated a real WACC for the period 1978 to 2005, to be between 7.4 and 10.9 per cent. The calculations, including sensitivity analysis, are set out in Annex C.

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<sup>1</sup>This is a simplification. In this simple model, all equity risk resides with the equity holders. There is the possibility of various hybrid methods of financing.

<sup>2</sup>We acknowledge that there may be small fluctuations. However, the range gives a reasonable representation.

<sup>3</sup>We define gearing as debt divided by the sum of debt plus equity.

## CDAS providers' estimates of cost of capital

10. Table 1 shows the providers' estimates of their pre-tax cost of capital,<sup>4</sup> submitted as part of their responses to the financial questionnaire.

TABLE 1 CDAS providers' estimates of their pre-tax cost of capital  
per cent

	2001	2002	2003	2004	2005	Simple average
Yell	[			✂		]
BT	-	-	13.5	13.5	13.5	13.5
Thomson	[			✂		]

Source: Yell, Thomson and BT; CC calculations.

Note: Yell provided its post-tax WACC which the CC converted to pre-tax (using a tax rate of 30 per cent as set out in its response to the financial information request).

11. We note that Thomson's estimate of its WACC uses a representative industry gearing level<sup>5</sup> rather than its gearing or that of SEAT group.
12. The figure of 13.5 per cent relating to BT was derived by Of tel (now Ofcom) during a price control review and is not BT's own estimate of its cost of capital but is the rate applicable to BT's regulated activities.<sup>6</sup> We note that BT's CDAS operations comprise a very small part of the BT Group. Ofcom consulted on a number of issues relating to risk and return, including estimates of the equity beta and the equity risk premium (ERP) in order to estimate an appropriate value for the cost of capital, and published two consultation documents as well as a final document.<sup>7</sup> In the final document,<sup>8</sup> it set out estimates for the component parts of BT's WACC, of 11.4 per cent pre-tax<sup>9</sup> as shown in Table 2.

<sup>4</sup>Yell's and Thomson's cost of capital was in respect of its CDAS business. BT's cost of capital was in respect of the BT Group. All are in respect of the five years to 31 March 2005.

<sup>5</sup>Which Thomson describes as 'typical'.

<sup>6</sup>Of tel calculated this using the CAPM model in a similar way to the calculations used by the CC.

<sup>7</sup>Ofcom published a first consultation document, entitled *Ofcom's approach to risk in the assessment of cost of capital* on 26 January 2005 which can be found at [www.ofcom.org.uk/consult/condocs/cost\\_capital/cost\\_capital.pdf](http://www.ofcom.org.uk/consult/condocs/cost_capital/cost_capital.pdf). The second consultation document, entitled *Ofcom's approach to risk in the assessment of the cost of capital—Second consultation in relation to BT's equity beta* can be found at [www.ofcom.org.uk/consult/condocs/cost\\_capital2/main/costcapital2.pdf](http://www.ofcom.org.uk/consult/condocs/cost_capital2/main/costcapital2.pdf).

<sup>8</sup>The final document, entitled *Ofcom's approach to risk in the assessment of the cost of capital* published on 18 August 2005 can be found at [http://www.ofcom.org.uk/consult/condocs/cost\\_capital2/statement/final.pdf](http://www.ofcom.org.uk/consult/condocs/cost_capital2/statement/final.pdf).

<sup>9</sup>Note that this is in respect of BT's non-copper access business.

TABLE 2 Ofcom estimates of pre-tax nominal WACC for the non-copper access businesses of BT

	'High gearing' 35%	'Low gearing' 30%
RFR	4.6	4.6
ERP	4.5	4.5
Equity beta	1.23	1.14
Cost of equity (post tax)	10.1	9.7
Debt premium	1.0	1.0
Cost of debt (pre tax)	5.6	5.6
Corporate tax rate (%)	30	30
Cost of debt (post tax)	3.9	3.0
Gearing (%)	35	30
WACC (post tax)	8.0	8.0
WACC (pre tax)	11.37	11.42
Average		11.4

Source: Ofcom: *Ofcom's approach to risk in the assessment of the cost of capital* published on 18 August 2005, page 91.

13. Comparing our estimates with those provided by the three CDAS providers, we note that BT's average WACC is within our range, and that Thomson's WACC is above our range. Thomson has used a beta of 1.05—within our range—and a risk-free rate (RFR) of [X] per cent—above our range.
14. Yell's estimate of its average WACC of [X] per cent is also above our range.

### Calculating the WACC

15. The cost of capital includes:
- (a) generic components:
- (i) the RFR;
  - (ii) the ERP; and
  - (iii) taxation;<sup>10</sup> and
- (b) industry-, or company-specific components:
- (i) beta;
  - (ii) debt premium; and
  - (iii) gearing.

### Approach to measuring profits of the major CDAS providers

16. We considered the appropriate costs of equity and debt for the major CDAS providers. Only one of the three companies, Thomson, had the provision of CDAS in the UK as its main activity (though it had a small Internet directory business). Yell's business comprises largely of CDAS although 50 per cent of this was in the USA, as

<sup>10</sup>There could be specific factors affecting tax, especially if a company was making losses or had significant tax losses brought forward.

well as non-printed CDAS operations in the UK. BT's CDAS operations were a minor part of its overall business as a telecommunications provider. The existence of these other activities meant that the corporate entity's cost of capital was likely to be different from those of its CDAS operations. We discuss the effects of these other activities in the section on betas.

17. With regard to obtaining information on betas, capital structure and debt premia, the only UK-listed companies in the industry were Yell and BT, and therefore the only companies for which data was readily available. We also made a capital structure assumption, considering what would be an appropriate level of gearing for firms in the industry which provided the weightings for the costs of equity and debt in the WACC.

## **Cost of equity**

### ***General approach and conclusions***

18. We followed the CC's Market Investigation guidelines, which state that we generally look to the CAPM when considering the cost of capital, but have regard to alternative models where appropriate.<sup>11</sup>
19. The CAPM postulates that the opportunity post-tax cost of equity ( $K_e$ ) is equal to the return on risk-free securities ( $R_f$ ) plus the company's systematic risk as measured by beta ( $\beta$ ) multiplied by the ERP ( $R_m - R_f$ ):

$$K_e = R_f + \beta (R_m - R_f)$$

Where RFR =  $R_f$  and ERP =  $(R_m - R_f)$ .

The post-tax cost of equity is then converted to a pre-tax cost of equity using the following formula:

$$K_{e \text{ (pre-tax)}} = K_{e \text{ (post-tax)}} / (1-t)$$

20. We used a nominal RFR of 4.39 per cent and an ERP of between 3.0 and 5.0 per cent. We estimated that beta lay in the range 0.89 to 1.07.
21. Using these elements, we estimated that the pre-tax cost of equity lay in the range 10.1 to 13.9, the midpoint of the range being 12.0.
22. Detailed explanations of these figures are set out in the following sections.

### ***The risk-free rate***

23. Unlike other elements of the CAPM, the RFR is observable from trading in liquid securities markets. The UK Government has issued index-linked securities (index-linked gilts), which are generally considered to have negligible default risk and inflation risk<sup>12</sup> and therefore provide a proxy for the RFR. The redemption yield on these index-linked gilts provides a direct estimate of the real RFR for differing maturities. The Bank of England makes regular estimates of index-linked yields for

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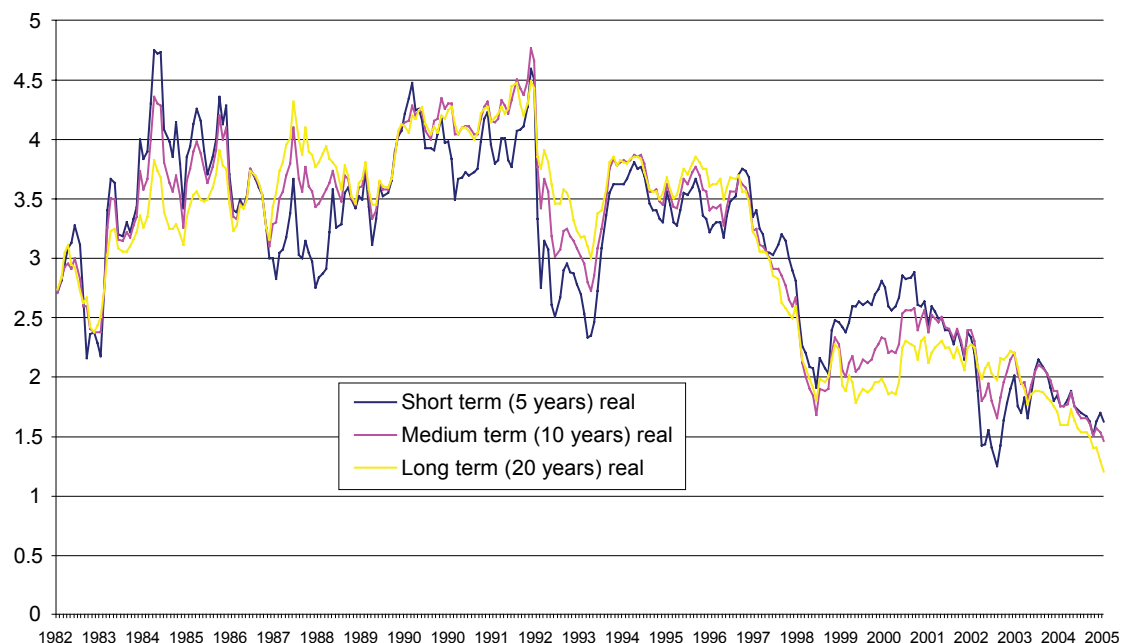
<sup>11</sup>Reference: CC3, *Market Investigation References: Competition Guidelines*, June 2003, paragraph 3.85.

<sup>12</sup>Some inflation risk arises from the RPI being lagged by eight months.

various maturities. Figure 1 shows the index-linked yields from April 1982 to December 2005.

FIGURE 1

**Real redemption yields on index-linked gilts (estimated by Bank of England from a smoothed zero coupon yield curve)**



Source: Bank of England.

24. Figure 1 shows that the yields have been on a downward trend since the early 1990s. At December 2005 the prospective yield on long-dated (~20 years) index-linked gilts was around 1.2 per cent, and the yields for medium-term (~ten years) and short-term (~five years) index-linked gilts were also below 2 per cent. All of these figures were below their averages for the whole period (about 3 per cent) but above the long-run real return on government securities (about 1.3 per cent from 1900 to 2000).
25. The level of government borrowing is generally regarded as a key determinant of gilt rates. There was considerable need for government borrowing in the UK during the 1980s and this could have contributed to the historically high rates during that period. Other relevant factors for the downward trend in yields in recent years include the minimum funding requirement for pension schemes, which increased the demand for both conventional and index-linked government securities and thereby placing upward pressure on their prices.
26. In its 2002 reports on Manchester Airport and BAA,<sup>13</sup> the CC used a range of 2.5 to 2.75 per cent for the real RFR, derived from its estimate at that time of medium-term average indexed-linked gilt yields. In its report into Mobile Network Operators (2003),<sup>14</sup> the CC used the same range. The CC noted that the factors referred to

<sup>13</sup>Manchester Airport PLC: a report on the economic regulation of Manchester Airport PLC, The Stationery Office, ISBN 0-11-515490-6, December 2002; BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd), The Stationery Office, ISBN 0-11-51548-2, November 2002.

<sup>14</sup>Vodafone, O2, Orange and T-Mobile: reports on references under section 13 of the Telecommunications Act 1984 on the charges made by Vodafone, O2, Orange and T-Mobile for terminating calls from fixed and mobile networks, The Stationery Office, ISBN 0-11515503-1, February 2003.

above reflected a continuing downward trend in the underlying rate and that it was necessary to adjust for such factors when using the RFR to estimate the cost of equity.

27. Taking all the above into account, we derived an annual index-linked gilt rate for the years 2000 to 2005 based on annual data from the Bank of England on short-, medium- and long-term gilts. Adjusting for inflation to obtain the nominal RFR produces an average of 4.39 per cent for the RFR during the period under consideration.

TABLE 3 The nominal RFR

	<i>per cent</i>						
	2000	2001	2002	2003	2004	2005	Average 2000–2005
Average yield from British Govt Securities, 5-, 10- and 20-year real zero coupon	2.25	2.43	2.32	1.89	1.88	1.62	2.06
RPI-X	2.08	2.13	2.21	2.82	2.21	2.26	2.28
Nominal RFR	4.37	4.60	4.58	4.76	4.13	3.91	4.39

Source: Bank of England, Office of National Statistics.

28. Both Thomson and Yell used slightly higher RFRs, of [X] and [X] per cent respectively.<sup>15</sup>
29. One party suggested we examine recent precedent by UK utility regulators; however, regulatory precedent for price regulation is forward-looking and our aim is to estimate a cost of capital for 2000 to 2005. The same party also suggested that we should exclude the evidence on 20-year bond yields because that party's average asset life was eight years and because investors would consider the duration of regulatory controls. The life of the party's fixed assets is of limited relevance in choosing a RFR. Regulatory controls have no bearing on the RFR.

### **Equity risk premium**

30. The ERP is not directly observable from market data because the future payout from equities is uncertain. In the past the CC and regulators have used two methods to estimate the ERP: historical data showing the difference between the realized return on equities over the RFR; and forward-looking data relating to investors' current expectations of the ERP.
31. If it is assumed that the ERP is constant over time, then current and future ERPs can be estimated from a historical average of the difference between past equity returns and RFRs. Since equity returns tend to be volatile from year to year, it is common practice in the finance literature to consider returns over an extended period.
32. Fama and French's (2002) estimates of the ERP in the USA for the period 1872 to 2000 using the dividend growth model and average stock returns were 3.5 and 5.6 per cent respectively. They argued that the difference between the two estimates was largely due to the unexpected capital gains during the period 1951 to 2000, and accordingly judged that the ERP estimate using the dividend growth model was closer to the true expected value than an estimate using historical returns.

<sup>15</sup>Yell's rate quoted is an average between March 2001 and 2005.

33. Data obtained from Dimson, Marsh and Staunton (2002) has produced arithmetic averages of ten-year holding returns for UK equities for the period 1900 to 2000 of 6.08 per cent. The arithmetic average<sup>16</sup> of ten-year holding returns on UK bonds over the same period was 1.4 per cent. This suggests a historical risk premium of 4.7 per cent.
34. According to Wright, Mason and Miles (2003), the central estimate of the ERP was between 4 to 5 per cent using an arithmetic mean. This was derived from historical returns (from an international set of data over the 20th century) on equity capital of between 6.5 and 7.5 per cent (arithmetic mean). They added a commonly-used estimate of the RFR of the order of 2.5 per cent (based on a sample of data from around 1980).
35. We noted that Dimson et al (2002) did not expect stock market investors to enjoy a repeat of the returns of the 1990s. In terms of excess return on equities relative to less risky government bills or bonds, their analysis suggests that investors should expect long-run outperformance by equities closer to 3 per cent a year on average in the future.
36. The more recent OXERA (2004) paper notes that Dimson, Marsh and Staunton (2003) suggested that a higher forward-looking UK premia may be appropriate. Dimson et al (2003) estimated an arithmetic average of 5.9 per cent. The OXERA (2004) paper concluded that a range of 3 to 5 per cent was appropriate.<sup>17</sup>
37. Dimson et al (2005) estimated that a forward-looking ERP for the world's major markets would be in the order of 5 per cent relative to government bills on an arithmetic mean basis. Given the risk premium of bonds relative to bills of approximately 1 per cent, the corresponding ERP relative to bonds would be closer to 4 per cent.
38. Professor Ian Cooper from the London Business School assessed the evidence on ERP which supported an ERP in the range between 4.0 and 6.0 per cent, with a central estimate of 5.0 per cent. This study was carried out on behalf of BT during the consultation on 'Ofcom's approach to risk in the assessment of the cost of capital'.
39. There remains much uncertainty about the ERP, and we continue to attach weight to both the historical evidence and the evidence of market expectations. Despite the uncertainty, it is necessary to choose an ERP, measured in conjunction with a long-term RFR, in order to estimate the cost of equity using the CAPM. Our view is that the ERP lies in the range 3.0 to 5.0 per cent.
40. Yell used an ERP of [X] per cent,<sup>18</sup> outside our range, and Thomson used [X] per cent which is near the top of our range.

### ***Estimates of beta***

41. In the CAPM, the beta coefficient is taken as a measure of the market (or non-diversifiable) risk of a particular security. This means that price fluctuations which are uncorrelated with the market are considered to be diversifiable and do not contribute to the beta. The beta coefficient links the return on the security and the average

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<sup>16</sup>The arithmetic mean is more widely used than the geometric mean.

<sup>17</sup>The OXERA (2004) paper also used the dividend valuation model (DVM) to estimate the return on equity and therefore the ERP. Using FTSE All share, FTSE 100 and FTSE 30 and assuming a RFR of 1.88, OXERA estimates ERP ranges of 3.43 to 3.68 per cent, 3.55 to 3.80 per cent and 4.00 to 4.25 per cent respectively, with an average range of 3.66 to 3.91 per cent.

<sup>18</sup>Yell's rate quoted is an average between March 2001 and 2005.

market return. Stocks with betas greater than 1.0 tend to amplify the overall movements of the markets. Stocks with betas between 0 and 1.0 tend to move in the same direction as the market, but not so far. This means that based on past data, a company has a beta of 2 then, if the future resembles the past, this means that the return on the company changes *on average* by 2 per cent for every 1 per cent change in market return.

42. The cost of equity is also dependent on the level of gearing: a highly geared company will face greater financial risks than a company with a low level of gearing. This is reflected in the equity beta of the company.
43. We tried to determine the beta for a large UK CDAS provider. We noted that BT did not have the provision of CDAS as its sole operations, which meant that its beta for the CDAS business is likely to differ from its company beta, and for that reason excluded it from our considerations. In addition, Thomson was privately owned and therefore did not have a company beta (though we note that it provided calculations to us of its WACC using a geared beta of 1.05 which is the historical beta we observed for SEAT, Thomson's parent company, as at 28 February 2006).
44. It has been suggested that advertising expenditure in Thomson is more discretionary than advertising in Yell and hence Thomson's business might be more affected by the economic cycle. For these reasons we consider it possible that Thomson may have a higher beta than Yell.
45. Betas may also change according to the particular historical data observed—for example, if average monthly returns are examined, then the beta will vary according to the day on which the monthly period begins.<sup>19</sup> We sought to estimate a range of betas for a major UK CDAS provider using available company betas. The effect of this range of betas on the cost of equity and WACC was then tested using sensitivity analysis.
46. We looked at betas calculated by the risk measurement service of London Business School. Normally London Business School calculates betas over a 60-month period, although for Yell there is only data available from June 2004 as its shares were only admitted to trading in July 2003. Table 4 shows the betas of Yell for the last 21 months. The beta has been higher since March 2005 and our inquiry commenced in April 2005, but we would not normally expect that regulatory intervention (such as a market reference) would increase a company's beta.
47. We consider that we should take the most recent figure for beta of 1.07 at June 2006 as this includes more data.

TABLE 4 **Betas for Yell**

	<i>Dec 04</i>	<i>Mar 05</i>	<i>Jun 05</i>	<i>Sep 05</i>	<i>Dec 05</i>	<i>Mar 06</i>	<i>Jun 06</i>
Yell	0.92	0.91	1.02	1.04	1.13	1.10	1.07

Source: London Business School Risk Measurement Service.

48. In the year ended 31 March 2006, Yell derived 38 per cent of its total revenues from UK CDAS operations.<sup>20</sup> The effect of other operations on Yell's beta is difficult to

<sup>19</sup>We acknowledge that using daily or weekly estimates of beta (as well as monthly estimates which we did use) may improve its accuracy; however, we note that it would only provide a range of betas. We carried out sensitivity analysis on the value of beta (shown in Annex A).

<sup>20</sup>Source: report and accounts for the year ended 31 March 2006.

estimate, although we consider it unlikely that these non-UK operations will cause Yell's beta to be significantly different to a UK CDAS beta: Yell's non-UK operations are the provision of printed directories in the USA.

49. In Yell's own calculations of WACC, it used an ungeared beta averaging at 0.68 which it obtained from the average ungeared betas for SEAT, TPI, Eniro, Pages Jaunes, Findexa, Johnston Press and Trinity Mirror. This was lower than our observed betas.
50. We also looked at recent betas for CDAS providers outside the UK, the details of which are shown in Annex B. The average equity beta for these companies was 0.89.<sup>21</sup> We did not degear and regear the betas as they were based on market gearing which was in the range 30 to 50 per cent.
51. In summary, we used a range for the beta of between 0.89 and 1.07 based on the range of CDAS provider company betas observed.
52. The sensitivity of the WACC to changes in the beta is tested in Annex A.

### **Gearing and capital structure**

53. The various components of the WACC are weighted based on gearing. We define gearing as debt divided by the sum of debt and equity. Gearing can be based on the following:
  - (a) actual book values of debt and equity;
  - (b) actual market values of debt and equity; and
  - (c) estimates of target gearing.
54. Gearing is important for three reasons:
  - (a) to weight the various costs of capital in the WACC;
  - (b) to adjust the equity betas of comparator companies to the gearing of the CDAS businesses; and
  - (c) it impacts the debt premium.
55. In theory, there is an optimum mix of debt and equity in a firm's capital structure which minimizes its WACC. Ideally, gearing should be calculated in respect of market values of both equity and debt (see paragraph 61 on the issue relating to a potentially excessive market value of equity). Where this is not available, book values are used.
56. Our approach to determining capital structure was to examine the gearing of the three major CDAS providers and come up with a range of possible gearings.
57. Yell's gearing ranged from 25 to 56 per cent (gearing based on book value of debt and market value of equity was 25 per cent; gearing based on book values of debt

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<sup>21</sup>Source: Barra. Note that the betas are historic, not predicted, since we were concerned with the cost of capital between 2000 and 2005.

and equity was 56 per cent),<sup>22</sup> although we noted that the industry gearing levels Yell used in its calculation of the WACC averaged [redacted] per cent, as shown in Table 5.

TABLE 5 Gearing used by Yell in its calculation of WACC

	2001	2002	2003	2004	2005	per cent
Yell	[		redacted		]	Simple average

Source: Yell.

Note: Yell expressed these as debt/equity and the CC has converted them to debt/(debt + equity).

58. We note that figures supplied by Thomson showing debt attributable to it by SEAT showed gearing of between [redacted] and [redacted] per cent, and that Thomson used a 'typical industry gearing level' of [redacted] per cent in its calculation of WACC, though it did not provide any justification for this figure. We discounted BT's gearing level as the CDAS business was such a small proportion of its whole business.
59. If the book value of equity is lower than market value, then a business will have higher gearing using book values (ie a greater proportion of debt in its capital structure) than it would using market values. It would generally follow that this higher book gearing would lead to higher costs of both equity and debt than under market gearing, but the WACC would be lower because of the higher proportion of debt in the capital structure. However, accurate market values of debt and equity may be difficult to obtain where providers have operations other than CDAS provision within their corporate group. Therefore, in addition to evidence on book values, we also considered possible market values and target gearings in our assessment.
60. As mentioned above, two of the three major CDAS providers we examined had other activities besides CDAS. It has been previously suggested that CDAS providers have significant amounts of intangible assets which are not reflected on the balance sheet. Thus, the difference between market and book value of the assets employed in these other activities may have been significantly different from that of CDAS. This is especially true where the other activities had higher growth expectations than CDAS, for example Internet directories.
61. Even if it were possible to isolate the market value of CDAS, it would not necessarily be reasonable to use this value as a basis for gearing. This is because if companies were earning persistently high returns as a result of a lack of effective competition in the market, the market value of their equity would be higher than if they were operating in a very competitive market. Our objective in calculating a cost of capital for a major CDAS provider is to provide a comparator to providers' actual returns and determine whether excessive profits are being made. It would therefore be somewhat self-defeating to reflect these possibly excessive profits in our comparator.
62. Because of the problems with using market values set out above, we decided to use book values as a proxy for market values. We tested the reliability of this proxy by examining evidence on the differences between book and market values of equity.
63. We examined the premium of book value to market value for a range of non-UK CDAS providers<sup>23</sup> and compared the average with that of Yell. We found that they did not differ significantly (69 per cent compared with 74 per cent).

<sup>22</sup>Based on year-end values and Yell's share price of 474.75p as at 31 March 2005.

64. With this in mind, we calculated the gearing levels for the same non-UK CDAS providers using book and market values of equity. These ranged between 52 and 54 per cent (average gearing based on book value of debt and market value of equity was 52 per cent; gearing based on book values of debt and equity was 54 per cent).<sup>24</sup>
65. Taking the evidence on gearing (Thomson's typical gearing of [X] per cent, Yell's gearing range of 25 to 56 per cent, and the range of average gearing for non-UK CDAS providers of 52 to 54 per cent) into consideration, we used a range of 30 to 50 per cent in our calculations of WACC. We also carried out sensitivity analysis to gearing levels outside this range which is shown in Annex A.

## Cost of debt

66. The cost of debt is largely determined by a company's credit rating. A company with a higher credit rating can borrow more cheaply than one with a lower rating. Companies may be assigned credit ratings by agencies such as Standard & Poor's, Moody or Fitch. A company which is more highly geared will generally have a higher cost of debt because of the increased risk of being unable to service its debt.
67. Yell and SEAT are assigned credit ratings by Standard & Poor's and Moody's, and BT by Standard & Poor's and Fitch. Yell and SEAT are both rated BB by Standard & Poor's,<sup>25</sup> and BT was rated A- by Fitch.<sup>26</sup> BB is the highest speculative grade whereas A- denotes high credit quality and is investment grade.<sup>27</sup> We noted that Yell's rating may have been adversely affected by the recent large acquisition in the USA and that the UK operations on their own may have warranted a BBB rating, which is the lowest investment grade credit rating.
68. We therefore considered a BBB rating to be a reasonable one for a typical CDAS provider. We obtained the cost of debt based on yields on Merrill Lynch seven- to ten-year bond indices for BBB-rated corporate bonds over these rates for the years 2000 to 2005.

TABLE 6 Cost of debt

	<i>per cent</i>						
	2000	2001	2002	2003	2004	2005	Simple average 2000–2005
Cost of BBB debt (pre-tax)	7.6	7.1	7.1	6.1	6.2	5.7	6.6

Source: Datastream.

69. We therefore consider an appropriate cost of debt for a large UK CDAS provider to be between 5.7 and 7.6 per cent, depending on the year we are examining, with an average of 6.6 per cent.
70. We note that Yell has hedged some of its interest rates (such that it has fixed interest rates on more than 50 per cent of the interest rate exposure on the indebtedness under the senior credit facilities using interest rate swaps over the period to March 2007) and that for this indebtedness, the weighted average interest rate as at

<sup>23</sup>The same sample as used for the evidence on betas.

<sup>24</sup>Excluding results showing values between 0 and 10 per cent and 90 and 100 per cent.

<sup>25</sup>17 May 2005 (the date of Yell's acquisition of Transwestern Holdings, LP) and 6 April 2004.

<sup>26</sup>7 February 2006.

<sup>27</sup>Investment grade means that agency giving the rating thinks the issuer has strong creditworthiness.

31 March 2006 is 7.4 per cent.<sup>28</sup> We consider this consistent with our belief that 6.9 per cent for a UK CDAS provider with no overseas activities is reasonable.

71. Thomson's pre-tax cost of debt between 1999 and 2004 was [~~8~~] per cent, although we note that this was the rate applied to the loan funding from its parent company, SEAT, and may not be an arm's length price.

## The WACC

72. The pre-tax WACC is calculated using the following formula:

$$\text{WACC} = (1-g) \times K_e \times (1/(1-t)) + g \times K_d$$

Where:

g is the gearing level (debt divided by the sum of debt and equity);

$K_e$  is the cost of equity;

$K_d$  is the cost of debt; and

t is the corporation tax rate. This is assumed to be 30 per cent.

73. Using the above gearing and cost of equity assumptions, we estimated an indicative range for the WACC for a typical CDAS provider. The range for the real WACC, which would exclude the effects of inflation, would be approximately 2 to 2.5 per cent below the nominal figure. Table 7 shows estimated pre-tax nominal WACCs for the period 2000 to 2005. The 'high gearing' and 'low gearing' WACCs use the upper and lower ends of the chosen gearing range and the level of the ERP.

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<sup>28</sup>Source: Yell annual report and accounts, 31 March 2006, note 19.

TABLE 7 Pre-tax nominal WACC

	2000	2001	2002	2003	2004	2005	Average 2000–2005
RFR %	4.37	4.60	4.58	4.76	4.13	3.91	4.39
ERP—lower estimate	3.0	3.0	3.0	3.0	3.0	3.0	3.00
ERP—upper estimate	5.0	5.0	5.0	5.0	5.0	5.0	5.00
Beta—lower estimate	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Beta—upper estimate	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Tax rate %	30.0	30.0	30.0	30.0	30.0	30.0	30.0
<i>Pre-tax cost of equity</i>							
Lower estimate	10.1	10.4	10.4	10.6	9.7	9.4	10.1
Upper estimate	13.9	14.2	14.2	14.4	13.5	13.2	13.9
<i>Pre-tax cost of debt</i>							
Cost of debt (pre-tax) %	7.60	7.04	7.11	6.12	6.15	5.69	6.62
<i>Capital structure—low gearing</i>							
Equity %	70	70	70	70	70	70	70
Debt %	30	30	30	30	30	30	30
<i>Capital structure—high gearing</i>							
Equity %	50	50	50	50	50	50	50
Debt %	50	50	50	50	50	50	50
<b><i>Pre-tax WACC—low gearing</i></b>							
<b>Lower estimate</b>	9.3	9.4	9.4	9.3	8.6	8.3	9.0
<b>Upper estimate</b>	12.0	12.1	12.1	11.9	11.3	11.0	11.7
<b><i>Pre-tax WACC—high gearing</i></b>							
<b>Lower estimate</b>	8.8	8.7	8.7	8.4	7.9	7.5	8.4
<b>Upper estimate</b>	10.7	10.6	10.7	10.3	9.8	9.5	10.3

Source: CC calculations.

## Sensitivity analysis

1. We examined the sensitivity of the WACC (presented in this section as an average of the period 2000 to 2005) to changes in the beta and the gearing. Table 1 shows the range for each that has been used in the calculation.

TABLE 1 Ranges for beta and gearing used in the WACC calculation

	<i>Lower %</i>	<i>Midpoint %</i>	<i>Upper %</i>
Beta	0.89	0.98	1.07
Gearing (% debt)	30	40	50

Source: CC calculations.

2. We then calculated the effect of changing the beta and the gearing between the lower and the upper ranges, and also the effect of changing each to 10 per cent below the lower range and 10 per cent above the upper range. The other variables were held constant at their midpoint values. Table 2 shows the results of these calculations.

TABLE 2 WACC: flexing gearing and betas; all other variables at midpoint

	<i>Lower -10%</i>	<i>Lower</i>	<i>Midpoint</i>	<i>Upper</i>	<i>Upper +10%</i>
Gearing	10.3	10.1	9.6	9.1	8.9
Beta	9.3	9.5	9.6	9.8	10.0

Source: CC calculations.

3. From Table 2 we can see that changing the beta does not reduce the lower end of the range, or increase the upper end of the range (8.4 to 11.7 per cent). In addition, changing the gearing does not reduce the lower end of the range, or increase the upper end of the range.
4. We therefore do not propose to increase the range of the WACC as a result of this sensitivity analysis.

## Betas of overseas CDAS providers

### Introduction

1. This annex sets out a range of betas—historical and predicted—for companies in a number of different countries who operate classified directory advertising businesses. It does not rank the companies according to compatibility with UK classified directory businesses, nor have the individual company betas been adjusted to reflect the size of the classified directory advertising business within each company.

### Beta definitions

2. Tables 1 and 2 include both historical and predicted beta information.
3. *Beta* measures the expected response of a capital asset for example stock, bond, or portfolio, to movements in an overall market index.
4. *Historical beta* is calculated by regressing historical stock excess return—defined as the return above the RFR—against market index excess return.
5. *Predicted beta* used in the tables is a Barra-derived beta using its own risk models. These forecast a stock's sensitivity to the market before the fact, based on risk factors such as industry exposures, size and volatility.
6. Barra<sup>1</sup> argues its predicted beta is a more accurate reflection of a company's risk as it reflects changes in the company's underlying risk structure. In comparison, the historical approach only recognizes changes in the company's operations slowly over time and cannot reflect significant changes such as acquisitions and disposals which change the company's risk profile. In addition, historical beta is influenced by events specific to the company that are unlikely to be repeated. For example, the December 1984 Union Carbide accident in Bhopal, India, took place in a bull market, causing the company's historical beta to be artificially low.

### Beta measures

7. Table 1, which has been sorted according to historical beta, sets out the current beta measures for 13 companies as at 28 February 2006. It also includes the last beta measure for two companies which have been either acquired or had a recommended offer within the last four months (both acquisitions had been made by other companies included within the beta analysis).
8. The table shows a concentration of historical beta within the range 0.860 to 1.181.
9. If predicted beta is used as a measure there is a concentration within the range 0.716 to 0.994.
10. Table 2 shows the historical beta by company for the last four years. This shows that US companies within the selection have experienced an increasing beta over the

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<sup>1</sup>Barra.com website.

period, for example Verizon Communications beta has increased from 0.925 in February 2003 to 1.035 in February 2006. In comparison, the majority of European companies and Telefonica SA (Argentina) have experienced a decreasing beta in the same period, for example SEAT Pagine Gialle's beta has decreased from 1.366 to 1.045 over the period. The exception to this is Eniro AB, whose beta has increased from 0.688 to 0.865.

11. In comparison to historic betas which appear to show distinct country differences, predicted beta measures have generally fallen for all companies over the same period (12 out of the 15 companies).

TABLE 1 **Current/latest beta measures**

<i>Company</i>	<i>Country</i>	<i>Primary industry</i>	<i>Weighting %</i>	<i>Other industries</i>	<i>Weighting</i>	<i>Date</i>	<i>Predicted beta</i>	<i>Historical beta</i>
PagesJaunes	France	Consumer goods				28 Feb 06	0.534	0.328
Telefonica SA	Argentina	Computers/Telecoms				28 Feb 06	0.716	0.393
MTS Inc	Canada	Telecoms				28 Feb 06	0.474	0.445
RH Donnelley Corp	USA	Information services				28 Feb 06	0.882	0.525
Findexa*	OMX (Norway)	Continental media				30 Nov 05	0.994	0.860
Eniro AB	OMX (Sweden)	Consulting & data services				28 Feb 06	1.306	0.865
TDC	OMX (Denmark)	Telecoms				28 Feb 06	0.737	0.936
Deutsche Telekom	Germany	Telecoms				28 Feb 06	1.136	1.006
AT&T Inc	USA	Telephones	89	Publishing	11	28 Feb 06	0.770	1.024
Verizon Communications	USA	Telephones	60	Information services	6	28 Feb 06	0.841	1.035
Seat Pagine Gialle	Italy	Continental media				28 Feb 06	1.161	1.045
Dex Media Inc†	USA	Publishing				30 Dec 05	0.728	1.092
Telefonica Publicidad (TPI)	Spain	Continental media				28 Feb 06	1.220	1.181
Surewest Communications	USA	Telephones	57			28 Feb 06	0.730	1.219
Volt Information Sciences Inc	USA	Industrial services	73	Publishing & info services	13	28 Feb 06	0.858	1.445

Source: Barra Beta Book.

\*Recommended acquisition by Eniro—shares suspended on Oslo stock exchange 2/12/05.

†Acquired by RH Donnelley 31/1/2006.

Note: Weightings have been included for primary and other industry where these were given by Barra. All other companies are assumed to be 100 per cent weighted in their primary industry.

TABLE 2 Historical beta by company

Company	Date	Predicted beta	Historical beta	Company	Date	Predicted beta	Historical beta
<i>USA</i>				<i>Europe</i>			
RH Donnelley Corp	28 Feb 06	0.882	0.525	Telefonica Publicidad SA	28 Feb 06	1.220	1.181
	28 Feb 05	0.738	0.257		28 Feb 05	1.470	1.213
	27 Feb 04	0.790	0.263		27 Feb 04	1.495	1.335
	28 Feb 03	0.655	0.287		28 Feb 03	1.616	1.367
AT&T Inc	28 Feb 06	0.770	1.024	Seat Pagine Gialle	28 Feb 06	1.161	1.045
	28 Feb 05	0.729	0.762		28 Feb 05	1.427	1.194
	27 Feb 04	0.971	0.814		27 Feb 04	1.631	1.337
	28 Feb 03	1.188	0.766		28 Feb 03	1.604	1.366
Verizon Communications	28 Feb 06	0.841	1.035	Deutsche Telekom	28 Feb 06	1.136	1.006
	28 Feb 05	0.818	1.012		28 Feb 05	1.159	1.147
	27 Feb 04	0.896	0.978		27 Feb 04	1.145	1.312
	28 Feb 03	1.018	0.925		28 Feb 03	1.010	1.365
Dex Media Inc	30 Dec 05	0.728	1.092	PagesJaunes	28 Feb 06	0.534	0.328
	30 Dec 04	0.810			28 Feb 05	0.789	
Volt Information Sciences Inc	28 Feb 06	0.858	1.445	Eniro AB	28 Feb 06	1.306	0.865
	28 Feb 05	0.916	1.190		28 Feb 05	1.038	0.725
	27 Feb 04	0.850	1.212		27 Feb 04	1.107	0.683
	28 Feb 03	0.952	1.156		28 Feb 03	1.141	0.688
Surewest Communications	28 Feb 06	0.730	1.219	TDC A/S	28 Feb 06	0.737	0.936
	28 Feb 05	0.777	1.056		28 Feb 05	1.112	1.107
	27 Feb 04	0.685	0.862		27 Feb 04	1.094	1.142
	28 Feb 03	0.841	0.628		28 Feb 03	1.249	1.289
<i>Canada</i>				<i>Rest of the world</i>			
MTS Inc	28 Feb 06	0.474	0.445	Findexa	30 Nov 05	0.994	0.86
	28 Feb 05	0.567	0.012		30 Nov 04	1.280	0.993
	27 Feb 04	0.465	0.046	Telefonica SA (Arg)	28 Feb 06	0.716	0.393
	28 Feb 03	0.443	0.184		28 Feb 05	0.727	0.554
			27 Feb 04		0.771	0.601	
				28 Feb 03	0.874	0.674	

Source: Barra.

## Estimated real WACC for CDAS providers 1978 to 2005

1. We estimated a real WACC for the period 1978 to 2005, to be compared with providers' IRR for that period.

### ***Risk-free rate***

2. We examined yields of index-linked gilts, published by the Bank of England.<sup>1</sup> We used the daily spot yield curve for index-linked zero-coupon gilts and took an average of the 5-, 10- and 20-year estimated yield curve figures. This is consistent with the methods used in other market inquiries to estimate the RFR over shorter periods of time.
3. There were a number of small issues with the data and these are listed below. None of them, either individually or in combination, is likely to affect the estimate materially:
  - (a) There was no data before 1979. Hence the RFR is actually for the period 1979 to 2005. This figure is unlikely to be materially different from the 1978 to 2005 rate.
  - (b) There was no real yield data for 1979 to 1984. We have taken nominal data and deflated it by RPI-X for that period.
  - (c) There was no 20-year yield estimate on some dates where there was no bond longer than 20 years.
4. The real RFR for the period was 2.9 per cent.

### ***Equity risk premium***

5. The ERP is traditionally estimated by comparing historical returns of equities and gilts, and also by considering investors' future expectations. It is assumed that the ERP is generally constant over time. Therefore we continue to use a range of 3 to 5 per cent.

### ***Beta***

6. We have assumed that Yell's beta between 1978 and 2005 is within the range used for the cost of capital calculations in the main section of this appendix (between 0.89 and 1.07). Yell was unlisted for much of the period and there does not appear to be any suitable proxy. Intuitively, we would not expect the beta of a CDAS supplier to vary markedly over a long period, and the range we are using is broad. We tested the sensitivity of the WACC to changes in beta assumptions and found it to be not sensitive, giving us comfort that our range was appropriate.

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<sup>1</sup><http://213.225.136.206/statistics/yieldcurve/index.htm> .

## ***Gearing***

7. We have used a similar approach to the cost of capital calculations, presenting high equity (70 per cent) and low equity (50 per cent) cases. We tested the sensitivity of the WACC to changes in gearing assumptions and did not find it necessary to increase the range of the real WACC as a result (see paragraphs 12 and 13).

## ***Tax***

8. The simple average corporation tax rate for the period 1978 to 2005 was 37 per cent and we have used this in our calculations. This figure may be slightly above the actual average rate paid by a provider over the period, as it would be making losses in the first years of its operations and therefore might not have paid any tax until rates reduced to below their average in the mid-1980s. However, it is unclear what this rate should be, so we have used 37 per cent in our calculations.

## ***Debt premium***

9. We have assumed that the rating of BBB used in the 2000 to 2005 calculations holds for the longer period. The average spread over gilts for this debt for 2000 to 2005 was 2.2 per cent, but this was influenced by unusually low premia recently. We were unable to obtain figures for equivalent debt over a longer period. However, we would expect the premium on debt to be higher, and so have used an estimate of 3.0 per cent.

## ***Inflation***

10. We have used RPIX, which excludes mortgage interest payments. This is consistent with other inquiries. The average annual RPIX figure for 1978 to 2005 was 5.13 per cent.

## ***Estimated WACC***

11. The estimated real WACC for the period 1978 to 2005 is set out in Table 1. The WACC ranges between 7.4 and 10.9 per cent, with a midpoint of 9.2, depending on the gearing, ERP and beta assumptions used.

TABLE 1 **Estimated real WACC for the period 1978 to 2005**

Real RFR (%)	2.9
ERP—lower estimate	3.0
ERP—upper estimate	5.0
Beta—lower estimate	0.89
Beta—upper estimate	1.07
Tax rate (%)	37.0
<i>Pre-tax cost of equity</i>	
Lower estimate	8.8
Upper estimate	13.1
<i>Pre-tax cost of debt (real)</i>	
Real RFR (%)	2.9
Spread (%)	3.0
Cost of debt (pre-tax) (%)	5.9
<i>Capital structure—high gearing</i>	
Equity (%)	50
Debt (%)	50
<i>Capital structure—low gearing</i>	
Equity (%)	70
Debt (%)	30
<b><i>Pre-tax WACC—high gearing</i></b>	
<b>Lower estimate</b>	<b>7.4</b>
<b>Upper estimate</b>	<b>9.5</b>
<b><i>Pre-tax WACC—low gearing</i></b>	
<b>Lower estimate</b>	<b>8.0</b>
<b>Upper estimate</b>	<b>10.9</b>

Source: Bank of England, ONS, CC calculations.

## ***Sensitivity analysis***

12. We examined the sensitivity of the WACC to changes in beta and gearing. We calculated the WACC using beta and gearing values at the end of their ranges, and at 10 per cent above and below the ends of their ranges. All other variables were held at their midpoint.

TABLE 2 **Ranges for beta and gearing used in WACC calculation**

	<i>per cent</i>		
	<i>Lower</i>	<i>Midpoint</i>	<i>Upper</i>
Beta	0.89	0.98	1.07
Gearing (% equity)	50	60	70

Source: CC.

13. The results of the sensitivity analysis are shown in Table 3. The table shows that even if beta or gearing is changed to 10 per cent outside the ranges used, the resulting WACC is still within our estimated range. As a result of this, we do not propose to increase the range of the WACC as a result of this sensitivity analysis.

TABLE 3 **WACC: flexing gearing and betas; all other variables at midpoint**

	<i>Lower -10%</i>	<i>Lower</i>	<i>Midpoint</i>	<i>Upper</i>	<i>Upper +10%</i>
Gearing	8.1	8.4	8.9	9.3	9.7
Beta	8.5	8.7	8.9	9.0	9.2

Source: CC.

**Thomson's estimated WACC for 1980 to 1999**

14. Thomson submitted an estimate of its pre-tax WACC for the period 1980 to 1999. The components of the WACC are set out in Table 4.

TABLE 4 **Thomson's estimated pre-tax real WACC, 1980 to 1999**

*per cent*

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Source: Thomson.

15. [✂]
16. [✂]
17. [✂]
18. [✂]