Oxera

Celebrating 25 years

eircom's cost of capital

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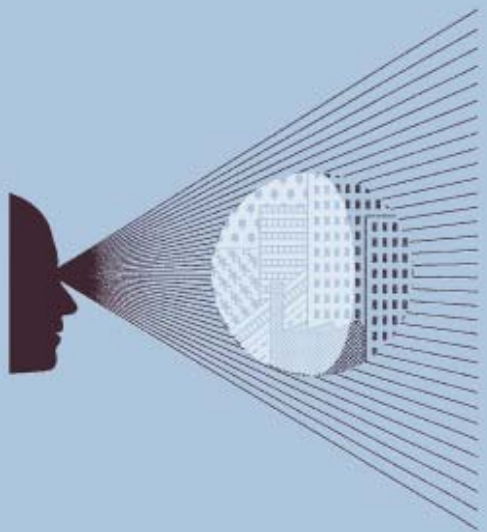

Executive summary

This report presents Oxera's analysis of the cost of capital of eircom's fixed-line business for the Commission for Communications Regulation (ComReg). eircom is the principal provider of fixed-line telecoms services in Ireland, with approximately 2.5m fixed-line telephone access channels. As part of the 2003 price review, ComReg established a cost of capital of 11.5% on a nominal pre-tax basis using an approach based on the capital asset pricing model (CAPM).

Since the previous price control and the last review of its cost of capital, eircom re-listed on both the London and Irish stock exchanges in March 2004. In August 2006, a cash offer by Babcock & Brown Capital Ireland Holdings Limited (BCMIH) and eircom's Employee Share Ownership Trust (ESOT) was approved to acquire the ordinary share capital of the company, removing eircom from the markets.

The evolution of the company's ownership and financial structure pose particular challenges for the cost of capital determination. Private ownership means that eircom's stock is not listed, preventing direct estimation of its equity beta for the period of the last 12 months.

Oxera has employed a number of methodologies to calculate eircom's fixed-line asset beta, giving a range of 0.45 to 0.70. The range reflects a consistent set of results from the application of different methodologies based on direct statistical estimates, peer comparison, beta decomposition, and relevant regulatory precedent. Moreover, specific business factors, such as capital intensity, as well as different business characteristics have been explored to provide an insight into the level of systematic risk faced by investors in eircom.

As a result of changes to eircom's financial structure, ComReg has asked Oxera to carry out estimations of eircom's cost of capital using both notional and actual gearing levels and the associated debt premia. Estimates of notional gearing using regulatory precedent and comparator companies provide a range of 30–50%. The associated implied debt premium was calculated on the basis of a shadow credit rating analysis and an analysis of spreads on eircom's bonds prior to acquisition. The debt premium under notional gearing was estimated at 120–190bp.

For estimates of actual gearing, three scenarios have been investigated, using in each case a different estimate for eircom's enterprise value. The results give a range for eircom's actual gearing of 60–91%. To calculate a value for the actual debt premium, the spread on each of eircom's debt instruments was combined, in proportion to its size, with respect to the total debt figure. The results of these calculations present a range for the actual premium on eircom's debt, consistent with the relevant benchmark, of between 257 and 304bp.

A number of approaches for remunerating eircom for tax have been explored, including the advantages and disadvantages of each. The approach adopted in this report is based on the pre-tax regime to calculate the weighted average cost of capital (WACC), and remains consistent with the approach adopted by ComReg at the last review.

The choice of an appropriate tax regime is particularly important at higher levels of gearing, given the potentially significant value of embedded debt tax shields. In the case of eircom, the high level of gearing adopted by the company since the last review raises a question about the sharing of these benefits between eircom and its customers. Given the above considerations, including eircom's gearing, ComReg might want to consider the impact of the potential application of alternative approaches to tax in detail. This is likely to require further analysis given, for example, the complexities of estimating effective tax rates and the potential impact on a company's finances.

For the risk-free rate, the evidence investigated in this report indicates that an appropriate range estimate might be between 4.5% and 5.0%. This range reflects current market evidence and recent regulatory precedent, while recognising the uncertainty regarding the future path of interest rates. As regards the equity risk premium (ERP), taking into account the available market evidence as well as the recent regulatory precedent, this report suggests a range of 4.8–6.0%.

The results for the base case, under notional gearing, are presented below, with the figures under actual gearing presented in section 10 of the report. The high levels of actual gearing suggest that a significant portion of the debt premium may be due to systematic risk, and therefore a non-zero debt beta has been incorporated into the analysis under actual gearing. A zero debt beta has been assumed under the base case, which is consistent with the notional level of gearing under the proposed methodology for estimating debt betas.

The results yield a range for eircom's nominal pre-tax WACC, under notional gearing, of between 7.77% and 11.08%, as shown below, compared with the range under actual gearing of between 7.68% and 10.49%. The corresponding midpoint estimates are 9.43% under the notional gearing and 9.08% under the actual gearing scenarios.

eircom's cost of capital (base case)

	Low	Midpoint	High
Cost of debt			
Nominal risk-free rate (%)	4.50	4.75	5.00
Debt premium (bp)	120	155	190
Nominal cost of debt (%)	5.70	6.30	6.90
Cost of equity			
Nominal risk-free rate (%)	4.50	4.75	5.00
Asset beta	0.45	0.57	0.70
Debt beta	0.00	0.00	0.00
Gearing (%)	30	40	50
Equity beta	0.64	1.02	1.39
Equity risk premium (%)	4.80	5.40	6.00
Corporate tax rate (%)	12.5	12.5	12.5
Cost of equity (post-tax) (%)	7.57	10.47	13.36
Weighted average cost of capital			
Nominal vanilla WACC (%)	7.01	8.57	10.13
Nominal pre-tax WACC (%)	**7.77**	**9.43**	**11.08**

Source: Oxera calculations.

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1 Introduction

This report presents the results of Oxera's analysis of the cost of capital of eircom's fixed-line business. As part of the 2003 price review, ComReg established a cost of capital for eircom of 11.5% on a nominal pre-tax basis using an approach based on the capital asset pricing model (CAPM).[1] Since that determination, various aspects of the telecoms industry in Ireland, as well as eircom's financial and business profile, have evolved, with possible implications for eircom's cost of capital. For example, the increasing penetration of broadband and mobile telecoms, as well as changes in the ownership and financial structure of eircom, may have had an impact on the company's business risk. Furthermore, changes in the market parameters may have a bearing on its financial and business risk profile. In this context, ComReg has asked Oxera to review and estimate a cost of capital for eircom. This report presents Oxera's analysis, and is structured as follows.

Section 2 sets out the context of this report, briefly describing eircom and the main features of the previous price cap determination.

– Section 3 presents a preliminary description of eircom's business divisions, their relative sizes and CAPEX intensity.

– Section 4 outlines the CAPM methodology used to estimate the cost of capital for eircom's fixed-line business.

– Section 5 details the methodologies used to estimate eircom's fixed-line beta.

– Section 6 details the methodologies used to estimate a value of eircom's actual and notional gearing and associated debt premia.

– Section 7 discusses the choice between a statutory and effective tax rate.

– Sections 8 and 9 present Oxera's updated estimates for the risk-free rate and the equity risk premium (ERP).

– Section 10 combines the results from each section to estimate a cost of capital for eircom's fixed-line business under both notional and actual gearing scenarios.

[1] Commission of Telecommunications Regulation (2003), 'Review of the Price Cap on Certain Telecommunications Services', Decision D3/03, Document 03/14, February, p. 12.

2 Background

eircom is the principal provider of fixed-line telecoms services in Ireland, with approximately 2.5m fixed-line telephone access channels. It owns the third-largest mobile operator in Ireland, Meteor, which it acquired in November 2005[2] and which, in March 2007, had approximately 832,000 subscribers, reflecting an increase of 88% since acquisition.[3]

In March 2004, eircom Group plc re-listed on the Irish and London stock exchanges, at an issue price of €1.55 per ordinary share, having been owned privately since 2001 by Valentia Telecommunications. In August 2006, a cash offer by Babcock & Brown Capital Ireland Holdings Limited (BCMIH) and eircom's Employee Share Ownership Trust (ESOT) was approved to acquire the ordinary share capital of the company,[4] de-listing eircom from the markets. The resulting ownership structure gave BCMIH 65% of eircom's ordinary share capital, with the remainder owned by ESOT.[5]

Investment in eircom represented a significant part (approximately 70%) of Babcock & Brown's enterprise value on the date of acquisition. eircom's acquisition value was £4.8 billion, of which Babcock & Brown acquired 57% (see Table 2.2).[6]

Table 2.1 Babcock & Brown's financial structure, June 2006 (£ billion)

Net debt	1.7
Market value of equity	2.2
Enterprise value	**3.9**

Note: Calculated using the AUD/GBP exchange rate of 0.40 as at June 30th 2006.
Source: Datastream and Analyst Presentation by Babcock & Brown, November 2006.

Table 2.2 Babcock & Brown's acquisition of eircom

eircom: acquisition enterprise value (£ billion)	4.8
Babcock & Brown: interest in eircom (%)	57.1
Babcock & Brown: interest in eircom (£ billion)	**2.7**
Interest in eircom relative to Babcock & Brown's pre-acquisition enterprise value (%)	**70**

Note: Calculated using the AUD/GBP exchange rate of 0.40 as at June 30th 2006.
Source: Datastream and Analyst Presentation by Babcock & Brown, November 2006.

The main elements of eircom's previous price cap determination, undertaken in 2003, were:[7]

– a nominal pre-tax cost of capital of 11.5% (estimated using the CAPM);

– a basket of regulated services including the following individual products:

[2] Analysys (2006), 'eircom Ltd Review'.
[3] ComReg (2007), 'Irish Communications Market: Quarterly Key Data: June 2007', Document Number 07/34, June.
[4] eircom (2006), 'Recommended Cash Offer for eircom Group plc by BCM Ireland Holdings Limited', August 16th.
[5] Babcock & Brown Capital Ltd (2006), 'BCM to refinance its equity in eircom', ASX News Release, November 16th.
[6] Babcock & Brown Capital Ltd (2006), 'European Analyst Presentation'.
[7] Commission for Communications Regulation (2003), 'Review of the Price Cap on Certain Telecommunications Services', Decision D3/03, Document 03/14, February.

  - the provision of telephone exchange lines and ISDN lines (rental);
  - telephone exchange lines and ISDN connection and takeover (connection);
  - local dialled calls;
  - trunk dialled calls (national);
  - operator calls;
  - payphone calls;
  - fixed-to-mobile calls;

- a decrease in the corporate tax regime in Ireland. At the time of the determination, the tax rate was 16%, but was expected to fall to 12.5% in 2004 and to 12% in 2005. ComReg opted to use an average of 13.5%;[8]

- the X factor applicable to the basket of regulated services was set at 0% annual. This implied that the prices of regulated services were allowed to increase directly with inflation.

As noted above, since the 2003 price cap determination, eircom has experienced significant changes to its ownership and financial structure that might imply changes to its business and financial risk profile.

In 2006, ComReg began the consultation process on alternatives for a future regulated price cap control, stating in its initial consultation, that:

> some form of a retail price cap continues to be needed to prevent eircom from exploiting its market power as competition develops.[9]

In this context, the determination of the eircom's fixed-line cost of capital is of primary importance for the future operation and development of the telecoms industry in Ireland.

[8] Report prepared for ODTR (2002), 'Eircom's cost of capital', p. 35.

[9] Commission for Communications Regulation (2006), 'Consultation on a Retail Price Cap as a Potential Remedy on Fixed Narrowband Access Markets—Part 1', Document 06/41, August, p. 25.

3 eircom's business divisions

This section presents an overview of eircom's business divisions. Table 3.1 presents a high-level categorisation of eircom's business activities.

Table 3.1 eircom's business divisions

Division 1	Division 2	Division 3	Division 4
Fixed-line business	Wholesale	Core network	Wholesale call origination/termination
			Wholesale transit/interconnection services (national and international)
			Wholesale trunk segments of leased lines and private partial circuits (PPCs)
		Access network	Unbundled local loops
			Wholesale broadband access
			Wholesale terminating segments of leased lines and PPCs
	Retail	Retail	Retail narrowband access (voice and data)
			Retail narrowband calls (local, national and international)
			Retail leased lines (national and international)
			Retail broadband services
			ISP services
			Calls to the Internet
			Calls to mobile
			Payphone access and calls
			Value-added services such as voice over Internet protocol (VOIP)
			Directory enquiries
			Supplementary services such as data networks, broadcast and visual services
			Remaining activities such as operator assistance, premium-rate services, VPN/IVPN, etc
Mobile communications and other businesses	Mobile and other	Mobile and other	Meteor business, including the provision of retail mobile telephony services, mobile access and call origination, mobile call termination, wholesale international roaming
			Apparatus supply
			Other subsidiaries and remaining activities

Source: Oxera analysis.

The wholesale division provides telecoms services such as unbundled local-loop and interconnection services to other authorised operators (OAOs), as well as to eircom's own retail business. The retail business sells telecoms products such as narrowband access and calls to end-users (residential and/or businesses).

The business divisions can be disaggregated further within the broad categories set out above, based on the different types of asset (eg, core and access networks) used for the provision of telecoms services. Under this categorisation, eircom could be divided into four business divisions. The description below outlines Oxera's understanding of the business divisions used for the purposes of the regulatory accounts, along with their business characteristics.

– **Local access network** includes the customer-dedicated network components running from the local exchanges to the end-users' premises (houses and businesses). It enables eircom's own retail division, as well as OAOs, to deliver telecoms products to end-users. Products provided under the local access network include:

  – unbundled local loops;
  – wholesale terminating segments of leased lines and PPCs;
  – wholesale broadband access.

– **Core network business** comprises all network components, with the exception of those used in the local access network. It enables customers of eircom and/or OAOs to communicate with customers of the same or another operator, or to access services provided by another operator directly. Products provided under the core network include:

  – wholesale call origination/termination;
  – wholesale transit/interconnection services (national and international);
  – wholesale trunk segments of leased lines and PPCs.

– **Retail business** is made up of all the activities involved in the sale of telephony services to end-users (businesses and individuals). Retail products can be broadly classified as 'volume-sensitive' products (eg, local, national and international calls, calls-to-mobile telephony, calls to the Internet, public payphones and directory enquiries), and 'non-volume-sensitive' products (eg, retail access and, to a lesser extent, retail broadband and leased lines). Other services provided under the retail division include the provision of 'supplemental services' (advance data services such as data networks, broadcast and visual services) and 'remaining activities' (operator assistance, premium-rate services, managed answering services, fixed SMS and VPN/IVPN).

– **Mobile telecommunications and other businesses** comprise a wide range of other services such as mobile communications (Meteor), the supply of equipment (rental, repair and maintenance of customer equipment), subsidiary activities (mainly the provision of Internet services through Indigo), and other activities such as repayment works, and IT and consultancy services.

Table 3.2 below details the relative sizes of eircom's business divisions using information from the company's 2006 regulatory accounts. The divisions include the local access network, the core network, and the retail division, which together constitute the fixed-line services, as well as the mobile (Meteor) and other divisions.

The table highlights the relatively small size of eircom's mobile business compared with the fixed-line business. Although the retail business has the highest notional turnover, it includes transfer revenues to the core and access divisions. Therefore, controlling for transfer prices, the local access network represents the largest business division of eircom, followed by the core network.

Table 3.2 Size of eircom's business divisions by turnover and mean capital employed, as per the company's regulatory accounts, March 31st 2006

	Turnover (€'000)	% of total	Capital employed (€'000)	% of total
Local access	561,782	21	934,655	66
Core network	545,094	21	279,744	20
Retail	1,258,206	47	146,466	10
Mobile	86,844	3	71,953	5
Other	206,109	8	–7,321[1]	–1
Total	2,658,035	100	1,425,497	100

Note: [1] This negative value is due to a large value for monies owed to creditors.
Source: HCA regulatory accounts 2006.

Table 3.3 presents operating profits by division proxied by turnover minus operating costs. It is of note that, in 2006, Meteor made an operating loss and since acquisition by eircom has yet to return a profit.[10]

Table 3.3 Operating profit by business division, March 31st 2006

	Turnover minus operating costs (€'000)	% of total operating profit
Local access	107,485	33
Core network	32,170	10
Retail	118,660	37
Mobile	–7,207	–2
Other	70,287	22
Total	321,395	100

Source: HCA regulatory accounts 2006.

In terms of growth and CAPEX, Table 3.4 below presents a measure of CAPEX intensity measured as CAPEX to turnover, whereas Table 3.5 presents relative ratios of CAPEX to total assets by business division.

[The following text is confidential and commercially sensitive, and has been redacted.]

[10] BCMIH (2007), 'Quarterly and 12 Month Results Announcement', March 31st. Meteor returned a €4m loss in the year ending March 31st 2007.

Table 3.4 CAPEX intensity (CAPEX/turnover)

	2003	2004	2005	2006	Average
Local access	✂	✂	✂	✂	✂
Core network	✂	✂	✂	✂	✂
Retail and other	✂	✂	✂	✂	✂
Total fixed line	✂	✂	✂	✂	✂

[The following text is confidential and commercially sensitive, and has been redacted.]

Table 3.5 CAPEX intensity (CAPEX/total assets)

	2003	2004	2005	2006	Average
Local access	✂	✂	✂	✂	✂
Core network	✂	✂	✂	✂	✂
Retail and other	✂	✂	✂	✂	✂
Total fixed line	✂	✂	✂	✂	✂

[The following text is confidential and commercially sensitive, and has been redacted.]

Table 3.6 Historical and forecast CAPEX in real terms, base year 2006/07 (€m)

	2002/03 historical	2003/04 historical	2004/05 historical	2005/06 historical	2006/07 forecast	2007/08 forecast	2008/09 forecast	2009/10 forecast	2010/11 forecast	Average 1	Average 2
Local access	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂
Core network	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂
Retail and other	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂
Total fixed line	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂	✂

4 Methodology for estimating eircom's fixed-line business cost of capital

4.1 WACC and CAPM

In its February 2003 Decision Notice on eircom's previous price cap determination, ComReg acknowledged that there was broad consensus in the Irish telecoms markets that the WACC and CAPM should continue to be used as the basis for determining the return on capital of eircom.[11]

The appropriately weighted average of the cost of debt and equity for a firm is the aggregate cost of capital. In previous determinations ComReg has used a WACC defined on a nominal pre-tax basis:[12]

$$WACC = R_d * g + [R_e*(1 – g)](1/1 – CT)$$

where R_e is the cost of equity, R_d is the cost of debt, g is the level of gearing and CT is the corporate tax rate.

The CAPM is a model used to value assets, where the required return on a given asset is determined by the relative contribution of that asset risk to the risk of the overall market portfolio. The central tenet of this model is that investors hold a broad portfolio of assets so that the idiosyncratic risk of any single asset is diversified away leaving only the systematic risk component. Therefore, only the systematic risk component is remunerated through the expected return.

The expected return on an asset according to CAPM is shown below where beta (β) is the coefficient of the asset's systematic risk or the level of correlation of returns of any given asset with the returns on the market portfolio, adjusted for variance of the market portfolio:

$$E[R_e] = R_f + \beta * (E[R_m] – R_f)$$

where:

$$\beta = \frac{Cov(R_e, R_m)}{Var(R_m)}$$

R_f is the risk-free rate, *β* is the correlation between the firm and the market, and ($E[R_m] – R_f$) is the market risk premium.

4.2 Estimation of eircom's asset beta

Conceptually, the CAPM is forward-looking, in that it defines the future expected return, which is consistent with investors' expectations of the nature of the risks faced by the company or a given asset. The only company-specific parameter in the CAPM is the beta—

[11] ComReg (2003), 'Review of Price Cap on certain telecommunications services', Decision Notice, February.

[12] ComReg is unique in Ireland among regulators as it uses a nominal risk-free rate in its calculation of the WACC. This approach is in line with the use of nominal WACC by Ofcom in its regulatory price determinations. See Ofcom (2005), 'Ofcom's approach to risk in the assessment of the cost of capital', August, p. 89.

ie, the level of the correlation of asset-specific returns with market returns. The calculation of an asset beta for eircom is complicated by the fact that the company is no longer listed and the duration of its prior listing was relatively short. Furthermore, the purchase of Meteor in 2005 has, once again, made eircom a fixed-line and mobile operator, potentially affecting its business risk. Since the objective of Oxera's analysis was to estimate the cost of capital of eircom's fixed-line business, the analysis needed to consider the impact of the mobile business on eircom's beta.

As a result of de-listing as well as changes in the company's financial and business profile, a robust, direct statistical estimate of eircom's beta based on market data might not be available. Given this factor, the absence of up-to-date market data and recent corporate actions by eircom affecting its profile, reliance on market estimates might not be sufficient. Therefore, Oxera's analysis has employed several methodologies based on statistical estimates, peer comparison, decomposition and regulatory precedent, in order to estimate eircom's fixed-line beta. In this way, each methodology not only acts as a separate data point, but also provides a cross-check on the other results (see section 5).

4.3 Financial structure and gearing

Due to changes in eircom's financial structure and a significant increase in its leverage over recent years, ComReg has asked Oxera to undertake an estimation of eircom's cost of capital based on actual gearing, in addition to the recommended approach based on notional gearing. Therefore, Oxera's estimates are presented under two approaches: notional gearing (the base case) and actual gearing (the alternative scenario).

The use of notional gearing may have a number of advantages, such as allowing the necessary flexibility for owners to adopt a range of potential capital structures, and reducing the degree of regulatory intervention in the financing of the business. This is further discussed in section 6. The results of the use of actual rather than notional gearing for the cost of capital estimate are presented in the same section.

The debt premium chosen for the WACC calculation must be consistent with the gearing assumption. For actual gearing, it would be consistent to take an estimate of the actual debt premium that eircom is likely to pay over the course of the price control. In the case of the notional level of gearing, the relevant debt premium may be approximated by the debt premia on comparator companies with a level of gearing similar to the assumed notional level of gearing. The historical debt premium paid by eircom when its gearing was more in line with the notional level might also serve as an indication of the appropriate debt premium assumption at notional gearing (see section 6.2 for details).

At high levels of gearing, debt might have a significant systematic risk component, which might need to be taken into account explicitly through the beta of debt. In general, the asset beta of a company can be defined as the weighted average of its debt and equity betas:

$$\beta_{asset} = g * \beta_{debt} + (1 - g) * \beta_{equity}$$

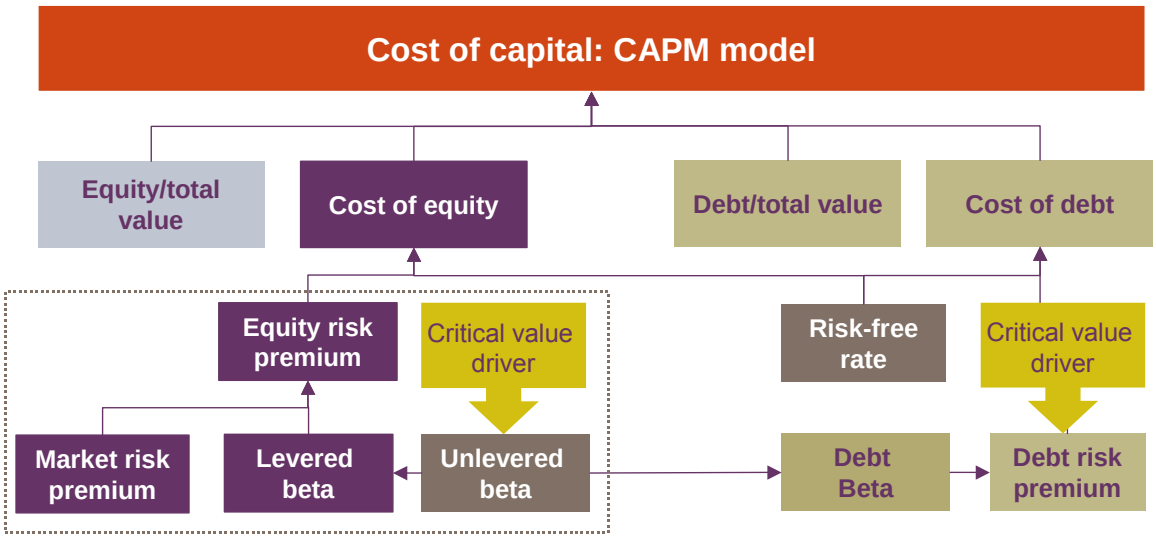
As with the equity beta, the beta of debt recognises the systematic risk faced by debt investors. Conventionally, for low gearing and investment-grade debt, the debt beta is often assumed to be zero, since the systematic risk component of debt is assumed to be negligible. In cases where a company is highly geared, has sub-investment-grade debt and a high debt premium, a significant portion of the debt premium may be due to systematic risk; in this case, a non-zero debt beta is likely to be a more appropriate assumption.

Oxera's analysis assumes a debt beta of zero in the base case at the notional level of gearing (see section 6.2 for details). However, for the analysis of actual gearing, given the high debt premia and significant level of gearing, a positive value has been used for the debt

beta. In this case, the debt beta has been estimated using the methodology employed by Ofcom in 2004. This methodology attributes a proportion of the debt premium to factors other than systematic risk, such as liquidity premium and default premium (see section 10).

Figure 4.1 summarises the building blocks for the cost of capital calculation based on the CAPM and WACC.

Figure 4.1 Calculating eircom's WACC



Source: Oxera.

4.4 Alternative methodologies to the CAPM

In addition to the CAPM, a one-factor model, consideration was given to the use of the Fama–French three-factor model as well as other multi-factors models, including Cahart's four-factor model.[13] The following explains why Oxera did not pursue application of such models in the case of eircom.

The Fama–French model seeks to explain stock returns in terms of the following three risk factors:

– the ERP ($R_m - R_f$) or the market factor, defined as the difference between the return on the index and the return on a risk-free security;

– the size factor, SMB, defined as the difference between the return on a portfolio of large-cap stocks and the return on a portfolio of small-cap stocks;

– the book-to-value factor, HML, defined as the difference between the return on a portfolio of high book-to-value stocks ('value' stocks) and a portfolio of low book-to-value stocks ('growth' stocks).[14]

Other multi-factor models explore additional factors. For example, the Cahart model uses as an additional factor: winners minus losers (WML), defined as the return on the past 'winner' portfolio minus the return on the past 'loser' portfolio.

[13] Cahart, M. (1997), 'On Persistence in Mutual Fund Performance', *Journal of Finance*, **52**, 57–82.

[14] See Fama, E.F. and French, K.R. (1993), 'Common Risk Factors in the Returns on Stocks and Bonds', *Journal of Financial Economics*, **33**, 3–56.

Some regulators have used multi-factor models to provide an additional check on the results from the CAPM. In particular, if the range of beta estimates is wide, multi-factor models, such as Fama–French, might be useful in providing an additional benchmark or a cross-check on CAPM.

The applicability and usefulness of multi-factor models might depend on the circumstances of the case, and there is still debate as to whether such models add significant additional information when predicting future returns compared with the CAPM. For example, Gregory and Michou (2007) state that:

> rolling CAPM estimates give predicted returns no worse than those that are obtained from more complex models.[15]

The use of the Fama–French approach, in parallel with the CAPM, does provide additional information, although the quality of this information is not always guaranteed. For example, the efficacy of the Fama–French methodology in Ireland is reduced by the non-existence (to the best of Oxera's knowledge) of Irish-specific versions of the two additional factors (SMB and HML).

Solutions to this problem could include direct estimation of the factors using Irish data, or by reading across the factor estimates from the UK or US data to Ireland.[16] The first option is not practical in the context of this analysis due to the large data requirement and analytical commitment necessary to perform a robust analysis. Moreover, it is not expected that this exercise would add substantial value to the analysis. Furthermore, it is questionable whether the second option could provide any analytical insight due to the problems of directly estimating the slope factors, as highlighted by Gregory and Michou (2007):

> the SMB and HML factor slopes have a great deal of variability through time, and unlike the position that obtains in the US research, there is little to suggest that the variation occurs in such a way as to reflect size and book-to-market changes in industries.[17]

Moreover, the results from any direct read-across from the UK or the USA are likely to be biased due to the use of non-Irish data.

In the case of eircom, where the difficulties of estimating single-factor model parameters are not trivial, the additional requirements of three-factor models are of particular significance.

– First, eircom's stock was listed on two exchanges, denoted in different currencies, which means that factors can be estimated on two different sets of data.

– Second, its period of public trading was short, resulting in a limited volume of data available for the regressions.

– Finally, the acquisition of eircom by Babcock & Brown removed eircom stock from both exchanges, further limiting the size of the dataset and removing the most relevant, recent data.

There is no evidence to suggest that these issues would become any less pronounced with the application of three-, or four-factor models.

[15] Gregory A. and Michou, M. (2007), 'Industry Cost of Capital: UK Evidence', Exeter Conference on Cost of Capital and Financing of Regulated Industries, May.
[16] Fama and French regularly update and publish these factors on their US website, and Gregory and Michou (2007) provides an authoritative replication of the US analysis for UK industries.
[17] Gregory and Michou (2007), op. cit.

The Fama–French model can be a useful check on results from the application of CAPM in a data environment where robust estimates of the additional factors are available. In the case of eircom, limited market data, combined with the lack of robust Fama–French load factor estimates for Ireland, suggests that the application of the Fama–French methodology might offer little additional insight into the cost of equity. It is for these reasons in this particular case that the methodology was not pursued.

5 Estimating eircom's fixed-line beta

The complexity of the determination of a beta value for eircom's fixed-line business is increased by two factors. First, eircom is no longer a listed company and the duration of its prior listing on the Irish and London Stock exchanges was relatively short—a period of two-and-a-half years. Second, with the purchase of Meteor in 2005, eircom is once again a fixed-line and mobile operator.

The work undertaken by Oxera to estimate the beta for eircom's fixed-line business can be split into the following approaches.

– **Estimation of eircom Group's beta as a proxy for eircom's fixed-line beta**. This approach incorporates the following methodologies: statistical estimation carried out by Oxera; third-party statistical estimation carried out by the Risk Measurement Service of the London Business School and Bloomberg; and comparison of beta estimates against a sample of companies with a large proportion of their value attributable to fixed-line operations.

– **Direct estimation of eircom's fixed-line beta**. In this approach two proxies for eircom's fixed-line business are used. The first takes a set of comparator companies and applies beta disaggregation to determine a range of estimates for the beta of a hypothetical company with fixed-line operations only. The second looks at recent regulatory precedent on the choice of asset beta for regulated telecoms incumbents as a proxy for eircom's fixed-line beta.

The first estimation relies on the assumption that the beta for the eircom Group is close to that for eircom's fixed-line business. This assumption may hold for eircom given that the proportion of revenue and profit attributable to Meteor and other business divisions, in comparison to eircom's fixed-line business, is small.[18] However, it might be less likely to be the case for the comparator companies, where mobile operations make up a much larger proportion of the businesses' profits.

To the extent that mobile business might be expected to have a higher beta than the fixed-line business, this assumption might lead to the estimated beta being biased upwards. For this reason, beta disaggregation has also been used to extract the effect of mobile operation on the companies' asset betas.

While direct estimates of eircom's beta are preferable, any one methodology will yield only one data point. It is therefore important that each methodology itself acts not only as a data point in the analysis, but also as a cross-check on the other results. The results from all methodologies have been compared with ComReg's previous determination of eircom's beta.

5.1 Estimation of eircom Group's beta

5.1.1 Direct statistical estimation

The following standard market model was used to estimate eircom's beta.

[18] For example, in the 2007 annual report, revenues attributable to Meteor make up 18% of the total, and profits for Meteor remain negative as in the 2006 annual report.

$$r_t = \alpha + \beta(rm_t) = \varepsilon_t$$

where:

r_t = eircom's returns;
rm_t = the return on the market;
ε_t = error term;
α = constant term;
β = covariance of eircom's return with the market (beta).

In estimating eircom's equity beta, a decision is required on the following aspects of the analysis.

– **Selection of data frequency (daily, weekly, monthly)**. There is no practical consensus regarding the frequency of data to use in such analyses. From a theoretical perspective, it can be argued that monthly data is less likely to be affected by autocorrelation than daily or weekly data. In practice, the decision on whether to use monthly rather than daily or weekly data is likely to depend on the amount of data available, robustness of different estimates, as well as potential biases associated with any particular approach. In this context, it is important to note that the use of monthly data reduces the number of data points available from 398 to 17.

– **Selection of market indexes (FTSE in the UK, ISEQ in Ireland)**. In March 2004, eircom was listed on both the London and Dublin stock exchanges. Over its trading history, a majority of shares were traded on the FTSE in London.[19]A higher trading volume increases the liquidity of that stock in a given market. This may increase the likelihood of the stock capturing market movements and indicate a level of systematic risk closer to the market portfolio. In this report, beta estimates using both market indices have been explored, although the results using the FTSE All-share index exhibit greater statistical significance. All results are reported in Appendix A1. The beta estimation results used in the final estimate are based on the FTSE All-share index.

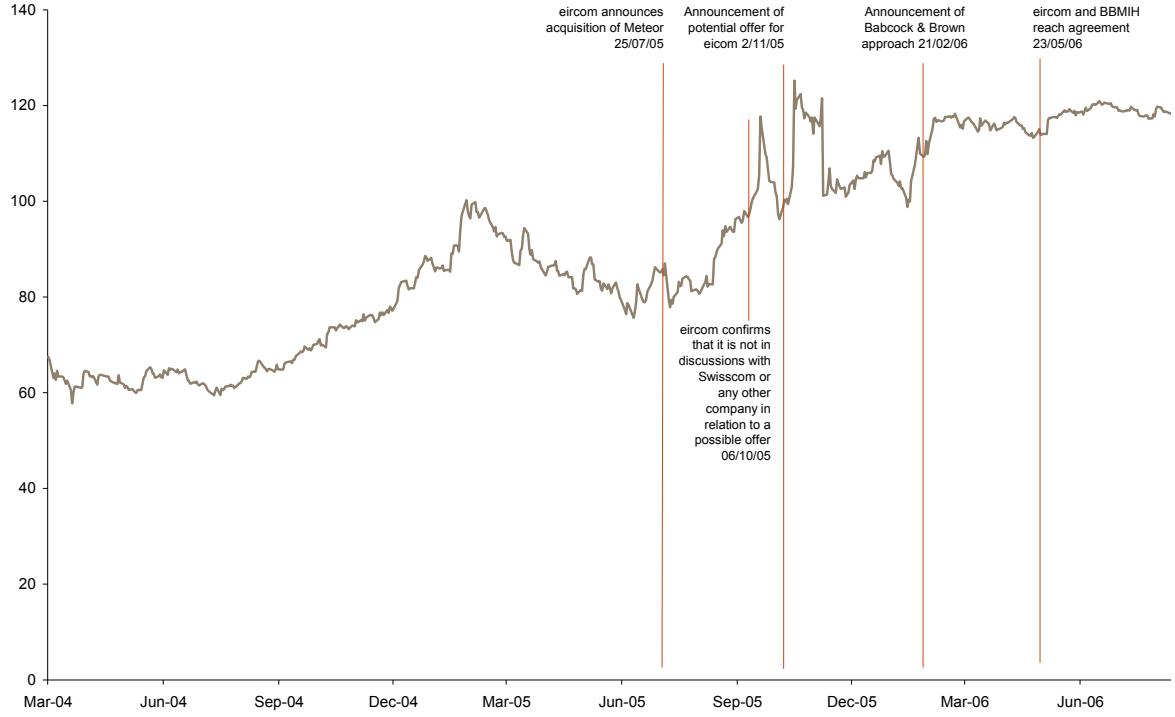
– **Selection of time periods**. Figure 5.1 below shows eircom's daily share price over the period it was traded between March 2004 and August 2006. The increase in the share index from mid-September 2005 to February 2006 is likely to be explained by market speculation regarding the acquisition of eircom.[20] Since idiosyncratic movements in a given stock might reduce beta estimates, Oxera has limited the estimation period to the following dates:

  – March 18th 2004 to September 27th 2005 for the daily beta estimation;
  – March 22nd 2004 to September 26th 2005 for the weekly beta estimation;
  – April 1st 2004 to September 1st 2005 for the monthly beta estimation.

[19] Between March 19th 2004 and August 18th 2006, turnover by volume for the Irish ISEQ and London FTSE was 44% and 56% respectively.

[20] Initial speculation concerned a potential offer by Swisscom (later denied by eircom in a communication on October 6th 2005) and then from a 'potential offeror', later confirmed to be Babcock & Brown. On October 6th 2005, the following was reported by eircom: 'eircom notes this morning's press speculation concerning a possible approach from Swisscom. The company confirms that it is not currently in discussions with that company or any other in relation to a possible offer.' On November 2nd 2005 eircom indicated that: 'The Board of eircom notes the recent share price movement and confirms that the Company has received a preliminary approach from a potential offeror that may or may not lead to an offer being made for the Company'. Finally, on February 21st 2006 eircom indicated that: 'The Board of eircom confirms that the Company has received a preliminary approach from Babcock & Brown Capital, which may or may not lead to an offer being made for the Company.' Source: http://investorrelations.eircom.net/news/.

Figure 5.1 eircom's daily return index



Source: Datastream, Oxera analysis.

Table 5.1 summarises the beta estimates using daily, weekly and monthly data. Only daily and weekly beta estimates are statistically significant. Monthly estimates are not statistically different from zero.[21]

Table 5.1 eircom's beta estimates

Frequency	Equity beta	t-statistic	R^2	Implied asset beta	Observations
Daily	0.62	4.50**	0.05	0.28	398
Weekly	0.90	2.96**	0.10	0.41	79
Monthly	1.53	1.90	0.19	0.69	17

Notes: * significant at 5%; ** significant at 1% from zero. In the calculation Oxera used a return index (RI) obtained from Datastream—the RI assumes that dividends are reinvested to purchase additional units of equity at the applicable closing price; the FTSE All-share index as the market reference in Equation 5.1; and currency in sterling for all the calculations. The implied asset betas are de-levered from the equity betas using 55% gearing. The gearing was obtained as an average of eircom's gearing level on March 31st 2004 (54.4% obtained from Datastream) and December 31st 2005 (55.2% obtained from Bloomberg), which reflects actual gearing over the estimation period.
Source: Oxera calculations.

5.1.2 Third-party estimates

Table 5.2 below summarises the estimates from the London Business School Risk Management Service and beta estimates obtained from Bloomberg.

[21] The full set of estimates is presented in Appendix A1.

Table 5.2 Third-party estimates of eircom's beta

Source	Frequency	Adjusted beta	R^2	Implied asset beta	Period	Observations
Bloomberg	Daily	0.70	0.04	0.31	18/03/04 to 27/09/05	382
	Weekly	0.96	0.09	0.43	19/03/04 to 23/09/05	79
	Monthly	0.95	0.07	0.43	31/03/04 to 31/08/05	17
LBS/RMS	Monthly	1.14	0.14	0.51	31/03/04 to 31/06/05	16

Note: LBS/RMS provides beta estimates on a monthly basis over a five-year period, using the figure at the end of the month, starting from 2004 and ending June 2006, giving 16 estimates. LBS/RMS adjusts the raw beta using a Bayesian approach. Bloomberg adjusts the raw beta using a deterministic approach where the adjusted beta = 0.67*(raw beta) + 0.33. All betas reported in the table above are estimated relative to the FTSE All-share index. The period and number of observations used by Bloomberg differ from those used in the econometric estimation due to default settings. For daily estimations, Bloomberg includes only active days (ie, excludes weekends, bank holidays and days where the stock exchange was closed). For weekly estimations Bloomberg uses the last day of the week. For monthly estimations, Bloomberg uses the last day of the month. The implied asset betas are de-levered from the equity betas using 55% gearing, as described in the notes to Table 5.1.
Source: London Business School (2005), 'Risk Measurement Service', July–September, and Bloomberg.

5.1.3 Beta estimation based on comparators

The methodologies of beta estimation from comparators and the estimation of an implied fixed-line beta using beta disaggregation (section 5.2.1) both require a set of comparator companies. This set has been selected using cluster analysis, a statistical technique that employs a number of user-specified criteria to select countries with telecoms market characteristics similar to those of Ireland. The incumbent telecoms provider in each comparator country was chosen as the relevant comparator company.

To perform the analysis, the following market variables were used to compare market characteristics for a set of EU Member States for which data was available.[22]

– **The number of major players in the fixed telephony market**. This corresponds to the number of operators (including the incumbent) that have a combined market share of the fixed total voice market of at least 90% (in terms of retail revenue). This gives an indication of the number of operators competing in the market, although the market shares could be highly asymmetric.

– **Incumbent's market share (volume) in the fixed market (all types of calls)**. The incumbent's market share is used to reflect more closely the degree of competition in each Member State.

– **Incumbent's broadband market share**. The broadband market may change the competitive conditions in the fixed-line voice market by enabling VOIP as well as other services.

– **EU broadband penetration rate**. The penetration rate provides a further measure of the status of the broadband market and its likely future development. It is measured as the number of broadband lines divided by the population.

– **Mobile market share of the leading operators**. The mobile market is also a source of competition for fixed-line businesses. The variable is measured as the mobile market share of the leading operator based on the number of subscribers.

[22] Data obtained from European Commission (2007), 'Annex to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions'. Estonia and Sweden were excluded from the analysis due to information on some of the variables being unavailable.

Details of the cluster analysis, as well as the data used for each EU Member State, are presented in Appendix A2. Table 5.3 summarises the results, showing that countries in cluster 1 appear to have telecoms market characteristics that are comparable with those observed in Ireland. The incumbent companies operating in countries in cluster 1 will therefore make up the comparator set.

Table 5.3 Cluster analysis

Cluster	Member State
Cluster 1	Portugal, Italy, Poland, Greece, France, Czech Republic, Denmark, Austria, Spain, Ireland, Belgium
Cluster 2	Finland, Luxembourg, Hungary, Netherlands, Slovakia, Slovenia, Malta, Lithuania, Latvia, Cyprus
Cluster 3	Germany
Cluster 4	UK

Source: Oxera analysis.

Table 5.4 presents the incumbent companies in each of the countries in cluster 1 together with the proportion of operating profits (EBITDA if operating profit not available) attributable to fixed, mobile and other operations. These values have been averaged from the 2006 and 2005 data in the 2006 annual report of each company. Fixed, mobile and other are defined as follows:

– **fixed**: all fixed-line wholesale and retail activities, including any activity in the core and local access network business lines; all fixed-line voice and data traffic, including both narrowband and broadband Internet access;

– **mobile**: all wireless or mobile operations, including wireless voice and data traffic, all mobile access, mobile call origination and mobile call termination;

– **other**: any other operations not directly attributable to either fixed or mobile operations.[23]

[23] In some cases, practical problems might arise with the allocation of business operations between fixed, mobile and other where the group's subsidiaries operate in different countries and/or across a variety of operations, including fixed and mobile. To resolve this, if a clear distinction was available in the regulatory accounts or annual report between mobile and fixed operations of the subsidiaries, these profits were attributed to the operations of the wider group. If such a distinction were unavailable, the comparator company was disregarded (this was only the case with Telefonica O2 Czech Republic). Another issue arose if the data on operating profits was either unavailable or gave anomalous results (such as a negative value). Here the revenue totals attributable to fixed and mobile operations were used as a proxy for operating profits.

Table 5.4 Cluster 1 operating profit composition

		% of operating profits from:		
Country	**Company**	**fixed line**	**mobile**	**other**
Austria	Telekom Austria	41.6	58.4	0.0
Denmark	TDC	58.3	34.3	7.4
France	France Telecom	40.6	49.7	9.7
Greece	Hellenic Telecommunications Organisation (OTE)	29.4	50.6	20.1
Italy	Telecom Italia	53.2	40.5	6.2
Ireland	**eircom**	**88.5**	**11.5**	**0.0**
Poland	TPSA	68.7	31.3	0.0
Portugal	Portugal Telecom SGPS	58.2	41.3	0.5
Spain	Telefonica	51.3	47.4	1.3
	Average	**50.2**	**44.2**	**5.6**

Note: The data required to carry out the full analysis in this section was not obtainable for Telefonica O2 Czech Republic and Belgacom; both companies are therefore omitted from the comparator set. For eircom, annual revenues are used to calculate business proportions since operating profits for Meteor were negative in 2005 and 2006.
Source: Bloomberg data and Oxera calculations.

To calculate the equity betas for the comparator companies, a number of options were explored: the choice of the relevant benchmark market index (the analysis in this report uses both the domestic market index and the Bloomberg Euro 500 index);[24] an appropriate data frequency, such as the use of daily, weekly or monthly data points; and the time period over which to carry out the beta estimation.

A selection of time periods from one to five years was used initially, together with daily, weekly and monthly data points. Since daily data is likely to contain substantial 'noise', it might not provide a robust estimate of the equity beta. Furthermore, the beta estimates using a single year of data may not capture a sufficient amount of data for a robust analysis. Therefore, two- and five-year estimation periods were used based on weekly and monthly data frequency. Table 5.5 presents these average equity and de-levered asset betas for the comparator companies.

Table 5.5 Analysis of mean weekly and monthly comparators' equity and corresponding asset betas over two- and five-year time periods

	2-year weekly	5-year weekly	2-year monthly	5-year monthly
Average equity beta	0.82	1.00	0.75	1.08
Average asset beta	0.54	0.67	0.44	0.71

Note: The asset betas have been de-levered from the two- and five-year equity betas using the average two- and five-year gearing for each company assuming zero debt betas.
Source: Bloomberg data, Datastream and Oxera calculations.

Table 5.5 indicates that the difference between the mean equity and asset betas is likely to be affected more by the choice of the time period of estimation than by the data frequency. The use of both time periods allows for potentially more robust estimates. At the same time, each frequency of data to be used in the estimation has its own advantages and

[24] The Bloomberg European 500 Index is a capitalisation-weighted index of the 500 most highly capitalised European companies. Source: Bloomberg.

disadvantages. For example, the two-year data is more recent than the five-year data and could therefore be argued to be more relevant, while the five-year data provides a larger sample of data points. Both the two-year and the five-year beta estimates are used in the analysis that follows. Finally, for weekly and monthly equity and asset betas, the difference in the results is small enough to aggregate the two data frequencies.

Beta estimation for comparators is carried out by compiling a set of beta estimates for eircom's peers with a business mix (ie, the proportion of value attributable to fixed, mobile and other operations) most similar to that of eircom's. Table 5.4 above highlighted the large proportion of eircom's business mix made up by its fixed-line business, which is larger than all of the comparator companies.[25] A selection has been made of the companies classed as similar, which in the context of this report, can be defined as those companies in the comparator set with a proportion of total operating profits greater than 50% attributable to fixed-line activities.

Table 5.6 displays average asset betas for the adjusted comparator set, derived from two- and five-year equity betas using both domestic market indices and the Bloomberg Euro 500 index and de-levered with two- and five-year, company-specific estimates for gearing. The asset betas derived from the Euro 500 index are lower for both the two- and five-year time periods, with a very small difference for the five-year time period. Such a difference might be expected with the use of a wider market index.

Table 5.6 Equity beta estimates for comparators

	Two-year	Five-year
Benchmark index	Implied fixed-line asset beta	Implied fixed-line asset beta
Domestic market index	0.711	0.559
Bloomberg Euro 500	0.643	0.555

Note: For full results, see Appendix A3. Average values do not include negative beta estimates for TDC.
Source: Bloomberg data and Oxera calculations.

5.2 Direct estimation of eircom's fixed-line beta

5.2.1 Beta disaggregation

The method employed in the previous section is based on the assumption that the component of the comparator companies' equity beta attributable to mobile has limited effect on the value of the whole company equity beta. If this effect is relatively large, the equity betas of the comparator companies might not constitute ideal proxies for eircom's fixed-line beta.

An alternative approach is to explicitly account for the beta of the mobile division. This approach is based on disaggregating the estimated asset beta of each comparator between mobile and fixed-line activities, and then subtracting the mobile beta from the whole company beta in order to obtain the implied fixed-line asset beta. This process requires a set of 'pure-play' mobile comparators to obtain a benchmark for the pure-play mobile asset beta. As beta disaggregation removes the potential effect of large mobile operations from the company beta, there is no need to limit the size of the fixed-line component, as in the methodology above. Instead the whole set of comparator companies from cluster 1 can be used to calculate a fixed-line asset beta.

[25] This also underscores the relevance of the group beta estimate for the estimation of eircom's fixed-line beta.

The relevant sample of pure-play mobile companies is made up of companies that receive a significant proportion of their profits from mobile operations. The selection of pure-play comparators used in this analysis is listed in Table 5.7. The table also presents the percentage figure for operating profits derived from mobile operations, two- and five-year equity betas, average gearing over two and five years, and the implied asset betas after adjusting for gearing. The proportion of profits can be used as a proxy for market value of the mobile division for each comparator.

Table 5.7 Mobile pure-play comparators

			Two-year data			Five-year data		
Country	Company	Proportion of profits from mobile	Equity beta	Average gearing	Asset beta	Equity beta	Average gearing	Asset beta
Thailand	Advanced Info Services	86%	0.99	6%	0.93	0.87	14%	0.76
USA	Alltel	100%	0.74	15%	0.63	0.88	22%	0.69
Greece	Cosmote	96%	0.56	23%	0.43	0.52	12%	0.46
Belgium	Mobistar	93%	0.47	–1%	0.48	0.62	12%	0.55
Japan	NTT DoCoMo	99%	0.50	–1%	0.51	0.68	2%	0.66
UK	Vodafone	99%	0.97	13%	0.84	1.19	13%	1.04
	Average	**96%**	**0.70**	**9%**	**0.64**	**0.80**	**12%**	**0.69**

Note: Gearing calculated as net debt/(net debt plus market capitalisation), where the figures for net debt and market capitalisation have been averaged between March 31st 2005 and March 31st 2006. Figures for the proportion of profits attributable to mobile are based on company accounts.
Source: Bloomberg data, company annual reports and Oxera calculations.

In the equation below, the beta of all assets (β_{total}) is shown as comprising a linear combination of weighted business line betas for fixed, mobile and other business functions. The 'other' business function is included as not all companies' operations can be attributable to either fixed or mobile telecoms sectors. Since the aim of the analysis is to obtain the beta for fixed-line operations only, the component of the total asset beta attributable to both mobile and other operations should be removed:

$$\beta_{total} = \beta_{fixed}\frac{MV_{fixed}}{MV} + \beta_{mobile}\frac{MV_{mobile}}{MV} + \beta_{other}\frac{MV_{other}}{MV}$$

Where:

$$\frac{MV_{fixed}}{MV} + \frac{MV_{mobile}}{MV} + \frac{MV_{other}}{MV} = 1.$$

In the equation above, MV stands for the market value of the company (enterprise value) or the market value of a single business division, where the subscript refers to a specific business division. Since MV is not available in all cases (in particular, it is not available for the specific business divisions of comparator companies), it has been proxied consistently throughout the analysis by the operating profits (or EBITDA for companies where the data on operating profits was not available).

The beta for mobile operations is obtained from the pure-play mobile comparator set; however, this cannot be done for the 'other' component, as this business line comprises a number of different activities. This is unlikely to have a significant effect on the results if the proportion of the company operating in the 'other' category is small compared with the proportions operating in the fixed and mobile sectors. As shown in Table 5.4, only one company has operations in the other category above 10%, and is subsequently removed

from the analysis. The assumption for the remaining comparators is that the asset beta for the 'other' category can be absorbed into the mobile component.

The results of the disaggregation methodology are sensitive to the relative size of a company's asset beta compared with the pure-play mobile asset beta. If the product of the mobile pure-play beta with the proportion of mobile profits from that company is greater than the company's asset beta, the disaggregation methodology yields a negative implied fixed-line asset beta. These results have been removed from the methodology. Table 5.8 displays the average de-levered asset betas, estimated using beta disaggregation, derived from both domestic market indices and the Bloomberg Euro 500 index for the two- and five-year time periods.

Table 5.8 Implied fixed-line asset betas based on disaggregation of comparators' beta estimates

	Two-year	Five-year
Benchmark index	Implied fixed-line asset beta	Implied fixed-line asset beta
Domestic market index	0.435	0.672
Bloomberg Euro 500	0.515	0.659

Note: For full results, see Appendix A3. Average values do not include negative beta estimates.
Source: Bloomberg data and Oxera calculations.

5.3 Regulatory precedent

In its 2005 risk assessment of BT's cost of capital, Ofcom estimated the equity beta for BT as 1.1, splitting it between 0.8–0.9 for the copper access network (with an assumption of 30–35% gearing) and 1.14–1.23 for the rest of BT's business, including calls and broadband (with an assumption of 30–35% gearing).[26] The disaggregation of BT's copper beta involved an analysis of the available evidence, including:

- benchmarking equity betas against the largest utility companies in the UK (using the assumption that the copper business is essentially a utility business);
- a 'first-principles' analysis of the degree of risk and the use of regulatory precedents;
- cross-section and time-series regressions linking the level of beta with the proportion of fixed-line business.

In its price review of designated interconnection services in 2005, the Commerce Commission of New Zealand estimated an equity beta for New Zealand Telecom in the range 0.6–0.9 for the company as a whole and 0.71–1.14 for the fixed PSTN business, with a preferred estimate as the midpoint (0.93).[27]

[26] Ofcom (2005), 'Ofcom's approach to risk in the assessment of the cost of capital', August, pp. 90–1.

[27] Commerce Commission of New Zealand (2005), 'Draft Determination on the Application for Pricing Review for Designated Interconnection Services', Public Version, April.

Table 5.9 Beta estimates in previous regulatory determinations

Regulator	Year	Overall equity beta	Disaggregated equity beta
ComReg	2003	1.03	n/a
Ofcom	2005	1.10	0.8–0.9 (copper access)
			1.14–1.23 (rest of the business)
Commerce Commission of New Zealand	2005	0.6–0.9	0.71–1.14 (fixed PSTN business)

Source: Regulatory determinations.

5.4 ComReg's previous determination

For comparison, the beta estimates presented above can be contrasted with the value used in the previous 2003 price cap determination can be used. ComReg's consultants suggested a range for eircom's asset beta between 0.6 and 0.8 and a 'best' estimate of 0.8, giving a 1.03 equity beta at 25% gearing.

5.5 Summary ranges of asset beta estimates

Table 5.10 presents a summary of the ranges of asset beta estimates resulting from the methodologies outlined above. Asset betas have been de-levered from equity betas using the following formula:

$$\beta_{asset} = \beta_{equity} * (1 - g) + \beta_{debt} * g$$

Where g is the gearing level. Due to relatively low levels of gearing and the corresponding debt premia for eircom between 2003 and 2005, the analysis has made the commonplace assumption of a zero debt beta.[28]

Table 5.10 displays the results of the analysis undertaken in the sub-sections above. The high and low estimates from each methodology are broadly in line with each other, with only third-party estimates standing out below the other methodologies. The average results from Table 5.10 give a range estimate of eircom's fixed-line beta of between 0.42 and 0.68, with a midpoint of 0.55.

[28] In the following section eircom's historical debt structure is analysed. The results show that eircom has faced a high debt premium over its listed period, averaging 184bp. This level suggests that the use of debt beta might improve the accuracy of the estimation. Calculating a debt beta using Ofcom's methodology, which divides the excess of the debt premium above the first 100bp by the ERP (here assumed to be 5.4%) gives a debt beta of 15.6bp. Repeating the calculation including a debt beta on both the highest and lowest equity beta estimates obtained from the direct statistical estimation and assuming a gearing of 55%, yields asset betas of 0.36 and 0.77, respectively.

Table 5.10 Summary of beta estimates

	Low	Midpoint	High	Gearing (%)
Direct statistical estimation	0.28	0.49	0.69	55
Third-party estimates	0.31	0.41	0.51	55
Peer comparison	0.56	0.64	0.71	Company-specific
Implied fixed-line comparators	0.44	0.56	0.67	Company-specific
Regulatory precedent	0.50	0.65	0.80	Company-specific
Simple average of estimates	**0.42**	**0.55**	**0.68**	

Note: Direct statistical estimation corresponds to the highest and lowest beta estimates in Table 5.1. Third-party estimates correspond to the highest and lowest beta value estimates in Table 5.2. Peer comparison values come from the highest and lowest estimates in Table 5.6. Implied fixed-line comparators estimates correspond to the highest and lowest beta estimates in Table 5.8. The data on the regulatory precedents is based on the BT determination and the 2005 determination by the Commerce Commission of New Zealand—see section 5.3. The gearing value of 55% was obtained as an average of eircom's gearing level on March 31st 2004 (54.4% obtained from Datastream) and December 31st 2005 (55.2% obtained from Bloomberg) and has been used to estimate the asset betas in the direct statistical estimation and the third-party equity betas. Equity betas from implied fixed-line and direct comparator estimations were de-levered using company-specific gearing ratios. Equity betas for BT were de-levered using a 35% gearing ratio (see Ofcom, 'Ofcom's approach to risk in the assessment of the cost of capital', August 2005, pp. 90–91) and 30% for the PSTN by the Commerce Commission of New Zealand (see Commerce Commission of New Zealand, 'Draft Determination on the Application for Pricing Review for Designated Interconnection Services', Public Version, April 2005.
Source: Various sources, and Oxera analysis.

Table 5.11 below compares Oxera's average estimates with the beta estimates from ComReg's previous cost of capital determination. Oxera's estimates, supported by the evidence presented above, are below the previous estimates, with a larger difference at the lower end of the range than at the higher end. In fact, the low and medium point estimates from the previous determination are above the corresponding low and medium point estimates for all methodologies presented in Table 5.10.

Table 5.11 Summary of beta estimates including eircom's previous determination

	Low	Midpoint	High	Gearing (%)
Average of estimates in Table 5.10 *excluding* previous cost of capital determination	0.42	0.55	0.68	
Previous determination	0.60	0.70	0.80	25.00
Average of estimates in Table 5.10 *including* previous cost of capital determination	**0.45**	**0.57**	**0.70**	

Note: Previous determinations correspond to the results presented in the 2003 paper by ComReg's consultants on estimating eircom's cost of capital (see section 5.3).
Source: Oxera analysis.

To the extent that the beta estimate derived in the course of ComReg's 2003 determination represents a separate data point (where this data point is the most recent estimate of eircom's beta in the regulatory context), it can be treated as an additional benchmark for the beta used in the current cost of capital determination. However, it should be recognised that, given the results of the methodologies undertaken by Oxera, as well as the time since the last determination, extreme caution should be applied when considering these estimates as the additional evidence in the context of the current review.

Nevertheless, recognising the importance of regulatory precedent for the cost of capital determination, the results from the previous ComReg cost of capital determination have been incorporated to yield a final range estimate of eircom's fixed-line beta of between 0.45 and 0.70, with a 0.57 average, as shown in the final row of Table 5.11 above.

6 Debt premium and gearing

Regulators typically aim to leave financing decisions to the firm, under the assumption that it is the company's management, not the regulator, which is best positioned to find the optimal financing structure. In this respect, corporate financial management is an important source of value and efficiency, which private firms deliver. Regulators also acknowledge the difficulties in calculating an actual level of gearing for a company. As a result, a widely applied approach is the use of a notional level of gearing based on the gearing that might be characteristic of a reasonably financed company carrying out similar operations as the company in question. To determine a notional level, regulators often use other regulatory precedents and/or the gearing levels of comparator companies.

In the case of eircom, however, to pursue a notional regime only would ignore the changes to the firm's financial structure that have taken place since acquisition by BCMIH.[29] Such changes might have implications for the level of gearing appropriate for the cost of capital determination, as well as for the appropriate way to remunerate the company for tax. Against this background, ComReg has asked Oxera to undertake an analysis of both the notional and actual levels of gearing. Were ComReg to pursue an actual gearing assumption, this approach may require the inclusion of a debt beta. This is due to the systematic risk to debt holders that is likely to increase with the amount of debt present in the financing structure.[30]

This section is structured as follows:

– section 6.1 works towards finding an actual level of gearing and associated debt premium. This section incorporates an analysis of eircom's historical and current financial structure, with emphasis on the relationship between the company and its financing vehicles. A range of actual gearing estimates is presented based on various assumptions of eircom's enterprise value;

– section 6.2 works towards a notional level of gearing and debt premium. In order to inform the level of notional gearing that could be used in eircom's cost of capital determination, the levels of gearing used by other regulators in Ireland and the UK, as well as comparator companies are examined. The proposed level of notional gearing is then used to derive an implied credit rating and debt premium.

6.1 Estimating actual gearing

The section starts with an analysis of eircom's historical financial structure as a basis to compare against when looking at its current financing regime. The significant changes since the acquisition by BCMIH are described in section 6.1.2 and by using data publicly available on eircom's financing structure, a number of actual gearing estimates and associated debt premia are derived.

[29] Oxera understands that since it was acquired by BCMIH in 2006, eircom no longer issues debt as an operating entity, but rather raises capital through special-purpose financing vehicles and inter-company loan agreements with the holding company.
[30] In addition, in line with CAPM assumptions, the debt premium might need to reflect an estimate of the expected return for debt investors, rather than the promised yield. Expected returns are lower than the promised yields as the former are adjusted for the likelihood of default. For sub-investment-grade debt, the difference between the expected returns and the promised yields may be significant. However, the use of promised yields rather than expected returns offers additional headroom for the company, which might be justified given the uncertainty regarding future evolution of spreads on debt over the next regulatory period.

6.1.1 eircom's historical debt financing

On August 6th 2003 eircom refinanced a large proportion of its existing debt to take advantage of historically low interest rates, according to some commentators.[31] As part of this refinancing, eircom issued three notes, as shown in Table 6.1.

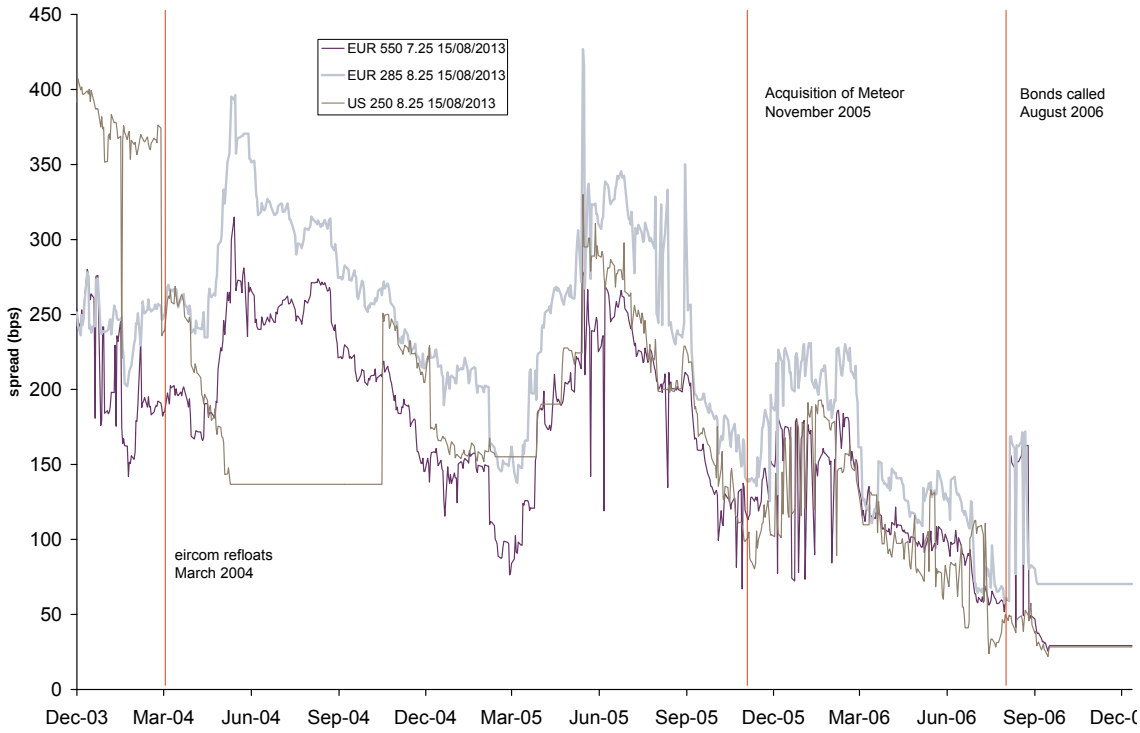
Table 6.1 Information on eircom's 2013 notes

Coupon (%)	Amount (€m)	Date of issue	Date of maturity	Spread[1] (bp)	Benchmark
7.25	550	07/08/2003	15/08/2013	50	German government 4.75%
8.25	285	07/08/2003	15/08/2013	50	German government 4.75%
8.25	250	07/08/2003	15/08/2013	50	US Treasury 4.125%

Note: [1] Launch spreads.
Source: Datastream, Bloomberg.

Figure 6.1 examines the evolution of spreads on eircom's 2013 notes over their traded history. Each bond was called in August 2006 as part of BCMIH's acquisition of eircom.

Figure 6.1 Evolution of the spreads on the 2013 notes



Source: Bloomberg.

The figure indicates that the spreads have been consistently above 100bp for a majority of their traded history. They have also shown a broad decrease over time, with significant volatility. The evolution of spreads is summarised in Table 6.2 below.

[31] *Irish Times* (2003), 'Valentia to Reap €512m as Part of Eircom's Debt Deal'.

Table 6.2 Spread history of the 2013 notes (bp)

	7.25% €550m	8.25% €285m	8.25% $250m	Average
March 21st 2004 to March 21st 2005	197	259	165	207
March 22nd 2005 to November 22nd 2005	188	250	203	214
November 23rd 2005 to August 15th 2006	117	150	109	126
March 21st 2004 to August 15th 2006	170	224	159	184

Note: 100 bp equals 1%.
Source: Bloomberg.

During the life of the 2013 notes, the bonds underwent two downgradings. These dates are of interest as they coincide with two major events in the company's corporate history. The first downgrading in March 2004 was close to the time eircom was re-listed on the Irish stock exchange, and the second downgrading in July 2006 came ahead of the acquisition by BCMIH when the bonds themselves were called.

Table 6.3 Ratings history of the 2013 notes

	7.25% €550m	8.25% €285m	8.25% $250m
July 29th 2003	BB+	BB+	BB+
March 2nd 2004	BB–	BB–	BB–
July 31st 2006	B	B	B
September 21st 2006	NR[1]	NR	NR

Note: [1] NR, not rated; this is the result of all three bonds being called in August 2006 by BCM.
Source: Bloomberg.

6.1.2 eircom's financing activities since the last review

In March 2004 eircom re-listed on the Irish stock exchange. The rating history of eircom's debt suggests that, while re-listing might not have had a large effect on eircom's financial structure, it seems to have had a significant effect on the company's risk profile, at the time, warranting a downgrading on all bonds by Standard & Poor's.

In November 2005,eircom acquired Meteor Mobile for €420m. It is Oxera's understanding that the acquisition did not require an additional bond issue or bank loan, as a rights issue of shares for €404m was carried out at around the time of acquisition to provide funding. In August of the following year, BCMIH and ESOT together acquired 100% of eircom's share capital and de-listed the company.[32] The acquisition price of €2.20 per share valued eircom's entire issued ordinary share capital at approximately €2.319 billion.[33] The resulting ownership structure gave BCMIH 65% of eircom's ordinary share capital, with the remainder owned by ESOT.[34] The value of the share capital, added to eircom's outstanding debt financing at the date of acquisition of €2.360 billion, gave an enterprise value of approximately €4.8 billion.[35]

During 2006, there was a significant increase in the company's borrowing, largely as a result of the acquisition of eircom by BCMIH. The acquisition resulted in both the refinancing of eircom's 2013 notes and the drawing of a bank loan worth €3.275 billion. Table 6.4 presents a consolidated account of eircom's debt structure over the period March 2005 to December

[32] eircom (2006), 'Recommended Cash Offer for eircom Group plc by BCM Ireland Holdings Ltd', August 16th.
[33] BCMIF Ltd (2006), 'Confidential Offering Circular'.
[34] Babcock & Brown Capital Ltd (2006), 'BCM to refinance its equity in eircom', ASX News Release, November 16th.

2006. Oxera understands that eircom itself no longer holds any outstanding debt instruments and instead receives all its financing from its holding company, BCMIH.

Table 6.4 Summary of eircom's historical debt structure

	Loans	Notes	Other[1]	Total (€m)
Borrowings as at:				
March 31st 2005 (before acquisition of Meteor)	1,250	1,028	127	2,364
March 31st 2006 (after acquisition of Meteor and before sale to BCMIH)	1,180	1,041	282	2,467
December 31st 2006 (after sale to BCMIH)	3,275	775	289	4,294

Note: [1] Refers to finance leases and preference shares. All figures are for the book value of debt. 'Loans' are based on bank borrowings and credit facilities and exclude senior preference shares. 'Other' on December 31st 2006 is net of interest accrued on borrowings. Debt issue costs are subtracted from the total debt figure for each row.
Source: eircom annual report 2006, available at http://investorrelations.eircom.net/pdf/annualreport2006.pdf; and BCMIPE Quarterly and nine-months results announcement 2006, available at http://investorrelations.eircom.net/pdf/BCMIPE3rdquarterandnine-monthresults.PDF.

Table 6.5 summarises the cash flows from financing activities for the nine-month period to year-end 2006. In the first column, for eircom Group, the three major refinancings of eircom's debt at the time of acquisition by BCMIH are shown. These refinancings consisted of the repayment of eircom's outstanding senior and senior subordinated notes (the 2013 notes), totalling €1,030m, and the repayment of eircom's credit facility, totalling €1,180m. In replacement of these debt instruments, BCMIH issued two bonds and took a large credit facility, of which a sum of €1,921m was passed down to eircom as inter-company debt.

Table 6.5 Summary of eircom Group and BCM Ireland Preferred Equity (BCMIPE) cash flows from financing activities for the nine-month period ending December 31st 2006

	eircom Group (€m)	BCMIPE (€m)	Total (€m)
eircom repayment of bank loan	–1,180	–	–1,180
eircom repayment of 2013 notes	–1030	–	–1030
Inter-company debt with parent undertakings	1,921	–1,918	3
Proceeds from loan borrowings	–	3,275	3,275
Proceeds from issuance of 2016 and 2017 (PIK) floating-rate notes	–	775	775
All other cash flows[2]	–41	–164	–205
Net cash generated from/(used in) financing activities	**–330**	**1,968**	**1,482[1]**

Note: [1] Sum of total excludes €157m of consolidated adjustments. [2] This is an aggregate value of all remaining cash flows. The quarterly floating and PIK notes issued by BCM Ireland Finance and BCM Ireland Preferred Equity, respectively, provided part of the finance for the acquisition of eircom Group plc. The notes were guaranteed on a senior subordinated basis by BCMIH, a wholly owned subsidiary of BCM Ireland Preferred Equity, and are guaranteed by a pledge over the assets of BCMIH, itself secured by a pledge over all the assets of BCM Luxembourg Ltd, eircom Group Ltd, Valentia Telecommunications, eircom Ltd, Irish Telecommunications Investments Ltd and Meteor Mobile Communications Ltd, which appear to constitute all operating activities of eircom.
Source: BCMIPE quarterly and nine-month results announcement December 31st 2006, available at http://investorrelations.eircom.net/pdf/BCMIPE3rdquarterandnine-monthresults.PDF.

Table 6.6 Information on BCM Ireland's 2016/17 notes

Issuer	Date of issue	Amount (€m)	Current coupon[1] (%)	Date of maturity	Type	Spread (bp)	Benchmark
BCM Ireland Finance Ltd	18/08/2006	350.0	8.814	15/08/2016	Floating	500	Euribor
BCM Ireland Preferred Equity	24/11/2006	425.0	10.814	15/02/2017	PIK	700	Euribor

Note: [1] Coupon taken as at April 19th 2007. The table shows the launch spreads and values on both bonds.
Source: Bloomberg and bond prospectuses.

The ratings history of the 2016/17 notes is detailed in Table 6.7. These bonds are currently assigned a sub-investment-grade credit rating according to Bloomberg.

Table 6.7 Ratings history

	€350m floating	€425m PIK
August 18th 2006	B	n/a
November 16th 2006	B–	n/a
November 24th 2006	B–	B–

Note: S&P credit ratings
Source: Bloomberg.

The details of the €3,451m revolving credit facility currently on issue by BCMIF are presented in Table 6.8.[35] The loan is secured by a first-priority pledge over the assets of BCMIH and its related assets, as detailed in the notes to Table 6.5.

Table 6.8 eircom first and second lien bank loan data

	Amount (€m)	Current rates
First lien debt		
Term Loan A	630.0	Euribor + 1.750%
Term Loan B	1,250.0	Euribor + 1.875%
Term Loan C	1,250.0	Euribor + 2.125%
A+B+C	3,130.0	
Revolving Debt	150.0	Euribor + 1.750%
Term second lien	150.0	Euribor + 4.750%

Note: Current rates are taken after re-pricing as at May 31st 2007. Term loan A amortising, initial drawn €650m.
Source: Bloomberg.

6.1.3 eircom's actual gearing and debt premium estimates

eircom's actual gearing and debt premium are estimated using the information presented above. Three gearing scenarios have been investigated, using, in each case, a different estimate for eircom's enterprise value (EV):[36]

[35] According to Bloomberg the original €3,650m credit facility taken by BCMIH at acquisition of eircom on August 15th 2006 was reduced on the replacement of €350m of mezzanine finance with €150m of second lien debt.

– EV (1) as at the date of transaction on August 18th 2006;
– EV (2) uses the enterprise value as at book value of assets on March 31st 2007;[37]
– EV (3) uses the enterprise value as the market value of equity prior to the takeover announcement plus the current level of net debt.

EV (1) takes the enterprise value on the date of acquisition by BCMIH as reported by Babcock & Brown Capital,[38] providing an indication of the last time eircom's market value of debt and equity were available. EV(2) uses the equalisation of the balance sheet to imply a value for eircom's total equity and liabilities with the book value of assets. The implicit assumption in this scenario is a market to asset ratio of 1. EV (3) uses current debt combined with the market value of equity prior to the speculation on eircom's takeover.

Table 6.9 summaries the results of the three scenarios, each carried out twice, treating the PIK notes either as debt or as equity. The average of the three scenarios treating PIK notes as debt and equity is 76% in both cases.

Table 6.9 Actual gearing calculations

	Net debt	EV (1)	EV (2)	EV (3)	Gearing (1)	Gearing (2)	Gearing (3)	Average
Calculations with PIK classified as:								
debt	4,104	4,800	4,024	6,105	86%	n/a	67%	76%
equity	3,679	4,800	4,024	6,105	77%	91%	60%	76%

Note: Net debt with PIK as debt calculated as current total debt (€4,205) minus cash and cash equivalents (€101 as at March 31st 2007). EV(1) taken as enterprise value on acquisition as reported by BCM Capital. For gearing (2) with PIK classified as debt, the value has not been reported since it amounts to over 100%.
EV (3) = (current net debt) + (€1.88 (the share price on September 27th 2005) * 1,064m = €2,000m equity market value).
Source: Oxera analysis, Bloomberg, Datastream and Babcock & Brown Capital.

To calculate a value for the overall debt premium, the spread for each debt instrument has been combined in proportion to its size with respect to the total debt figure. The results of these calculations are presented in Table 6.10, again treating PIK notes separately as debt or equity.

Table 6.10 Actual debt premium

	Estimated debt premium (bp)	Adjusted debt premium (bp)
Estimated debt premium with PIK classified as:		
Debt	281	304
Equity	234	257

Note: Estimated debt premia indicate spreads above 3-month EURIBOR. Adjusted debt premia are equal to estimated debt premia plus the average differential between 3-month EURIBOR and the relevant government benchmark consistent with the risk-free rate estimates.
Source: Oxera calculations.

[36] For the purposes of this analysis, debt held by financing vehicles and supported by eircom's cash flows (including debt issued by the BCM subsidiary companies) is consolidated as eircom's debt.
[37] Book value of assets from March 31st 2007 *BCM Ireland Finance Limited Quarterly* and announcement of 12-month results. This value does not include consolidated adjustments of €2,064m made up largely from adjustments for goodwill and intangible assets.
[38] Babcock & Brown Capital (2007), '2007 Full Year Results Presentation' August, available at http://www.babcockbrowncapital.com/media/290362/28-8-07%20bcm%20presentation.pdf.

In order to maintain consistency, the debt premia that are used in the cost of capital calculation need to be consistent with the risk free rate estimate. The debt premia presented in the Table 6.10 are referenced against the three-month EURIBOR, whereas the risk-free rate estimate is based on the ten-year Irish government bond as well as regulatory precedent. For the period BCM securities have traded (August 2006 to present) the average spread between the ten-year Irish government bond and three-month EURIBOR has been –22.7bp. Incorporating this differential with the values of estimated actual debt premia increases the yields to 304 and 257bp, respectively.

6.2 Estimating notional gearing

Three approaches to the treatment of capital structure are broadly recognised in the regulatory context: actual (or projected), optimal, and notional gearing. The actual (or projected) gearing levels have been examined in section 6.1. The optimal level of gearing requires the regulator to assume the role of a corporate financial manager, which might not be appropriate. The notional level of gearing is often based on the gearing that might be characteristic of a reasonably financed company carrying out the same operation as the company in question.

The use of notional gearing has a number of advantages: it allows the flexibility necessary for owners to adopt a range of potential capital structures and reduces the degree of regulatory intervention in the financing of the business. It also reflects the inherent uncertainty regarding the future evolution of the capital structure of the business.

Furthermore, the impact of higher leverage on the cost of capital is neutral under Modigliani–Miller (MM). From a regulatory policy perspective, it might be prudent to use the MM as the initial benchmark for the regulatory determination of the cost of capital when introducing a significant change in the assumed level of gearing compared with the previous determination. The potential impact of higher notional leverage on the costs of capital of regulated businesses might then need to be explored by the regulator with reference to specific factors that represent a departure from the MM assumptions, such as debt tax shields or the costs of financial distress.

To the extent that the future ownership of the company is uncertain, an assumption that suggests a level of leverage significantly above the average gearing of eircom's peers might need to be justified. Moreover, evidence on gearing assumptions used by regulators in other sectors might be useful for determining the appropriate level of notional gearing.

6.2.1 Regulatory precedent

In eircom's two previous cost of capital determinations, the Office of the Director of Telecommunications Regulation (ODTR) used the actual level of gearing. In 2000 the ODTR referred to actual gearing calculations, explaining that:[39]

> The use of market values rather than book values for calculation of gearing in the WACC calculation does not appear to have a significant impact on the estimated WACC.

In 2002, a similar approach was adopted, although there was a reference to alternative methodologies:[40]

[39] ODTR (2000), 'eircom's Reference Interconnect Offer', Decision Notice D7/00 & Report on the Consultation, Document No. ODTR 00/31, April.
[40] ODTR (2002), 'Review of the Price Cap on Certain Telecommunications Services', Consultation III, 02/96, November.

Therefore, the Director's current methodology remains broadly similar to her previous approach, although she has also considered the use of optimal gearing as an alternative to actual gearing on this occasion.

In Aer Rianta's cost of capital determination for the aviation authority, an explanation is given for why an actual current or expected average gearing might be preferable to the use of an optimal assumption.[41] The Commission for Aviation Regulation (CAR) argues that an optimal capital structure can be difficult to determine, in particular with respect to a country such as Ireland which has a low corporate tax rate: 'the concept of an 'optimal' capital structure is less important to company value'.

Oftel adopted a different approach in 2001, relying on an optimal gearing assumption for BT's price review.[42] Here, the optimal gearing was determined as the level of debt for a specific company where the tax benefits of debt begin to be outweighed by the costs of financial distress owing to the difficulties caused by servicing high debt obligations.

An example of the use of an optimal gearing assumption in Ireland is provided by the CAR's cost of capital determination for the Irish Aviation Authority in 2002. However, this was accompanied by a second WACC estimation at the actual level of gearing.[43] The Commission for Energy Regulation (CER) has not used an optimal gearing assumption, but instead has relied either on legacy values, such as in its 2000 Power Generation Price Review,[44] or notional values computed using comparator companies or other regulatory precedents, as in the 2005 Direction on Allowable costs to Electricity Supply Board (ESB).[45] Table 6.11 summarises the regulatory precedent on gearing in Ireland and the UK.

Table 6.11 Regulatory precedents on gearing assumptions in Ireland and the UK

Ireland				UK			
Regulator	**Subject**	**Year**	**Gearing assumption**	**Regulator**	**Subject**	**Year**	**Gearing assumption**
CER	ESB PG	2000	35% actual	**Ofreg**	NIE	2002	50% actual
CAR	Aer Rianta	2002	50% actual	**Ofgem**	DNOs	2004	57.5% optimal
CAR	Irish Aviation Authority	2002	50% optimal	**Ofwat**	WASCs	2004	55% optimal
CER	Bord Gáis Éireann	2003	55% notional	**Ofgem**	TPCR	2006	60% assumed
ComReg	eircom	2003	25% notional	**Ofcom**	BT	2005	35% optimal
CAR	Dublin Airport Authority	2005	46% actual	**Ofgem**	GDPCR	2006	62.5% notional
CER	ESB PG	2005	55% notional	**CAA**	BAA	2007	60% notional
CER	Best new entrant	2006	70%				
Average			**48%**	**Average**			**54%**

Note: NIE, Northern Ireland Electricity; DNO, distribution network operator; WASC, water and sewerage company, TPCR, electricity transmission price control review. Ofcom also considered 30% gearing for BT in 2005. CAR also considered a 0% gearing scenario for the Irish Aviation Authority in 2002.
Source: Regulatory documents and Oxera calculations.

[41] CAR (2001), 'Aer Rianta's Cost of Capital Report to the Commission for Aviation Regulation', August.
[42] Oftel (2001), 'Proposals for Network Charge and Retail Price Controls from 2001', February.
[43] CAR (2002), 'The Irish Aviation Authority's Cost of Capital Report to the Commission for Aviation Regulation', February.
[44] CER (2000), 'ESB Power Generation Price Review', September.
[45] CER (2005), 'Direction to ESB Power Generation on Allowable Costs'.

The above suggests that the use of notional gearing is broadly recognised by the regulatory precedent in Ireland. At the same time, the precedent points to the use of actual or predicted levels of gearing over notional assumptions at lower levels of debt. According to the information available to Oxera, no regulatory determination in Ireland has yet addressed the case of a very highly geared company.

6.2.2 Gearing of comparators

In addition to regulatory precedent, the actual levels of gearing for comparator companies offer a useful benchmark. The gearing estimates presented in this sub-section are calculated as the ratio of net debt to enterprise value. Table 6.12 below displays a selection of comparator companies to eircom, emphasising the difference in financial structure between eircom and other telecoms companies. Only one company, Telecom Italia, has a gearing level above 50%, and the average of the comparators is below half the actual value of 76%, calculated for eircom.

Table 6.12 Comparator companies' actual gearing levels

Country	Company name	Two-year average gearing (%)
Austria	Telecom Austria	27
Denmark	TDC	33
France	France Telecom	46
Germany	Deutsche Telekom	39
Greece	Hellenic Telecom	22
Italy	Telecom Italia	55
Poland	TPSA	18
Portugal	Portugal Telecom	25
Spain	Telefonica SA	38
UK	BT Group	30
	Average	33

Note: The gearing values have been calculating using the formula net debt/(enterprise value) averaged across data for 2005 and 2006.
Source: Datastream and Oxera calculations.

The information on comparators and regulatory precedents implies that a notional gearing estimate could lie within the range 30–50%.

6.2.3 Implied notional debt premium

A notional level of gearing can be considered together with the information on eircom's operating cash flows, in order to derive an estimate of a debt premium consistent with the level of notional gearing. This analysis uses calculations of key financial ratios for eircom based on the notional financing structure.

Since debt is traded, it is possible to associate a particular credit rating with a specific range for the debt premium. The value of this relationship is that the same financial variables used by credit rating agencies can be used to calculate an implicit or 'shadow' credit rating for a given company. This rating can then be linked to the debt premium range associated with companies of a similar rating to imply an appropriate debt premium.

Three key standard financial indicators were derived for eircom's fixed-line business:

– **interest coverage**: the amount of profit available relative to a firm's interest obligations on outstanding debt;
– **profit/interest**: where profit is EBITDA after tax, interest expense and dividends;
– **EBITDA/total debt**: the positive cash flow of a company relative to its outstanding debt.

Once the values of the indicators are calculated, they can then be compared with the credit rating thresholds used by credit rating agencies. Table 6.13 below presents financial ratios and thresholds for a given credit rating used by Moody's Investors Service with respect to UK utility companies.

Table 6.13 Moody's utility rating criteria

	Aa	Aa	A	A	Baa	Baa	Ba	Ba
Business risk	Medium	Low	Medium	Low	Medium	Low	Medium	Low
Interest coverage	>6	>5	3.5–6.0	3.0–5.7	2.7–5.0	2–4.0	<2.5	<2
EBITDA/debt (%)	>30	>22	22–30	12–22	13–25	5–13	<13	<5
Profit/debt (%)	>25	>20	13–25	9–20	8–20	3–10	<10	<3
Debt/capital (%)	<40	<50	40–60	50–75	50–70	60–75	>60	>70

Source: Moody's rating methodology.

Values for capital employed, percentage interest payments and EBITDA are based on eircom's 2006 annual report, the last financial year statement published before the acquisition by BCMIH. Table 6.14 keeps these values fixed and calculates the financial indicators, assuming, in each column, a different level of notional gearing but varying the total amount of debt and hence the cost of debt accordingly.

Table 6.14 Implied financial indicators for eircom at different levels of notional gearing

	Notional gearing assumption		
	30%	40%	50%
Business risk	Medium	Medium	Medium
Interest coverage	6 (A–)	5 (Baa+)	4 (Baa)
EBITDA/debt (%)	39 (Aa)	29 (A)	23 (Baa)
Profit/debt (%)	26 (A)	18 (Baa)	13 (Ba+)
Debt/capital (%)	30 (Aa)	40 (A)	50 (Baa)
Implied 'shadow ' credit rating	Aa/A–	A–/Baa+	Baa–/Ba+

Source: Group Annual Report and regulatory accounts 2006 and Oxera calculations.

This analysis indicates that the 'shadow' rating under notional gearing might be close to a 'Baa' rating. This credit rating lies close to the lower end of the range implied by financial indicators. This reflects eircom's potentially higher business risk than that of other utilities. This estimate is also broadly consistent with the observed market spreads. To imply a debt premium, the shadow rating can be compared against the spreads on debt securities with similar credit ratings.

Table 6.15 below presents the average implied spreads across a number of credit ratings for different time periods. In order to calculate the implied spreads, the daily yield on the Merrill Lynch corporate bond index for bonds rated AA, A and BBB for 1- to 5- and 5- to 10-year maturities has been averaged over the relevant time periods to obtain yield estimates for the indices. The required spreads on bonds with different credit ratings are estimated by

subtracting the yield on the government benchmark of suitable maturity from the yields on indices. The table below displays the average of the spreads across the two maturities used.

Table 6.15 Spreads on corporate bonds (percentage points)

Year	AA (Aa)	A (A)	BBB (Baa)
1-year	0.54	0.74	1.05
2-year	0.56	0.72	1.15
3-year	0.59	0.75	1.21
4-year	0.64	0.85	1.43

Note: Average values calculated back from 31 December 2006.
Source: Datastream and Oxera calculations.

The implied corporate 'shadow' rating of 'Baa' (BBB), estimated on the basis of financial indicators considered at notional gearing level, implies debt spreads of approximately 120bp above the relevant benchmark, for a period reflecting the 3-year traded life of eircom's 2013 notes.

The higher end of the range of notional gearing (30–50%) is close to eircom's pre-acquisition gearing. The evolution of spreads on eircom's bonds prior to acquisition can therefore be considered in this context. These spreads were detailed in Table 6.2. Taking a time period indicative of the life of eircom's 2013 notes (2003–06) gives an alternative range estimate for the debt premium of 159–224bp.

The data on eircom's historical bonds shows that, in 2003, the 2013 notes were issued with a rating of BB+. Upon eircom's re-listing, the bonds were downgraded to BB–, with a further downgrade upon the announcement of its acquisition by BCMIH. This movement suggests that, according to credit rating agencies, the risk associated with these securities following the acquisition by BCMIH has increased and points towards the higher end of the spreads in Table 6.2. However, since the pre-acquisition gearing was slightly higher than the assumed notional gearing, the actual observed spreads might be expected to lie above the debt premiums implied under the notional gearing assumption.

Second, in carrying out the 'shadow' rating exercise, an attempt was made to imply a credit rating for eircom's fixed-line business. The analysis resulted in a higher credit rating than that observed historically. This is understandable given the lower levels of notional gearing used.

This analysis indicates that an estimate of the debt premium for eircom at notional gearing should fall within the 120–190bp range. This estimate is consistent with the observed debt premiums on eircom's bonds prior to acquisition and refinancing. The estimates of eircom's notional and actual gearing are used separately in section 10 to calculate a WACC under both gearing assumptions.

7 Taxation

The decision by regulators on the treatment of taxation should be made against the background of the method currently in use as well as the potential differences between the tax allowance and tax paid, including the impact of gearing.

In general, changes in the treatment of tax by the regulator may have a significant impact on the profitability of existing capital, among other factors, and may have further implications for the incentives for investments in the future. Furthermore, regulatory consistency might be an important factor for investors.

At the same time, in the cost of capital determinations regulators have adopted measures of effective tax rates instead of using the statutory tax rate in order to bring tax allowances closer to the actual taxes paid by the company and to claw back the benefits of debt tax shields. In particular, it might be argued that, for regulated monopolies, the tax benefits of debt should be shared between the company and its customers.

This section begins with a description of the difference between effective and statutory tax rates, and then expands on the points highlighted above. It concludes that, since there are arguments for the use of both effective and statutory tax rates, ComReg might want to consider investigating in greater detail the possibility of using an effective tax rate in its cost of capital determination. At the same time, given the advantages of a statutory tax rate at notional gearing, highlighted below, the approach taken in this analysis is based on the application of a statutory tax rate in Ireland. This methodology is consistent with the approach adopted at the last review.

7.1 Regulatory approaches to taxation

The regulatory approaches to the treatment of taxation can be simplified into two broad categories relevant to this report.

– **Pre-tax cost of capital, with the statutory rate**—the regulator may apply a pre-tax cost of capital based on vanilla WACC, where the cost of equity is grossed up by the statutory corporation tax rate.[46] Allowed profits are then intended to be sufficient to cover both investor remuneration and statutory tax payments. Since the pre-tax cost of capital allowance applies the tax uplift to the required returns on equity, it implicitly claws back debt tax shields as long as the assumed (notional) level of gearing is broadly in line with the actual level of gearing. If the notional level of gearing is lower than the actual gearing, the company is implicitly allowed to keep the benefits of debt tax shields above the assumed notional level of gearing. Applying a statutory tax rate also implies that any differences between capital allowances and the rates of depreciation, which might lead to annual variations in the effective tax rate on profits, are not explicitly controlled for.

– **Pre-tax cost of capital, with the effective tax rate**—the regulator may apply a pre-tax cost of capital based on vanilla WACC, where the cost of equity is then grossed up at an effective tax rate (different from the statutory tax rate) in order to calculate the pre-tax cost of capital. Alternatively, the cost of capital is based on a vanilla WACC with a separate allowance for tax, in line with projected taxes to be paid. This approach is then

[46] Where the starting point is the vanilla post-tax cost of capital, the grossing up would apply only to the cost of equity. If a post-tax cost of capital, net of tax shields, is used as the starting point, the grossing up applies to the full WACC.

similar to the post-tax approach since the estimate of the effective tax rate is likely to be based on a modelling exercise similar to that required to estimate the future tax payments under the post-tax model. To the extent that the tax allowances are in line with projected taxes, this approach claws back the benefits of debt tax shields, and controls for the tax implications of any potential differences between allowed depreciation and capital allowances.[47] The difference between the statutory and effective tax rates might be particularly significant under high gearing, large capital allowances, and high inflation.

7.2 Potential effects of different tax regimes

7.2.1 Capital committed on the basis of the existing regime

A change in the tax regime might have an impact for investors who invested capital in the past in order to finance existing assets. Given that these investments will now be sunk, and will have been made within the context of an expectation of a particular tax treatment, there is a risk that a change in treatment may be perceived as opportunistic and could therefore have adverse consequences for future investment incentives. This is particularly the case where regulatory risk is itself a principal driver of a firm's cost of capital and where CAPEX has been large recently.

Previous investments by eircom have been undertaken on the basis of a pre-tax statutory cost of capital. Since the cost of capital over the lifetime of an asset affects the return on those assets, the profitability of that investment can be adversely affected by downwards adjustments to the cost of capital.

7.2.2 Incentives to invest in new capital

With respect to investment, it is plausible that the profitability of investment is affected by the treatment of capital allowances in regulatory policy. For example, if a firm knows that it can retain the benefits of capital allowances beyond those projected by the regulator, this will have an impact on the firm's decision on whether to invest in a given project. By permitting the firm to retain the capital allowances of any additional investment, the regulator would appear to be providing an incentive for additional investment consistent with the intention of capital allowances to promote investment.

By contrast, a change in the pre-tax effective rate would tend to reduce the marginal benefits associated with any investment the firm may choose to make, at least in respect of investments which currently receive a favourable (ie, accelerated) capital allowance relative to statutory depreciation rates. This could result in significant challenges in financing new investments.

7.2.3 Regulatory consistency

Regulatory consistency may be applied over time, or across sectors. Consistency in time might suggest that the existing approach should be retained unless the consequences of this are demonstrated to be negative. Consistency across sectors may be deemed important in a world where businesses must compete for capital.

The arguments for a consistent regulatory approach do not require that the allowed return remain constant over the lifetime of an asset, but they do imply that a consistent overall

[47] If a different tax rate is assumed when calculating the post-tax cost of capital (ie, the statutory tax rate) and for grossing up to the pre-tax cost of capital (the effective tax rate), the company would suffer from both the lower, implicitly assumed cost of debt (post-tax), as well as a lower effective tax rate on the estimated profits after interest.

regulatory approach is desirable. While it is reasonable to update the WACC as market conditions change (for example, where there is a change in the risk-free rate or beta), greater concern is likely to be raised among investors where there are fundamental changes to regulatory treatment without due account being taken of the ramifications.

Fundamental changes to the method of calculating the cost of capital—particularly on such a substantial issue as the treatment of tax and capital allowances—represent a clear change in regulatory approach. If there are evident developments in the regulatory environment that necessitate consideration of such changes (eg, increased leverage), and the impact on both current and future investors can be minimised, such a change in policy can be justified.

7.2.4 Financial consequences of a switch

The movement from a statutory to an effective tax rate regime may have significant financial consequences for the company. Although the statutory tax rate in Ireland is relatively low in comparison with that in, for example the UK (such that the value consequences of a switch to an effective tax rate might be smaller), it should be recognised that a negative impact on the firm's value as a result of a change in regulatory tax policy might be of significance for both the financial position of the firm and the security of its future finances from similar policy changes.

At the same time, a significant difference between actual and notional gearing used for the cost of capital determination might create substantial tax benefits for the company since the implied tax allowance in the cost of capital might be larger than the actual taxes paid. For example, if the difference between nominal gearing and actual gearing is 40%, the additional tax allowance would be approximately equal to 40%*T*RAB, where T is the statutory tax rate and RAB is the regulatory asset base to which the allowed rate of return is applied.

In many cases, regulators have recognised the arguments for sharing the benefits of debt tax shields between consumers and the regulated company. They have therefore chosen the notional level of gearing, which implicitly claws back some, but not all, of the tax benefits of leverage. In some cases, however, the regulators have adopted the effective tax rate approach, as described above (based on the company-specific tax position), in order to transfer most of the tax benefits of debt to consumers.

7.2.5 Summary

The effects of switching the tax regime can be significant for both investors and customers. It might be important to analyse the effects of a potential change in the tax regime thoroughly before implementing such a policy change. It should be noted that the analysis required is likely to be complex, given the challenges of estimating effective tax rates.

The choice of an appropriate tax regime might be particularly important at higher levels of gearing, given the potentially significant value of embedded debt tax shields. In the case of eircom, the high level of gearing adopted by the company since the last review raises a question about the level of sharing of these benefits between eircom and its customers.

At the same time, there are some clear benefits of using the statutory tax rate, as outlined above. The approach adopted in this report remains consistent with the last review, where a pre-tax regime was used to calculate the WACC. The tax rate used in the WACC calculation is therefore the standard statutory corporation tax rate in Ireland of 12.5%.

8 Risk-free rate

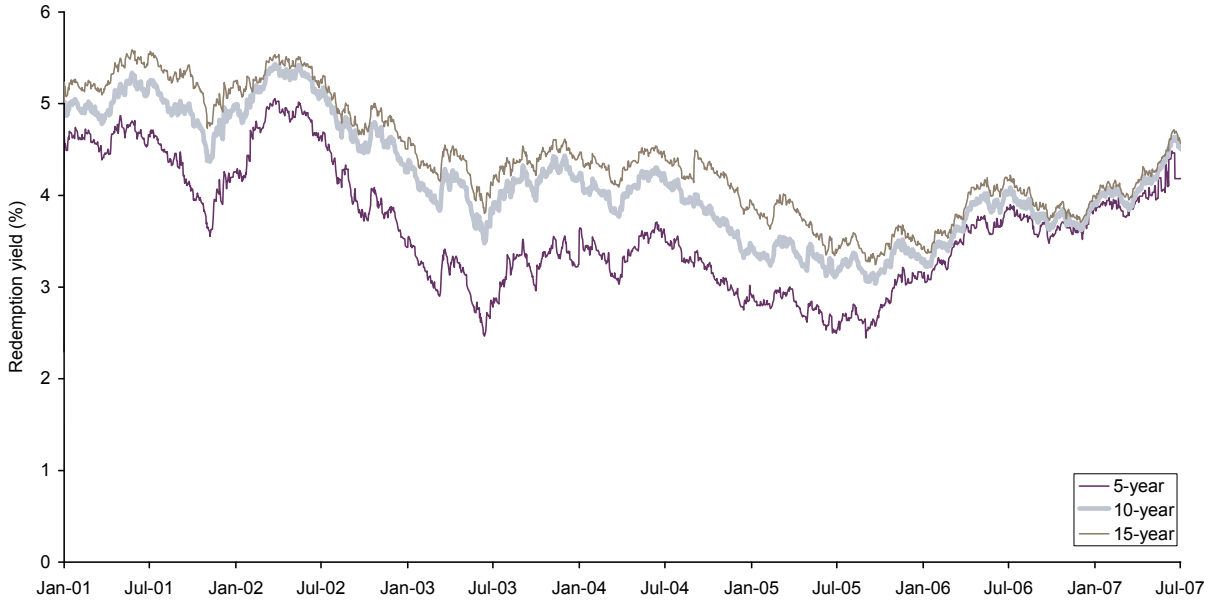
An appropriate value of the risk-free rate in the calculation of eircom's WACC should reflect the return an investor would receive if investing in a risk-free asset. While inherently a forward-looking parameter, analysis of historical data can indicate the possible variation in the risk-free rate over the regulatory period. The analysis below presents proxies for the risk-free rate in a historical context and then examines recent regulatory evidence.

8.1 Historical benchmarks

To measure a nominal historical benchmark of the risk-free rate, a common method is to analyse the yield on government bonds over time and across different levels of maturity. In this analysis the historical nominal yields on both Irish and German government bonds are presented across a range of maturities. German government bonds have been selected as a comparison measure. As the largest economy, Germany represents a benchmark for the Eurozone and has exhibited signs of stability over recent years, with low and stable levels of inflation. Furthermore, ComReg used the German bond as its benchmark in its previous price control.

Figure 8.1 displays the daily redemption yields for Irish government bonds across a range of maturities from the beginning of 2001. Of note is the rise in yields in the past six months across maturities, and a divergence between the long and short ends.

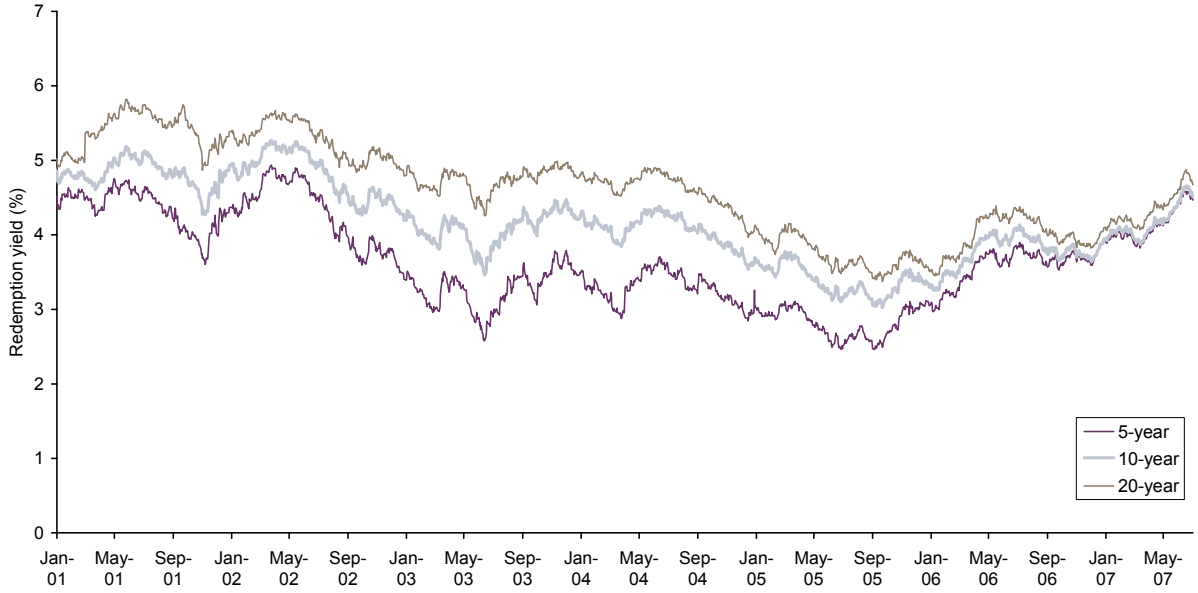
Figure 8.1 Nominal Irish government bonds daily yields for a selection of maturities, January 1st 2001 to July 2nd 2007



Note: The data for the 20-year Irish government bond was incomplete and so the 15-year bond was used as a proxy for long-run lending.
Source: Datastream.

Figure 8.2 shows German government bond yields. As with the evidence presented for Ireland, Germany has also seen a recent rise in yields, although the divergence across maturities has been less pronounced.

Figure 8.2 Nominal German government bonds daily yields for a selection of maturities, January 1st 2001 to July 2nd 2007



Source: Datastream.

Table 8.1 compares historical averages of the nominal risk-free rate between Ireland and Germany over different time periods, with the spot rate taken on July 2nd. In both cases average yields fall the shorter the time period used to calculate the yield. Of note is how close the yields are for both Ireland and Germany across all averaging periods and how far they are below the current spot rate.

Table 8.1 Comparison of historical nominal risk-free rates with current spot rate

	Germany	Ireland
Spot rate, July 2nd 2007	4.51	4.50
Historical one-year average	4.00	3.97
Historical three-year average	3.74	3.67
Historical five-year average	3.93	3.92

Note: Nominal yields have been calculated as one-, three- and five-year historical averages taken on July 2nd 2007 for ten-year bonds.
Source: Datastream, Oxera calculations.

8.2 Relevant determinations of the risk-free rate

Another source of data on the determination of a risk-free rate is recent regulatory precedent. Table 8.2 below lists the risk-free rates used by Irish regulators in price reviews since 2000. As mentioned above, ComReg is unique among Irish regulators in using a nominal WACC. The risk-free rates in the table are thus real rates, apart from the ComReg's 2003 determination. The real rate used by regulators reflects the downward trend over time of the nominal rates above, falling from 3% in 2000 to 2.38% in 2005.

Table 8.2 The risk-free rate used in recent regulatory determinations in Ireland (%)

Regulator	Subject	Year	Real risk-free rate used in determination	Implied nominal risk-free rate
CER	ESB PG	2000	3.0	5.6
CAR	Aer Rianta	2001	2.6	5.2
CAR	Irish Aviation Authority	2002	2.6	5.2
CER	Bord Gáis Éireann	2003	2.5	5.1
ComReg	eircom	2003	n/a	4.45
CAR	Dublin Airport Authority	2005	2.6	5.2
CER	ESB PG	2005	2.4	4.9

Notes: In the case of eircom, the nominal risk-free rate is based on ComReg's determination. The implied nominal risk free rates in other cases have been derived by applying a uniform inflation rate of 2.5% to the real risk-free rate used in a given determination. Over the period 2000-2005 Irish inflation has been above 2.5% until 2004 and below 2.5% in 2004 and 2005.
Sources: Regulatory documents, Central Bank of Ireland and Oxera calculations.

8.3 Comparing the benchmarks and deriving risk-free rate estimates

Table 8.3 compares the nominal historical benchmarks for the five- and ten-year maturities with the spot yield and ComReg's 2003 value.

Table 8.3 Comparison of nominal historical, forward and spot values of the risk-free rates

		Five-year lending	Ten-year lending
Germany	Historical five-year average risk-free rate	3.40	3.93
	Historical one-year average risk-free rate	3.92	4.00
	Spot rate on July 2nd 2007	4.47	4.51
Ireland	Historical five-year average risk-free rate	3.40	3.92
	Historical one-year average risk-free rate	3.84	3.97
	Spot rate on July 2nd 2007	4.18	4.50
	ComReg 2003 determination	4.45	4.45

Note: Nominal yields are calculated as one- and five-year historical averages taken on July 2nd 2007 for five- and ten-year maturities.
Source: Datastream, Oxera calculations.

From 2001 to the end of 2005, there was a downward trend in the yields of both German and Irish government bonds. This trend now seems to have reversed, with a sustained increase in yields from 2006 onwards, with spot yields on July 2nd above the long- and short-term averages. Appropriate weight should be given to these values due to the obligations on regulators to ensure the successful financing of their regulated companies. With spot yields above trend, it would be difficult to argue for a limit on the risk-free rate below current market evidence. For this reason, it is appropriate to take as the lower end of the range for the nominal risk-free rate the current spot yield of 4.50 on ten-year nominal Irish government bonds.

While mean reversion of interest rates might take yields below current spot levels, yields could also continue to rise. Regulators should therefore allow a headroom on the current

spot yield that takes into account both the possibility of further increases in the yield and the potential effects of mean reversion. To achieve this, an upper limit of 5%, in line with past regulatory determinations, seems reasonable.

The evidence in this section indicates that a range estimate on the nominal risk-free rate might be between 4.5% and 5%. This range reflects current market evidence and recent regulatory precedent, while recognising the uncertainty regarding the future path of interest rates.

9 Equity risk premium

The ERP is the additional remuneration required by investors for holding equity as opposed to risk-free assets. It is calculated by subtracting an appropriate risk-free rate from the expected returns in the market in question. The ERP is not directly observed, but may be estimated on the basis of ex ante or ex post evidence.

One of the most comprehensive ex post assessments is that carried out annually by Dimson, Marsh and Staunton (latest 2006), who conclude that the Irish ERP lies in the range 3.6–6.0%.[48] This has risen since the 2002 review, where the same dataset gave an Irish ERP in the range of 3.1–5.3%.[49]

There are cases when an ERP specific to the country of operation is not the most appropriate benchmark. Such situations arise when the equity markets in the country, or the economy as a whole, have experienced recent atypical events or, as a result of large political or regulatory shifts, the future evolution of equity markets is no longer an adequate reflection of historical movements. It might be therefore appropriate to consider other determinations of the ERP. Table 9.1 provides estimates of the ERP presented by Dimson, Marsh and Staunton (2006), based on a number of measures and for several regions.

Table 9.1 ERP for a selection of comparator countries and around the world, 1900–2005 (%)

	Relative to bills			Relative to bonds		
	Geometric mean	Arithmetic mean	Standard deviation	Geometric mean	Arithmetic mean	Standard deviation
UK	4.4	6.1	19.8	4.1	5.3	16.6
Belgium	2.8	5.0	23.1	2.6	4.4	20.1
Denmark	2.9	4.5	19.8	2.1	3.3	16.2
France	6.8	9.3	24.2	3.9	6.0	22.3
Germany	3.8	9.1	33.5	5.3	8.3	27.4
Ireland	**4.1**	**6.0**	**20.3**	**3.6**	**5.2**	**18.4**
Italy	6.6	10.5	32.1	4.3	7.7	29.7
Spain	3.4	5.5	21.4	2.3	4.2	20.2
World	4.7	6.1	16.6	4.0	5.1	15.0
Average of comparators	**4.43**	**6.80**	**–**	**3.13**	**5.13**	**–**
Overall average[1]	**4.48**	**7.04**	**–**	**3.63**	**5.66**	**–**

Note: [1] Does not contain the values for 'World'.
Source: Dimson, Marsh and Staunton (2006).

There is an argument of consistency in taking the ERP relative to bonds, since the market risk-free rate was a bond proxy. However, given that bills are shorter-term instruments than bonds, they may provide a more accurate reflection of the ERP over the regulatory period.

[48] Dimson, E., Marsh, P. and Staunton, M. (2006), *Global Investment Returns Yearbook 2006*.
[49] Dimson, Marsh and Staunton (2002), *Global Investment Returns Yearbook 2002*.

The ERP of the comparator countries where data is available is also displayed in the table, as well as values for the UK and Germany. The average values of the comparator countries yield a range for the ERP of 3.1–6.8, which is wider than that for Ireland, but results in a similar midpoint. This suggests that the Irish ERP is typical of the ERP seen in the comparator countries. Comparing the Irish range of the ERP against the world averages suggests that the Irish range is lower than the world average.

9.1.1 The ERP at the last review

In 2002 ComReg examined a variety of potential benchmarks, namely survey data of the long-run historical ERP in the Eurozone and other equity capital markets, and regulatory precedents in the UK, Eurozone and Australia. On the basis of the first benchmark, the suggested ERP was 6–7%; on the basis of the second benchmark, it was 5–7%. At the time ComReg's consultants argued that, given the limited sample size and methodology used by UK regulators, they would not place any weight on UK regulatory precedent, which at the time lay in the range 3.5–5%.

9.1.2 Regulatory precedent on the ERP

In addition to Table 9.1, it is insightful to examine how different regulators have interpreted the evidence on the ERP. Table 9.2 suggests that the value of the ERP used by Irish regulators has remained stable over time. The CER, however, in its most recent price control review of ESB used a value of 6% at the top end of its range, suggesting a value of 5.25.

Table 9.2 The ERP in recent regulatory determinations in Ireland (%)

Regulator	Subject	Year	ERP used in determination (best estimate)
CER	ESB PG	2000	5.4
CAR	Aer Rianta	2001	6.0
CAR	Irish Aviation Authority	2002	6.0
CER	Bord Gáis Éireann	2003	5.0–7.0 (6.0)
ComReg	eircom	2003	5.0–7.0 (6.0)
CAR	Dublin Airport Authority	2005	6.0
CER	ESB PG	2005	2.5–6.0 (5.25)

Note: Where a range of values is shown, the value in parenthesis is the estimate used.
Sources: Regulatory documents and Oxera calculations.

The data presented by Dimson, Marsh and Staunton suggests a range for the ERP of between 3.6 and 6%. A midpoint of this range would be 4.8%, which is lower than previous regulatory determinations in Ireland. Furthermore, comparing this range with the Dimson, Marsh and Staunton data in 2002 indicates that there has been an increase at the higher end of the determination, from 5.3 to 6, which might need to be reflected in the ERP. The evidence also suggests that the Irish ERP is in line with the values observed in other comparator countries.

The ERP estimates adopted for the WACC calculation in this report is 4.8 at the lower end, taking into account recent regulatory precedent and the Dimson, Marsh and Staunton data, and 6% at the higher end. This range gives a midpoint of 5.4%, which is broadly consistent with previous regulatory determinations, but reflects the Dimson, Marsh and Staunton evidence that the ERP may be lower than 6%.

10 Towards eircom's fixed-line cost of capital

The above methodologies complete the analysis on the components of the cost of capital by estimating separate assumptions for beta, the debt premium and gearing on a forward-looking basis. Using the equation in section 4, the WACC for eircom can be obtained. Table 10.1 records the parameters adopted and the final cost of capital range at a notional level of gearing (30–50%) and the corresponding debt premium (base case).

Table 10.1 Base case for a cost of capital range at notional gearing

	Low	Midpoint	High
Cost of debt			
Nominal risk-free rate (%)	4.50	4.75	5.00
Debt premium (bp)	120	155	190
Nominal cost of debt (%)	5.70	6.30	6.90
Cost of equity			
Nominal risk-free rate (%)	4.50	4.75	5.00
Asset beta	0.45	0.57	0.70
Debt beta	0.00	0.00	0.00
Gearing (%)	30%	40%	50%
Equity beta	0.64	1.02	1.39
ERP	4.80	5.40	6.00
Corporate tax rate (%)	12.5%	12.5%	12.5%
Cost of equity (post–tax) (%)	7.57	10.47	13.36
WACC			
Nominal vanilla WACC (%)	7.01	8.57	10.13
Nominal pre-tax WACC (%)	**7.77**	**9.43**	**11.08**

Source: Oxera analysis.

The above calculation assumes a debt beta of zero. This is a typical assumption made in cost of capital calculations for companies with investment-grade debt, and is consistent with the assumption of the debt premium consistent with the notional gearing of 30–50%, given the adopted methodology for estimating debt beta.

In Table 10.2 below, the WACC is calculated for a range of actual estimates for gearing and corresponding debt premia. The high and low scenarios use the highest and lowest estimates of eircom's actual gearing, together with the high and low debt premium values. The calculation for the debt beta is the same as that used by Ofcom,[50] which divides the excess of the debt premium above the first 100bp by the ERP.

[50] Ofcom (2004), 'Wholesale Mobile Voice Call Termination', Statement, June 1st.

Table 10.2 Alternative scenario using actual gearing and debt premium

	Low	Midpoint	High
Cost of debt			
Nominal risk-free rate (%)	4.50	4.75	5.00
Debt premium (bp)	257	281	304
Nominal cost of debt (%)	7.07	7.56	8.04
Cost of equity			
Nominal risk-free rate (%)	4.50	4.75	5.00
Asset beta	0.45	0.58	0.70
Debt beta	0.33	0.33	0.34
Gearing (%)	60	76	91
Equity beta	0.63	2.47	4.30
ERP	4.80	5.40	6.00
Corporate tax rate (%)	12.5%	12.5%	12.5%
Cost of equity (post–tax) (%)	7.53	19.17	30.82
WACC			
Nominal vanilla WACC (%)	7.25	8.67	10.09
Nominal pre-tax WACC (%)	**7.68**	**9.08**	**10.49**

Note: The large size of the debt betas is due to the high premium on debt, but is not outside other determinations of debt betas. For example, Schaefer and Strebulaev (2007) estimate the implied debt beta on a BBB-rated security using an assumption of an equity beta of 1.97, as in the table, at 30bp. This is only marginally below the debt betas obtained using the Ofcom methodology. The credit rating of the 2016/17 bonds is B–.
Source: Oxera analysis. Schaefer, S.M. and Strebulaev, I.A. (2007), 'Structural Models of Credit Risk are Useful: Evidence of Hedge Ratios on Corporate Bonds', working paper, June.

The results yield a range for eircom's nominal pre-tax WACC, under notional gearing, of between 7.77 and 11.08, with a midpoint of 9.43. Using the calculated values for the actual gearing and debt premium, together with the incorporation of a debt beta, decreases the range for the WACC to 7.68–10.49, with a marginally lower midpoint at 9.08%. The upper bound is brought towards the midpoint in the actual calculation because, at higher gearing assumptions, the effect of the high cost of equity on the WACC is reduced. Furthermore, the inclusion of a debt beta in the analysis reduces the size of the equity beta, making the cost of equity smaller than it would be with a zero debt beta assumption.

It is also worth noting that the relative differences between the vanilla WACC and the pre-tax WACC in the case of nominal and actual gearing are driven by the respective differences in the implied tax allowances at notional and actual gearing levels.

The range under notional gearing is wider than in ComReg's previous determination, due, in part, to a lower bottom limit on the WACC in the Oxera analysis, which is itself based on a lower bottom limit of the asset beta compared with previous determinations. Oxera has used a number of methodologies to calculate the asset beta. Thus, based on the results presented in this report, there is no indication that greater emphasis should be placed on a higher value of the asset beta.

A1 Econometric estimates of eircom's beta

Table A1.1 Equity beta estimates using the FTSE All-share as the market index

Frequency	Currency	Return type	Beta	t-statistic	R-squared	Obs.	From	To
Daily	€	Adjusted	0.61	4.60**	0.10	398	18/03/04	27/09/05
		Unadjusted	0.39	3.50**	0.00	398	18/03/04	27/09/05
	£	Adjusted	0.62	4.50**	0.92	398	18/03/04	27/09/05
		Unadjusted	0.60	4.29**	0.00	398	18/03/04	27/09/05
Weekly	€	Adjusted	0.61	2.29*	0.10	79	22/03/04	26/09/05
		Unadjusted	0.59	2.20*	0.10	79	22/03/04	26/09/05
	£	Adjusted	0.90	2.96**	0.10	79	22/03/04	26/09/05
		Unadjusted	0.90	2.93**	0.10	79	22/03/04	26/09/05
Monthly	€	Adjusted	0.94	1.20	0.08	17	01/04/04	01/09/05
		Unadjusted	0.82	1.00	0.06	17	01/04/04	01/09/05
	£	Adjusted	1.53	1.90	0.19	17	01/04/04	01/09/05
		Unadjusted	1.33	1.60	0.14	17	01/04/04	01/09/05

Note: * significant at 5%; ** significant at 1%. 'Adjusted' return type corresponds to the return index (RI) obtained from Datastream. The RI assumes that dividends are reinvested to purchase additional units of equity at the closing price applicable. 'Unadjusted' return type assumes that no adjustment has been made for dividends.
Source: Oxera calculations.

Table A1.2 Equity beta estimates using ISEQ as the market index

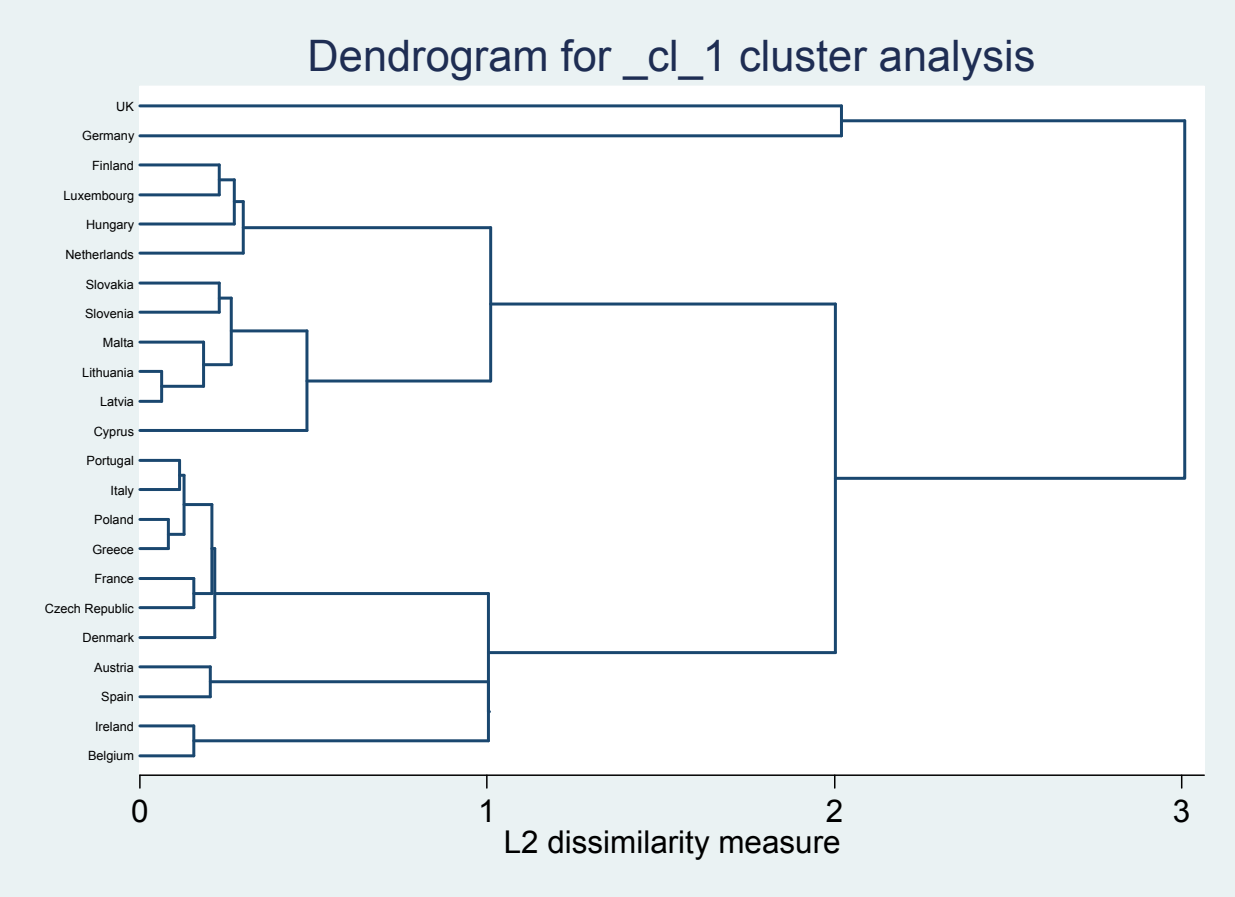
Frequency	Currency	Return type	Beta	t-statistic	R-squared	Obs.	From	To
Daily	€	Adjusted	0.15	1.98*	0.00	398	18/03/04	27/09/05
		Unadjusted	0.14	1.80	0.00	398	18/03/04	27/09/05
	£	Adjusted	0.09	0.80	0.00	398	18/03/04	27/09/05
		Unadjusted	0.24	3.08**	0.04	398	18/03/04	27/09/05
Weekly	€	Adjusted	0.16	1.00	0.00	79	22/03/04	26/09/05
		Unadjusted	0.15	0.90	0.00	79	22/03/04	26/09/05
	£	Adjusted	0.26	1.70	0.00	79	22/03/04	26/09/05
		Unadjusted	0.26	1.60	0.03	79	22/03/04	26/09/05
Monthly	€	Adjusted	–0.16	0.40	0.01	17	01/04/04	01/09/05
		Unadjusted	–0.20	0.60	0.02	17	01/04/04	01/09/05
	£	Adjusted	0.06	0.20	0.00	17	01/04/04	01/09/05
		Unadjusted	0.02	0.10	0.00	17	01/04/04	01/09/05

Note: * significant at 5%; ** significant at 1%. 'Adjusted' return type corresponds to the RI obtained from Datastream. The RI assumes that dividends are reinvested to purchase additional units of equity at the closing price applicable. 'Unadjusted' return type assumes that no adjustment has been made for dividends.
Source: Oxera calculations.

A2 Cluster analysis

The number of clusters in the data depends on the level of dissimilarity used. For example, at dissimilarity level 0 (ie, search for countries that are similar), each country is a cluster by itself, whereas at dissimilarity level 3, all countries form part of the same cluster. An important result is that telecoms markets in the UK and Germany are individual clusters up to a dissimilarity level 2, at which point they can be considered in the same cluster.

Figure A2.1 Dendrogram



Source: Oxera analysis.

Using dissimilarity level 1 as a reference, four clusters can be derived from Figure A2.1. Ireland is included in cluster 1 (see Table A2.1). Based on this exercise, only fixed-line incumbent operators in cluster 1 countries should be used as comparators of eircom.

Table A2.1 EU countries and telecoms characteristics used for the cluster analysis

Countries	Number of major players	Incumbent market share in the fixed-line market	Incumbent's broadband market share	EU broadband penetration rate	Mobile market share of the leading operators
Belgium	6	0.6	0.472	0.218	0.45
Czech Republic	4	0.7	0.369	0.096	0.41
Denmark	4	0.6	0.623	0.294	0.31
Germany	9	0.4	0.486	0.164	0.36
Greece	4	0.8	0.637	0.033	0.40
Spain	5	0.7	0.558	0.139	0.46
France	4	0.7	0.482	0.190	0.45
Ireland	6	0.7	0.480	0.103	0.47
Italy	4	0.7	0.675	0.136	0.40
Cyprus	1	1.0	0.983	0.074	0.90
Latvia	1	1.0	0.429	0.093	0.35
Lithuania	1	1.0	0.490	0.093	0.36
Luxembourg	2	0.8	0.755	0.197	0.51
Hungary	2	0.9	0.507	0.086	0.45
Malta	1	1.0	0.366	0.123	0.52
Netherlands	2	0.7	0.449	0.298	0.48
Austria	5	0.6	0.397	0.397	0.67
Poland	4	0.8	0.685	0.685	0.91
Portugal	4	0.8	0.691	0.691	0.74
Slovenia	1	1.0	0.546	0.576	0.80
Slovakia	1	0.9	0.659	0.676	0.98
Finland	2	1.0	0.691	0.691	0.71
UK	11	0.5	0.248	0.684	0.33
Average	**3.65**	**0.77**	**0.55**	**0.14**	**0.45**

Note: Number of major players as at December 2005. Figures for Germany and Ireland are estimates. Figures for Denmark, Netherlands and Slovenia are based on minutes of traffic. Information for all other countries is based on retail revenues. Incumbent market share as at December 2005. Includes all types of call by volume: local calls (local phone calls and local calls to the Internet), long-distance, international calls and calls to mobile. Incumbent broadband market share as at October 2006. Data for Austria as at July 2006. EU broadband penetration rate as at October 2006. According to the Danish regulator, lines provided by not-for-profit user associations should be added, even though the associations are themselves end-users. This increases the penetration rate of Denmark.
Source: Commission of the European Communities (2007), 'Annex to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions', Volume 2, March.

A3 Comparator analysis

Table A3.1 Comparator bonds for credit rating analysis

Issuer	Coupon	Maturity	Amount (m)	Currency	Ask YTM	Spread	Spread + OAS	Benchmark	Moody's
Ote plc	4.63	20/05/2016	900	EUR	4.99	82	77	German govt bond	Baa1
Ote plc	3.75	11/11/2011	650	EUR	4.71	55.8	36	German govt bond	Baa1
Telefonica SA	Float	30/06/2009	300	EUR	3.52	63	63	Annual Euribor	Baa1
Telefonica SA	4.50	14/12/2009	500	EUR	4.44	30.5	–21	German govt bond	Baa1
Telefonica Spain	4.84	03/03/2008	421	EUR	4.32	26.1	–65	French discount T bill	Baa1
Telecom Italia	4.75	19/05/2014	750	EUR	4.99	81.5	83	German govt bond	Baa2
Telecom Italia	5.63	29/12/2015	500	GBP	6.40	117.5	251	UK gilt stock	Baa2
TPSA Eurofinance	4.63	07/05/2011	300	EUR	4.68	53	31	German govt bond	Baa1
TPSA finance	7.75	12/10/2008	800	USD	5.49	83.2	133	US T bill	Baa1
Portugal Tel Fin	3.75	26/03/2012	1,000	EUR	4.89	73.2	71	German govt bond	Baa2
Portugal Tel Fin	4.38	24/03/2017	500	EUR	5.39	120	151	German govt bond	Baa2
Average	**4.86**		**602**		**4.89**	**71**	**74**		

Source: Bloomberg.

Table A3.2 Method 1 comparators >50% fixed-line profits

Country	Company	Operating profits derived from fixed line (%)	Two-year Domestic market index	Five-year Domestic market index	Two-year Bloomberg 500 Euro index	Five-year Bloomberg 500 Euro index
Denmark	TDC	58		0.465		0.473
Spain	Telefonica	51	0.419	0.797	0.325	0.757
Italy	Telecom Italia	53	0.404	0.487	0.367	0.484
Poland	TPSA	69	0.704	0.784	1.024	0.801
Portugal	Portugal Telecom SGPS	58	0.707	1.021	0.505	0.702
	Average		**0.559**	**0.711**	**0.555**	**0.643**

Note: The two- and five-year average asset betas refer to the average of two-year weekly and monthly asset betas and five-year weekly and monthly asset betas respectively. The average figures in bold are reported in Table 5.6 above. Blank cells refer to asset betas below zero and are not incorporated in the average value.
Source: Bloomberg and Oxera calculations.

Table A3.3 Summary of implied fixed-line asset beta analysis

Country	Company	Two-year Domestic market index	Five-year Domestic market index	Two-year Bloomberg 500 Euro index	Five-year Bloomberg 500 Euro index
Denmark	TDC		0.303		0.315
Greece	OTE		0.843	0.668	0.632
Spain	Telefonica	0.214	0.896	0.030	0.818
France	France Telecom	0.266	0.855	0.513	0.992
Italy	Telecom Italia	0.200	0.305	0.132	0.300
Austria	Telekom Austria		0.093	0.654	
Poland	TPSA	0.736	0.825	1.200	0.850
Portugal	Portugal Telecom SGPS	0.759	1.257	0.411	0.709
	Average	**0.435**	**0.672**	**0.515**	**0.659**

Note: The two- and five-year average asset betas refer to the average of two-year weekly and monthly asset betas, and five-year weekly and monthly asset betas respectively. The average figures in bold are reported in Table 5.8 above. Blank cells refer to asset betas below zero and are not incorporated in the average value.
Source: Bloomberg data and Oxera calculations.

Table A3.4 Regulatory comparators

Parameter estimate	CER	CAR	CAR		CER	*ComReg*	CAR	CER	CER
	ESB PG	Aer Rianta	Irish Aviation Authority[1]		Bord Gáis Éireann	*eircom*	Dublin Airport Authority	ESB PG	Best new entrant
Year	2000	2001	2002		2003	*2003*	2005	2005	2006
Cost of equity									
Real risk-free rate (%)	3.0	2.6	2.6	2.6	2.5	**2.5**	2.6	2.4	2.9
ERP (%)	5.4	6.0	6.0	6.0	6.0	**6.0**	6.0	5.3	5.5
Asset beta		0.5	0.7	0.7	0.6	**0.8**	0.6	0.6	
Equity beta	0.8	0.9	1.2	0.7	1.0	**1.0**	1.1	1.2	1.8
Real cost of equity (%)	7.4	8.1	9.8	6.5	8.5		9.2	8.8	12.9
Cost of debt									
Real risk-free rate (%)	3.0	2.6	2.6	2.6	2.5	**2.5**	2.6	2.4	2.9
Debt premium (%)	1.5	1.1	1.2	1.2	1.4	**0.9**	1.1	1.8	2.0
Real cost of debt (%)	4.5	3.7	3.8	3.8	3.9		3.7	4.1	4.9
Gearing (%)	35	50	50	0	55	**25**	46	55	70
Corporate tax rate (%)	10	13	13	13	13	**14**	13	13	13
Post-tax WACC (real, %)		**5.7**	**6.5**	**6.5**	**5.7**	**7.3**		**5.9**	
Pre-tax WACC (real, %))	**7.0**	**6.6**	**7.5**	**n/a**	**6.5**	**8.5**	**6.5**	**6.8**	**7.8**
Post-tax WACC (nominal, %)						**9.3**			
Pre-tax WACC (nominal, %)						**10.6**			

Note: [1] The two columns refer to separate gearing assumptions.
Sources: CER (2000), 'ESB Power Generation Price Review', September; CAR (2001), 'Aer Rianta's Cost of Capital Report to the Commission for Aviation Regulation', August; CAR (2002), 'The Irish Aviation Authority's Cost of Capital: Report to the Commission for Aviation Regulation', February; CER (2003), 'BGÉ'S Cost of Capital: A Final Report for the Commission for Energy Regulation'; A report prepared for ODTR (2002), 'eircom's Cost of Capital: A Draft Final Report for ODTR'; CAR (2005), 'Dublin Airport Authority's Cost of Capital: Report to the Commission for Aviation Regulation; May; CER (2005), 'Direction to ESB Power Generation on Allowable Costs 2006'; CER (2006) 'Best New Entrant Price A Decision and Response Paper'.

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