

**Comments on the Ofcom consultation document:
Ofcom's approach to risk in the assessment of
the cost of capital**

The risk of the copper access network

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Ofcom's approach to risk in the assessment of the cost of capital

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Annexes to main response

This document includes the following two separate documents referred to in BT's main response:

Annex 1: "The equity market risk premium"
by Professor Ian Cooper, London Business School

Annex 2: "The risk of the copper access network"
by Professor Ian Cooper, London Business School

This document is available electronically at <http://www.btplc.com/responses>.

SUMMARY

Ofcom is reviewing various elements of its regulatory treatment of risk. Previously it has used its estimate of BT Group cost of capital for all regulated assets. Now it is proposing to reduce its estimate of the equity beta of the copper access network from the 1.3 it uses for BT to somewhere in the range 0.9-1.2.

Ofcom states that there is no direct evidence about the risk of the copper access network. Therefore, it bases its estimate on three types of indirect evidence:

- The betas of UK utilities
- The betas of US telecommunications companies
- Estimates of the income elasticity of demand of access versus call services

From this it concludes that the copper access network has lower risk than the rest of BT, and the unregulated activities have higher risk.

In my opinion, the indirect evidence that Ofcom provides based on the share prices of UK utility companies is not relevant to the estimation of an asset beta for the copper access assets. Ofcom effectively states the same conclusion. Other studies show that the risk of telecommunications is significantly higher than the risks of gas, electricity and water in all countries. Therefore, asset betas from these other utility industries provide no evidence about telecommunication asset betas.

Ofcom interprets the evidence from US telecommunications companies as showing that the companies it classifies as long-distance carriers, AT&T and Sprint, have higher asset betas than the companies it classifies as local access companies. Ofcom's evidence for this is very weak. It ignores differences caused by regulation, it does not split the operations cleanly between the two types of assets, and it does not take account of the rapidly changing structure of the US telecommunications industry. Even if one ignores these difficulties, Ofcom interprets the evidence as showing that AT&T has a different level of risk from the local exchange carriers. What it actually shows is that AT&T appears to have the same level of risk as the local exchange carriers, suggesting that access and long-distance have the same level of risk. The only company with a different level of risk is Sprint, and there are many possible causes of the difference beta of Sprint.

Ofcom's observation about the relative income elasticities of call and access revenues *is* suggestive of a possible difference in asset betas. However, it does not prove such a difference and gives no indication of the size of the difference. It may be that other factors operate in the opposite direction, or that the influence of the short-term historical income elasticity is very small. In general, there is no reliable way to estimate asset betas from fundamental information of this type, and empirical studies show that there are many other factors that should be included if such an estimation is attempted.

There is one other piece of evidence that should be considered. Three primary determinants of asset betas are industry, type of regulation and location. The access and call assets share these characteristics, and, in the absence of any evidence to the contrary, the starting point should be that they have similar betas.

None of the above proves that the risk of the copper access assets is the same as that of the other assets of BT. It simply means that there is no evidence that is closely related to the problem that Ofcom seeks to address: the estimation of the asset beta for the copper access assets. I agree with Ofcom that there is no direct evidence that can be used to estimate the asset beta of the copper access network.

In the absence of such evidence, any assessment of the risk of the copper access assets is necessarily speculative. Any inference of the asset beta from indirect evidence is, as Ofcom states, based on 'a degree of judgement'. In my opinion, the element of judgement rather than evidence is bound to be overwhelming, because the relevant direct evidence does not exist.

In principle, if the required return on the copper access assets could be reliably estimated, it should be used. Not doing so would introduce errors that Ofcom discusses. However, if the required return cannot be reliably estimated, and instead a guess is used, it can cause mistakes at least as important as those discussed by Ofcom. For instance, if a guess is made that a subset of assets has a low rate of return and this guess is incorrect, then using that rate will destroy shareholder value.

Therefore, the question is not whether, in principle, the rate of return should be different for the copper access assets, but whether there is, in practice, enough information to estimate this rate reliably. In my opinion, there is not.

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1. Introduction

Ofcom is reviewing various elements of its regulatory treatment of risk.¹ One change that it is considering is to revise the beta it uses for the copper access network. Previously it has used its estimate of BT Group cost of capital for all regulated assets. In September 2004 its estimate of the BT equity beta was 1.3.² Now it is proposing to reduce its estimate of the equity beta of the copper access network to somewhere in the range 0.9-1.2.³

This note examines the evidence Ofcom presents to justify this change.

2. Ofcom's new position

Ofcom has not previously used different required rates of return for different parts of BT. Rather, it has used the BT Group cost of capital for all regulated activities of BT, on the grounds that there is no reliable evidence on which to base estimates of disaggregated betas.

In 2004 Ofcom foreshadowed the possibility of using a different rate of return for the copper access network.⁴ According to Ofcom at that time, there were three characteristics of the copper access assets that made it worth considering whether their risk differs from the other regulated assets. These were:

- the copper access network is already in the ground,
- little new investment is required in the copper access network,
- the copper access network is not contestable by competition.

A different reason is now given for using a lower risk for the copper access network. It is that the copper access revenues come from mature, "essential" products, whose returns are not closely correlated with fluctuations in aggregate demand. It is not clear whether Ofcom views the earlier reasons as still relevant. They are discussed in the Appendix. None of them is a reason to use a lower beta for the copper access assets.

Ofcom now states that there is no direct evidence about the risk of the copper access network. Therefore, it bases its estimate on inferences drawn from three types of indirect evidence:

¹ Ofcom (2005).

² Ofcom (2004a) and (2004b).

³ This assumes an equivalent amount of gearing to make the numbers comparable.

⁴ Ofcom (2004c) sections 7.15-7.19.

- The betas of UK utilities
- The betas of US telecommunications companies
- Estimates of the income elasticity of demand of access versus call services

From this it concludes that plausible estimates of the equity betas of various parts of BT are:⁵

1. Copper access with a beta of 0.9-1.2 (40% of BT Group value)
2. Other regulated with a beta of 1.30 (30% of BT Group value)
3. Unregulated with a beta of 1.43-1.82 (30% of BT Group value)

Ofcom derives the beta for the unregulated activities from the beta of the copper access network by assuming that the overall beta of the BT group is 1.30 and the beta for the other regulated assets is also 1.30.

3. Is it possible to estimate the required return of the copper access network?

The generally accepted methods of estimating the asset beta of the copper access assets of BT would be:⁶

- A. Find 'pure play' traded companies that operate only copper access assets in an environment identical to BT, estimate their asset betas, and use an average of these as an estimate of the asset beta for the copper access assets.
- B. Find a set of companies that operate only in the non-copper-access activities of BT. Estimate their asset betas. Estimate the asset beta of the copper access assets by deducting this risk from the overall risk of the BT group.
- C. Find a set of traded companies that have some operations in copper access assets, and other operations for which the stock market risks can be measured. Use these data to impute an estimate of the beta of the copper access assets.⁷

The merit of these approaches is that they are all based on share price betas that include the beta of the copper access assets themselves. Even

⁵ These are equity betas, calculated assuming a level of gearing equal to BT's overall gearing.

⁶ An extensive discussion of divisional cost of capital estimation can be found in Morin (1994) chapter 14. Different authors emphasise different approaches to the problem. Other discussions are in Copeland et al (2000), Franks et al (1985) and Brealey and Myers (2003).

⁷ See Wood, McInish and Lawrence (1992).

so, the accuracy of the second and third approaches is limited because they involve inferring the asset beta of the copper access assets indirectly from differences between observed betas.

None of the three methods can be applied to the copper access assets of BT. There are no traded companies that have copper access assets identical in risk to those of BT (approaches A and C). Nor are there traded companies that operate only in the non-copper-access activities of BT (approach B). Therefore, there is no way to base the assessment of the risk of the copper access assets either directly or indirectly on stock market betas that include assets with risk equal to the risk of the copper access assets themselves.

In the absence of such evidence, there are two other methods that are sometimes used, albeit with limited success. These are:

- D. Use accounting data to estimate either the absolute or relative level of risk of the copper access assets (the 'accounting beta').
- E. Use theoretical arguments to estimate the risk of the copper access assets. This may incorporate other empirical data, such as the revenue sensitivity and cost structure of copper access assets.

Method D would involve the use of a set of historical accounts for the separated copper access business. Such accounts do not exist, so the approach is not feasible.

The last method, using theoretical arguments to estimate risks, is the least reliable of all. Because it is not directly based on stock market betas, any theoretical argument about the risk of an asset is incomplete unless it can be then related to stock market betas. This is very difficult. For instance, it is well known that a large part of beta risk is generated by factors that cannot be measurably related to cash flows.⁸ A possible reason is that the part of the value of a share generated by near-term cash flows is quite small. Therefore, most of the beta of a share comes from variation in values that represent expectations far into the future. These are very difficult to measure without reference to share prices. Furthermore, there is a danger that theoretical arguments may be partial, in the sense that they focus on a single characteristic of an asset, whereas its risk and required return arise from a combination of all its characteristics.

In summary, there is no evidence that is closely related to the problem

⁸ See, for instance, Campbell and Mei (1993).

that Ofcom seeks to address: the estimation of the asset beta for the copper access assets. In the absence of such evidence any assessment of the risk of the copper access assets is necessarily speculative. Brealey and Myers state that, without direct stock market evidence:⁹

‘You cannot hope to estimate the relative risk of assets with any precision.’

Any inference of the asset beta from indirect evidence is, as Ofcom states, based on ‘a degree of judgement’. In my opinion, the element of judgement rather than evidence in this instance is bound to be overwhelming, because the relevant direct evidence does not exist.

4. Evidence from the betas of other companies

4.1 Introduction

Ofcom uses two sets of indirect evidence based on the share price betas of other companies. These are the betas of UK utility companies and the betas of US telecommunications companies. Using these, it makes inferences about the risk of the copper access assets of BT. This section examines this evidence. To put the discussion in context, it is important to understand what factors affect the betas of the companies Ofcom uses as indirect evidence. So I first discuss some previous studies of the betas of regulated companies.

4.2 Previous studies of the betas of regulated companies

Previous studies have attempted to identify the factors that determine the levels of risk of different regulated companies. An overview is the study by Alexander, Mayer and Weeds for the World Bank in 1996. The results of this study have since been updated in PwC/Franks (2003).

Tables 1 and 2 show how these authors classify the risks of regulated companies. This is by industry, country, and style of regulation. Each of these factors is seen to have a significant effect on beta. In particular:

- The risk of telecommunications is significantly higher than the risks of gas, electricity and water in all countries where such a comparison is possible.
- The risk of telecommunications differs between countries.

⁹ Brealey and Myers (2003) page 238.

-Risk is strongly affected by regulation.

The general difference between the betas of telecommunications and the other industries implies that gas, electricity and water betas contain no information about telecommunications betas. Almost all experts recommend that estimates of asset betas should be based on betas from the same industry. Different industries have different betas, and there is no standard method of adjusting betas from one industry to be relevant to another industry. As a consequence, all standard approaches to estimating divisional costs of capital of which I am aware are based on betas within an industry and not betas from other industries.

Table 1: Average assets betas by country and sector, 1996-2001

	Electricity	Gas	Water	Telecoms
<i>UK</i>	0.40	0.70	0.25	0.89
<i>US</i>	0.28	0.28	0.20	0.60
<i>Canada</i>				0.46
<i>Japan</i>	0.09			1.01
<i>Argentina</i>	0.25			0.57
<i>Chile</i>	0.43			
<i>Germany</i>	0.40			
<i>Spain</i>	0.43	0.71	0.37	
<i>Sweden</i>				0.95
<i>Australia</i>		0.25		
<i>New Zealand</i>				0.81

Source: PwC/Franks (2002) page 65.

Apart from industry and country, the other important factor that these authors identify as affecting asset betas is regulation. Table 2 shows their estimate of how asset betas depend on the type of regulation. The difference caused by different types of regulation is substantial. Therefore, it is incorrect to compare asset betas of regulated companies that are subject to different regulatory regimes.

Table 2: Average asset beta values across regulatory regimes

	Average beta
<i>High-powered</i>	0.71
<i>Intermediate</i>	0.60
<i>Low-powered</i>	0.32

Source: Alexander, Mayer and Weeds (1996) page 29.

Table 2 also illustrates another important point about regulation that is not widely appreciated. Alexander et al estimate the average asset beta for high-powered regulatory regimes as 0.71. The average *asset* beta across all industries is also about 0.6-0.8.¹⁰ The empirical evidence from these authors is, therefore, that high-powered regulation results in an asset beta that is the same as that for competitive industries. Thus monopoly does not result in a low beta as long as it is properly regulated.

4.3 Ofcom's evidence from other UK regulated industries

The first evidence that Ofcom uses is the betas of companies from the UK gas, electricity and water industries.¹¹ The asset betas of these companies are relatively low, and Ofcom ascribes this to the structure of demand for their products. It then draws the inference that this provides evidence about the beta of the copper access network. This is based on the assertion that:

‘Some of the characteristics of BT's access business, specifically the way in which revenues may not be closely correlated with short-term variations in aggregate demand, are similar to those of utility companies.’

In my opinion, this argument provides no real evidence about the risk of the copper access assets of BT. It is based on many implicit assumptions, none of which are substantiated empirically.¹² Ofcom could equally have chosen other companies that share other characteristics of BT, such as technological companies, with very different results.

The use of evidence in this way simply ignores all the other characteristics that make the telecommunications industry different from these utility industries. These include the impact of changing technology, different cost structures, the long-term rather than short-term income elasticity of demand, different expectations about future regulation, and many other factors. In some cases, Ofcom even uses companies that are obviously different from other UK utilities in the same industry. For instance, a large part of Scottish Power is a US electricity utility that is regulated by rate-of-return regulation. Ofcom's use of evidence contrasts with the standard approach in divisional risk appraisal, which requires

¹⁰ This comes from an average equity beta of one and an average amount of debt of about 20%-40%. See Rajan and Zingales (1995).

¹¹ It uses the seven largest utilities by market capitalisation.

¹² These include: that the levels of elasticity are similar in the short and long-run, that cost structures are similar, and that other factors such as technology and regulation have the same effect.

that a comparative company used for beta estimation must share all the risk characteristics of the division whose cost of capital is being estimated. At a minimum, this is usually taken to imply that it comes from the same industry.

Ofcom appears to accept that the evidence provided by the betas of other UK utilities is very limited. However, it claims that other evidence it presents increases the force of this evidence. The other evidence presented by Ofcom does not address any of the shortcomings discussed above. Therefore, in my opinion, the evidence on the betas of other UK regulated companies should not carry any weight in estimating the required return on the copper access assets of BT.

4.4 Evidence from the US telecommunications industry

Ofcom also uses evidence from the asset betas of US telecommunications companies. The US telecommunications market is different from the UK market, so the absolute levels of these asset betas should not be taken as evidence about the asset betas of parts of BT. Ofcom acknowledges this. Ofcom does, however, use the relative asset betas of three companies that it classifies as US local exchange carriers (LEC's) (BellSouth, SBC and Verizon) and two that it classifies as long-distance carriers (AT&T and Sprint) to suggest that the asset beta of the copper access network is lower than the BT Group asset beta. Ofcom's interpretation of this evidence suffers from many problems.

First, the interpretation depends crucially on the assumption that other factors that might affect the relative risks of these companies are the same.¹³ One such factor is regulation, and this appears to be very different between the two parts of the US market. Economides (2004) describes the state of regulation in the US long-distance market:¹⁴

‘Most economists agree that presently the long-distance market is effectively competitive.’

In contrast, he states that, for the US local access networks:¹⁵

‘cost-based leasing of [unbundled network elements] is very likely to be quickly phased out, and the [regional Bell operating

¹³ In particular, it assumes that the relative influence of these factors on the difference between the local access network and the long-distance network in the US is the same as in the UK.

¹⁴ Page 16.

¹⁵ Page 40.

companies] will be allowed to charge monopoly prices for unbundled network elements..’

If he is right, and the LEC’s are able to exploit their monopoly position, then their betas may be lowered as a result. Although properly regulated monopoly does not necessarily have a low beta, monopoly that is unregulated may. In addition, it is not clear how high-powered the new US telecommunications regulatory regime will be. There is still uncertainty about whether it will operate like a price cap regime or in some other way.¹⁶ Therefore, it is possible that any difference between the asset betas of the US LEC’s and long-distance carriers simply reflects a difference in their competitive and regulatory environments.

Second, it is not clear that the distinction between the companies it classifies as long-distance versus local access is as clear-cut as Ofcom suggests. For instance, according to Hoover’s Online business intelligence service:¹⁷

‘Sprint is the #4 long-distance carrier in the US, after AT&T, MCI and Verizon, based on the number of subscribers.’

Thus, according to this authority, based on the number of subscribers Verizon, which Ofcom classifies as a local exchange carrier, has more long-distance business than Sprint, which it classifies as a long-distance carrier.

Third, the structure of the US telecommunications industry is changing very rapidly. In recent months, SBC has taken over AT&T, Verizon has taken over MCI, and Sprint has taken over Nextel. Takeovers affect share price behaviour and the fluid structure of the industry makes it extremely difficult to separate other sources of differences in betas from the changing structure. Moreover, betas reflect the expectation of future operations of companies, and not just their current businesses. The cross-over between LEC’s and long-distance companies means that it is very difficult to identify what proportion of the risk of each is due to which business.

Fourth, Ofcom’s inference, that the evidence shows that both AT&T and Sprint have significantly higher asset betas than the LEC’s, is incorrect. Table 3 shows the Ofcom beta estimates.¹⁸ I have converted them to asset

¹⁶ See Federal Communications Commission (2003) paragraph 138.

¹⁷ Hoover’s company profiles: Sprint Corporation, 23 February 2005.

¹⁸ Ofcom does not report all these explicitly, but it is possible to infer them from its discussion.

betas, to make them comparable. The big difference is not between the asset betas of the long-distance carriers and the LEC's, but rather between Sprint and the rest. Given the uncertainty in beta estimation for an individual company, the beta of AT&T is no different from those of the LEC's. There may be many reasons why Sprint has a different beta. This evidence certainly does not demonstrate that being a long-distance carrier, as opposed to a local access company, gives a different level of risk.

Table 3: US telecommunications betas

	Ofcom equity beta	Ofcom asset beta
BellSouth	0.69	0.57
SBC	0.56	0.49
Verizon	0.72	0.53
AT&T	1.08	0.66
Sprint	1.14	1.06

Sources: Ofcom (2005) Figure 10, my calculations.

In summary, Ofcom's evidence that the asset beta of US telecommunications access is lower than that of long-distance is very weak. It ignores differences caused by regulation, it does not split the operations cleanly between the two types of assets, and it does not take account of the rapidly changing structure of the US telecommunications industry. Even if one ignores these difficulties, Ofcom interprets the evidence as showing that AT&T has a different level of risk from the local exchange carriers. What it actually shows is that AT&T appears to have the same level of risk as the local exchange carriers, suggesting that access and long-distance have the same level of risk. The only company with a different level of risk is Sprint.

The conclusion that it is effectively impossible to disaggregate the risk of the US telecommunications industry in the way proposed by Ofcom echoes the conclusion of an expert on the estimation of rates of return for US regulated companies, writing in 1994:¹⁹

‘The divisional cost of capital techniques are fairly complex and require reliable historical data. Even if reliable historical data on individual divisions are available, any change in the utility's operating environment underscores the need to be forward-looking. Historically-based measures of risk are necessarily biased in

¹⁹ Morin (1994) page 372.

assessing current circumstances. For example, in the telecommunications industry in the late 1980s and early 1990s, the fundamental risks of telephone companies and or their component parts were changing rapidly. At that time, the estimation of individual cost of equity rates for individual telephone service segments was questionable and largely academic because growing competition was quickly blurring any distinction between utility and competitive services. Any risk distinctions between divisions of the telephone utility industry were diminishing with each new leap in technology and with the gradual penetration of competition across the entire spectrum of telecommunications services, including the copper access.'

4.5 Evidence from other traded companies: Conclusion

There are no companies with traded shares that give direct evidence about either the absolute or relative level of the risk of the copper access assets. Because of this, Ofcom uses two types of indirect evidence: betas of UK utilities and betas of US telecommunications companies. In my opinion, both contain almost no relevant evidence and the weight given to them should be very low.

Ofcom's use of evidence from other regulated industries contrasts with the standard approach in divisional risk appraisal, which requires that a comparative company used for beta estimation must share all the risk characteristics of the division whose cost of capital is being estimated. At a minimum, this is almost always taken to imply that it comes from the same industry.

Ofcom appears to accept that the evidence provided by the betas of other UK utilities is very limited. However, it claims that the other evidence it presents increases the force of this evidence. The other evidence presented by Ofcom does not address any of the shortcomings in the evidence from utility companies. Therefore, in my opinion, the evidence on the betas of other UK regulated companies should not carry any weight in estimating the required return on the copper access assets of BT.

Ofcom's evidence that the asset beta of US telecommunications access is lower than that of long-distance is very weak. It ignores differences caused by regulation, it does not split the operations cleanly between the two types of assets, and it does not take account of the rapidly changing structure of the US telecommunications industry. Even if one ignores

these difficulties, Ofcom interprets the evidence as showing that AT&T has a different level of risk from the local exchange carriers. What it actually shows is that AT&T appears to have the same level of risk as the local exchange carriers, suggesting that access and long-distance have the same level of risk. The only company with a different level of risk is Sprint, and there may be many causes of its different beta.

5. Use of fundamental analysis

5.1 Ofcom's use of fundamental data

In addition to evidence from the betas of traded shares, Ofcom discusses estimates of the relative income elasticities of demand of access and call services. Ofcom's summary of the evidence on income elasticity is:

‘For example, *The Future of the Telecommunications Industry: Forecasting and Demand* by David G Loomis and Lester D Taylor (Eds) and *Telecommunications Demand in Theory and Practice* By Taylor LD (1994), summarise a number of academic articles relating to forecasting the demand for telecommunications services. In these books, a large number of studies carried out over three decades in North America and Europe showed that, on average, the income elasticity of demand for access is significantly lower than the corresponding elasticities for various call types.’

As far as I can tell, neither of the two books cited by Ofcom contains consistently estimated income elasticities for calls and access from which one could quantify the difference in elasticities. Therefore, even apart from the difficulties with this approach that are discussed below, it is not clear how Ofcom is drawing a quantitative inference from its qualitative observation.

5.2 Fundamental analysis of asset betas

Under a very restrictive set of assumptions, the beta of an asset can be related to its fundamental determinants by the expression:²⁰

$$\text{Beta}(\text{assets}) = \text{Beta}(\text{revenue}) * [1 + \text{PV}(\text{fixed cost}) / \text{PV}(\text{asset})]$$

The relevant measure of revenue elasticity in this expression is the

²⁰ See, for example, Brealey and Myers (2003) page 238.

revenue beta. This measures the responsiveness of revenue to the level of the stock market. It is related to the income elasticity that Ofcom discusses. However, the link between them is not direct, and the magnitude of difference in the revenue beta caused by a particular difference in income elasticity is unclear.

The difficulties in translating a difference in income elasticity into an operational estimate of an asset beta are huge. They include:

- Risk arising from fundamental factors is only part of measured beta risk.
- Risk differences along one dimension do not take into account differences along other dimensions.
- It is not clear how much weight to give differences along one dimension of risk relative to similarities such as industry, type of regulation and nationality.
- The above expression assumes that risk is not changing over time.
- The expression assumes that cash flows are perpetuities.
- The relevant revenue beta is the beta with respect to stock market prices, not with respect to GDP or personal income. Risk measures based on macroeconomic variables explain only a small part of stock market betas.
- The elasticity measure that should be estimated is the elasticity of expected future cash flow with respect to expected future aggregate corporate cash flow.
- A short-run elasticity measure will not capture the long-run income elasticity of demand, which may have more effect on stock market betas.
- Assets may differ in their cost structures and this will also affect beta.
- The cost structures of disaggregated assets are very hard to measure because of common costs.
- Other factors, such as regulatory risk and technological change, may affect asset betas differently for different assets. If they will be different in the future from the period of measurement of the income elasticities, the relative betas should be adjusted for this.

Many of these problems amount to the same thing. The past short-run income elasticity of demand is only one element of many that determines the beta of an asset. Analysis of this one dimension omits the influence of all other factors. It is not clear how much weight to give differences along this one dimension relative to other characteristics of the assets and call assets. For instance, they have important similarities, such as

industry, type of regulation and nationality. Nor is it clear how to translate a quantitative difference in income elasticity into a quantitative difference in betas.

One context in which to view Ofcom's attempt to draw inferences about beta from fundamental data is other empirical attempts to relate actual betas to fundamental variables. Some variables that have been used to estimate 'fundamental betas' are:²¹

1. Dividend or earnings growth
2. Size
3. Share turnover
4. P/E ratio
5. Book value/ market value
6. Earnings variability or beta
7. Financial gearing
8. Capital intensity
9. Dividend yield
10. Operating gearing
11. Revenue variability and beta

The income elasticity of demand appears in this list only to the degree that it is related to the revenue beta and earnings beta. However, these variables do not empirically dominate the other variables listed above in explaining actual share price betas. And the aggregate information about risk contained in all the variables listed above combined is less than the information contained in the share price alone.

Even if these variables do explain betas, there is a further difficulty in using them to estimate betas. The relationship must be calibrated, so that a difference in one of the variables can be translated into a difference in beta. This is done empirically. There is no reliable theoretical way of making this transformation. I am not aware of any empirical calibration of the relationship between income elasticity of demand and asset beta.

There is an additional difficulty in the case of telecommunications. These fundamental variables explain risk best in relatively stable environments. The changing regulatory and technological environment of telecommunications means that the risk of the copper access assets is unlikely to be constant over time.²² To quote the Chief Executive of

²¹ See Foster (1986), Watts and Zimmerman (1986) and Conine (1982).

²² This is given by Franks et al (1985) (page 268) as one of the major problems in estimating divisional risk.

Ofcom:²³

‘In five years time, no one is going to be talking about voice regulation. In five years time it will probably be a free product or bundled in with other services.’

It might seem that this problem can be avoided by simply concentrating on the next regulatory period, where such changes may have a lesser effect. However, the asset values at the end of that period will reflect risks that extend into the future. Unless these asset values are set in a way that insures against all future risks, the problem of changing risk beyond the end of the current regulatory period will remain.

5.3 Use of fundamental analysis: Conclusions

There are many difficulties with using the qualitative evidence on income elasticities of demand to estimate the asset beta of the copper access assets. Ofcom’s observation about the relative income elasticities of call and access revenues is merely suggestive of a possible difference in asset betas. It does not prove such a difference and gives no indication of the size of the difference. It may be that the many other factors that affect betas operate in the opposite direction, or that the influence of the short-term historical income elasticity is very small. In particular, three primary determinants of asset betas are industry, type of regulation and location. The access and call assets share these characteristics and this may mean that they have very similar betas.

There is a possibility that the relative income elasticities of demand of the copper access assets may affect their beta. However, the chain of logic from one to the other is long and involves four essentially empirical steps: estimating the relative income elasticities for the copper access assets and the other assets, seeing how this affects revenue betas, translating the difference in revenue betas into a difference in theoretical asset betas, and then translating the difference in the theoretical asset beta into a difference in actual asset betas. All these steps are highly problematic and Ofcom presents no evidence about any of them.

6. Should Ofcom (or BT) use different rates for different assets?

In principle, each group of assets has its own level of risk and required return. If it is possible to reliably estimate different rates for different

²³ Stephen Carter, Chief Executive of Ofcom, quoted in the *Financial Times* of 30 November 2004.

asset groups, they should be used as asset-specific required returns. Doing this avoids the types of errors illustrated by Figure 8 of the Ofcom report.

However, if the required return cannot be reliably estimated and instead a guess is used, it introduces another type of error. Then the randomness induced by the guess will cause mistakes at least as important as those discussed by Ofcom. For instance, if a subset of assets is guessed to have a lower rate of return on the basis of very little evidence, then there is a significant chance that this rate will be too low. If such an investment is made at too low a rate, then it will destroy shareholder value. Therefore, the question is not whether, in principle, the rate of return should be different for different assets, but whether there is, in practice, enough information to do so reliably.

In my opinion, there is no direct evidence that the copper access network has lower risk than other BT assets. In my opinion, the indirect evidence that Ofcom provides based on the share prices of UK utility companies is not relevant to the estimation of an asset beta for the copper access assets. Ofcom effectively states the same conclusion.

Ofcom interprets the evidence from US telecommunications companies as showing that the companies it classifies as long-distance carriers, AT&T and Sprint, have higher asset betas than the companies it classifies as local access companies. Ofcom's analysis ignores differences caused by regulation, it does not split the operations cleanly between the two types of assets, and it does not take account of the rapidly changing structure of the US telecommunications industry. Even if one ignores these difficulties, Ofcom interprets the evidence as showing that AT&T has a different level of risk from the local exchange carriers. What it actually shows is that AT&T appears to have the same level of risk as the local exchange carriers, suggesting that access and long-distance have the same level of risk. The only company with a different level of risk is Sprint, and there are many possible causes of the difference beta of Sprint. Therefore, this provides little evidence that the asset beta of the copper access network of BT is lower than the other assets of BT.

Ofcom's observation about the relative income elasticities of call and access revenues is suggestive of a possible difference in asset betas. However, it does not prove such a difference and gives no indication of the size of the difference. It may be that the many other factors that affect betas operate in the opposite direction, or that the influence of the short-term historical income elasticity is very small.

None of the above proves that the risk of the copper access assets is the same as that of the other assets of BT. It is just that there is no reliable evidence on which to base an estimate of the difference. In the absence of such evidence, any adjustment to the asset beta of the copper access assets is, essentially, a guess.

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APPENDIX: REASONS PREVIOUSLY GIVEN BY OFCOM FOR COPPER ACCESS TO HAVE A LOWER BETA

A1. Introduction

In 2004 Ofcom foreshadowed the possibility of using a different rate of return for the copper access network. According to Ofcom at that time, there were three characteristics of the copper access assets that made it worth considering whether their risk differs from the other regulated assets. These were:²⁴

- the copper access network is already in the ground,
- little new investment is required in the copper access network,
- the copper access network is not contestable by competition.

This Appendix discusses the evidence on whether these are valid reasons to use a different beta for the copper access assets.

A2. The impact of the fact the copper access network is already in the ground

The risk of an investment is determined by the risk of its future cash flow stream. If the assets required to run an operation are already ‘in the ground’ it does not affect the risk of the investment unless it affects the risk of the future cash flows. To see this, consider the situation when an asset is about to be bought. At that stage, the cash required for the investment will be treated as a known immediate cash flow and will not affect the required return used to evaluate the future cash flows. The required return will depend only on the characteristics of the future cash flows.

The situation will be exactly the same once the asset has been purchased. The required return will be the same as it was before the asset was purchased. It will still be determined by the characteristics of the future cash flows. So the required return is the same before and after the asset has been purchased. Therefore, there is nothing that arises directly from the fact that an asset is ‘already in the ground’ that should affect its required rate of return.

²⁴ Ofcom (2004c) sections 7.15-7.19.

A3. The impact of the level of investment required

The level of future investment required to maintain an asset does not directly affect its beta. However, future investment needs may be part of the fixed costs needed to sustain an asset and generate its future revenue stream. As such, they may affect the operating gearing of the asset and, through this, its asset beta. If the copper access assets have lower future investment needs than the other assets of BT, then this may affect their relative beta.

There are at least five problems with estimating the impact of this on the relative asset beta of the copper access assets compared with the other assets of BT:

- It depends on also knowing the future investment needs of the other assets of BT.
- The operating gearing that matters is the entirety of fixed costs for a particular revenue stream. Other fixed costs may have an effect that goes the other way. For instance, the maintenance costs of the copper access assets are relatively fixed.
- For some common costs it will be impossible to disentangle whether they arise from the copper access assets or other assets.
- The relative asset betas also depend on the revenue betas of the assets.
- Even if lower future investment does translate into lower operational gearing, and this is not offset by differences in revenue betas, translating this into an adjustment in the asset beta involves many measurement problems discussed in section 5.2 above.

In conclusion, there is a possibility that the 'low' future investment needs of the copper access assets may affect their asset risk. However, the chain of logic from one to the other is long and involves four essentially empirical steps: estimating the relative amount of future investment for the copper access and the other assets, seeing how this affects the total fixed costs, measuring revenue betas and asset values in order to incorporate the operating gearing into a formula for the theoretical asset beta, and translating the difference in the theoretical asset beta into a difference in actual asset betas. All these steps are highly problematic and Ofcom presents no evidence about any of them.

A4. The impact of competition (and regulation)

Ofcom suggests that the lack of contestability of the copper access market may affect its beta. It is sometimes asserted that competitive or contestable businesses have higher betas than monopolies. For instance, Alexander, Mayer and Weeds (1996, page 18) state, in their survey of the risk of regulated businesses for the World Bank:

‘The degree of market risk involved in holding a company’s shares is likely to be influenced by the level of competition in the relevant industry. A monopolistic firm has more power than a competitive company to pass unavoidable cost changes on to consumers and it is therefore less exposed to business risks. It would therefore be expected that a monopoly firm would have a lower beta coefficient than a competitive firm operating under otherwise similar circumstances.’

This conclusion may appear so reasonable that it is not worth debating. However, its conclusion is by no means clear.

First, the analysis is theoretically problematic because the type of risk being considered is not clearly the type of risk that should affect beta. Only economy-wide shocks affect beta, since other shocks are diversifiable. Competitive shocks involve, by their nature, primarily a reallocation of cash flow between competitors rather than a general shock to the economy.

Second, it is not clear whether the industry being referred to is regulated or not. If it is regulated, the conclusion that it has a lower level of risk than a competitive industry is not at all clear. If all participants in a competitive industry receive a general cost shock, it is not clear that this will be passed on to the consumer less in a competitive than in a regulated monopolistic industry. In particular, if the monopolistic industry is regulated in a way that mimics the effects of competition, there should be no difference in their betas. It is possible that Alexander et al are considering an unregulated monopolistic industry. If so, their argument and others like it, have no relevance to a regulated monopolistic industry.

Because the theoretical argument is suspect, the question becomes essentially empirical. Here the evidence is clearer. As discussed in section 4.2 above, the average asset beta across all industries is about 0.7, because the average equity beta is, by definition, one, and the average amount of debt is about 30%.

Alexander et al (1996) gives estimates of the asset betas of that arise, on average, from different regulatory regimes. These are shown in Table A1.

Table A1: Average asset betas for different regulatory regimes

	Average asset beta
High-powered	0.71
Intermediate	0.60
Low-powered	0.32

Source: Alexander, Mayer and Weeds (1996).

There are two important points about this table. The first is that the asset beta depends enormously on the regulatory regime. Therefore, it is incorrect to discuss the effect of monopoly on the cost of capital without reference to the way that the monopoly will be regulated. The second is that the average asset beta for the high-powered regulatory regimes is 0.71. The average asset beta for all companies is also about 0.7. The empirical evidence from these authors is, therefore, that high-powered regulation of the type used in the UK results in an asset beta that is the same as that for competitive industries.

Similarly, the conclusion of the National Audit Office/NERA (2002) is:²⁵

‘Overall, whilst the conventional wisdom may say that price regulation reduces the market risk to which a utility is exposed, recent literature on regulatory risk exposes such factors as regulatory lag, imperfect price adjustment mechanisms, imperfect information and inconsistency that it is argued can actually increase the cost of capital for regulated utilities above that which would be observed in competitive conditions.’

In conclusion, there is no theoretical argument or empirical evidence that says that monopoly, *combined with regulation*, results in a lower asset beta than competition. This is especially true if the regulation is high-powered, of the type practiced in the UK.

²⁵ Page 55.