Report for Ofcom

Final report

Alternative methodologies for the valuation of BT's duct assets – Public version

2 March 2010

Ref: 18435-94

analysys mason

Contents

1 Introduction 1

2 The valuation of regulated assets 2
2.1 Asset valuation and its regulatory role 2
2.2 Asset valuation methodologies 3
2.3 Roll-forward methodologies 8
2.4 Ofcom's current asset valuation methodology 13

3 Analysis of methodologies 14
3.1 Key characteristics of BT's duct network 14
3.2 Principles for the analysis of methodologies 16
3.3 Analysis of methodologies 19
3.4 Optimisation 29
3.5 Depreciation 32
3.6 Roll-forward methodologies 36
3.7 The use of indices 39

4 Recommendations and conclusions 45

Analysys Mason Limited
Bush House, North West Wing
Aldwych
London WC2B 4PJ
UK
Tel: +44 (0)20 7395 9000
Fax: +44 (0)20 7395 9001
enquiries@analysysmason.com
www.analysysmason.com
Registered in England No. 5177472

1 Introduction

This document is the final report for a project carried out on behalf of Ofcom to examine alternative methodologies for the valuation of BT's duct assets. Ducts are pipes laid in the ground through which telecoms cables can be deployed. They form a sizeable part of the capital cost of BT's network.

BT currently prepares and publishes Regulatory Financial Statements (RFS) on an annual basis, which are used by Ofcom in various regulatory and pricing decisions. These RFS are prepared on a current cost accounting (CCA) basis, which typically values assets at their net current replacement cost. BT has recently recalculated the 2009/2010 value of its duct assets under CCA, using new assumptions and data, resulting in a 36% increase in the gross and net replacement cost of the ducts. This has important implications for key regulatory decisions, and we understand Ofcom is examining this revaluation separately from this project.

Ofcom is examining alternative approaches to the valuation of BT's duct assets, specifically for use in charge controls for regulated services (the full methodology currently used by Ofcom is complex – please refer to Section 2.4 for more details).

The remainder of this document is laid out as follows:

- Section 2 describes the different asset valuation methodologies available, and describes their key characteristics.
- Section 3 presents our analysis of these asset valuation methodologies, and their appropriateness to BT's duct assets.
- Section 4 presents the conclusions and recommendations arising from this.

2 The valuation of regulated assets

In this section we first describe the concept of asset valuation and its role in wholesale pricing decisions, before presenting the framework used to classify the different methodologies. We then discuss the main methodologies for setting the initial value of the asset and for rolling it forward, and conclude with a comparison with Ofcom's current methodology.

2.1 Asset valuation and its regulatory role

A good understanding of the value of regulated assets is necessary for a number of important regulatory decisions. One of the most important of these is the regulation of charges for wholesale access by alternative operators to specific services or pieces of infrastructure. These services include, for example:

- wholesale line rental (WLR)
- local loop unbundling (also known as metallic path facility, MPF) – access to the last mile copper access network which is partly deployed in ducts
- and potentially regulated access to the underground duct network itself.

Broadly, when setting regulated wholesale charges regulators balance a number of factors, including the need for BT to earn a reasonable return on its investments, and the need to stimulate competition and new market entry by alternative operators. Regulated charges are set according to the following general process:

- First, the initial value of the asset is calculated using one of the methodologies presented later in this report.

- Next, this value is rolled forward every year. This means the initial value calculated as above is updated. Some methodologies do this in a relative sense, by calculating an adjustment to the initial asset value every year. Other methodologies recalculate the value of the asset each year, as has been done during the first stage.

- The resultant asset value is then used to calculate a regulated charges based on a certain allowed return on investment, or cost of capital. This stage also includes allowances for other factors, including depreciation and the operational expenditure involved in the management of the asset.

Although the final stage is a crucial element of the charges regulation process, the focus of this report is on the first two steps – the calculation of the initial asset value, and the roll-forward of that value over time.

2.2 Asset valuation methodologies

There are a wide range of methodologies that can be used to value an asset, and these produce different results, depending on their outlook. For example, the price paid for an asset in the past, the asset's current replacement cost, and the value of future cash flows produced by the asset are not necessarily the same. Please refer to sections 2.2.2 to 2.2.4 for more detail. We have compiled a list of these based on our own experience, and a review of methodologies used by regulators around the world. The initial list of methodologies considered is as follows:

- Historic cost accounting / Depreciated historic cost
- Un-depreciated current replacement cost
- Depreciated current replacement cost
- Modern equivalent assets / Optimised replacement cost
- Depreciated optimised replacement cost
- Net present value of future cash flows
- Proxy asset valuation
- Based on sale price
- Market capitalisation.

A number of these methodologies share certain characteristics. As such, it is useful to group similar methodologies according to these characteristics. To do this, we have created a framework into which we classify the methodologies. We then go on to describe the methodologies in more detail.

2.2.1 Framework for the classification of methodologies

The key areas where the asset valuation methodologies differ are as follows:

- The valuation basis of the asset. That is, whether the valuation methodology sees the asset as:
  - a real past transaction (historical);
  - a replacement for an existing asset, valued at the cost to provide the same functionality today (replacement cost);
  - or whether it views the assets in financial terms as an investor would, as a source of future cash flows.

- Whether the valuation methodology optimises the asset before calculating its cost. That is, whether the methodology takes the assets as they are and then assigns a valuation to them, or if the number, capacity or topology of the assets are first adjusted to assume an efficient deployment, before a value is assigned.

- Whether the valuation methodology depreciates the asset in order to arrive at a valuation. That is, whether the value of the asset is reduced in some way to take account of the fact that it was deployed at some time in the past: in that case, its useful life reduces as time passes, and a proportion of its initial cost is recovered every year through some form of depreciation

This leads to the following categorisations:

Basis of valuation Methodologies may be:

- Historical
- Current
- Financial.

Optimisation Methodologies may be:

- Optimised
- Un-optimised

Depreciation Methodologies may be:

- Depreciated – these consider the investment to have occurred over a period of time (usually the actual construction cycle)
- Un-depreciated – in practice, 'undepreciated' models work from a gross replacement cost and are in effect based on very rapid (or single-year) construction; to set annualised charges they need to use annualisation methods such as annuity, tilted annuity, or economic depreciation.

This leads to the following classification of the above methodologies:

Methodology	*Valuation basis*	*Optimisation*	*Depreciation*
Historic cost accounting	Historic	Un-optimised	Depreciated
Un-depreciated current replacement cost	Current	Un-optimised	Un-depreciated
Depreciated current replacement cost	Current	Un-optimised	Depreciated
Modern equivalent assets / optimised replacement cost	Current	Optimised	Un-depreciated
Depreciated optimised replacement cost	Current	Optimised	Depreciated
Net present value of cash flows	Financial	n/a	n/a
Proxy asset valuation	Financial	n/a	n/a
Sale price	Financial	n/a	n/a
Market capitalisation	Financial	n/a	n/a

Figure 2.1: Classification of asset valuation methodologies [Source: Analysys Mason]

2.2.2 Historic cost methodologies

Historic cost accounting (HCA) / Depreciated historic cost (DHC)

This methodology values assets at the cost at which they were acquired, using actual historical transaction data. This may either be through a purchase of the asset, or through construction – in which case costs incurred during construction can be capitalised according to the relevant accounting standards. Examples of the costs that are capitalised include labour, materials and services purchased during the construction of the asset. The asset is then depreciated over its assumed useful life using standard historic cost accounting methodologies. This methodology has been used for setting the initial asset valuation in the US electricity distribution industry.

2.2.3 Current cost methodologies

Several methodologies aim to determine the current cost of an asset. These methodologies differ from each other in numerous ways. They may be:

- optimised or un-optimised,
- depreciated or un-depreciated, as discussed above.

In addition, they may be based on absolute valuation or indexing. That is, the initial valuation of the asset can be determined according to current prevailing asset prices (absolute valuation), or the valuation of the asset can be determined by applying an index of price growth or inflation to a previous year's valuation.

Strictly speaking, current cost accounting values an asset at:

Current cost = min (replacement cost, recoverable amount),

where recoverable amount = max (present value of future cash flows, market value).

The recoverable amount term is a financial valuation and is relevant in situations where the asset value is impaired (e.g. an alternative technology has arisen that limits the ability of the asset to generate revenues). However, it is (for the reasons discussed in section 2.2.4 below) not possible to estimate in this case.

Accordingly in this case "current cost" is only practicable if equivalent to "current replacement cost". In the following, we use the term "current replacement cost" for additional clarity.

Un-depreciated current replacement cost

This methodology values assets at their replacement cost. No optimisation is used – for example, the network topology is not altered to remove unused assets. In practice, the historical quantities are retained (less any assets retired in the year) and the unit costs may either be calculated from actual prices or by indexing past prices by a suitable index, such as the general inflation rate (Consumer Price Index (CPI), or Retail Price Index (RPI)), or by an industry-specific or technology-specific inflation index. This methodology does not take account of the age of the asset, as it does not include depreciation – as such, it assumes a rapid or single-year replacement build.

Depreciated current replacement cost (DCRC)

Assets are valued at the cost of purchasing similar assets (of a similar age and technology).The key conceptual difference between this method and un-depreciated current replacement cost is that its depreciated value is based on the actual age profile of the asset, rather than assuming a rapid or single-year build, as in the case above. Theoretically, no calculation required to obtain this value if such assets are traded, because it is based on a market price for the assets. Accordingly, this methodology implies a level of depreciation equal to the decline in value of old assets from their time of purchase. However, in practice this can be difficult, since old assets are not always traded. This is particularly the case with BT’s duct. For this reason, this methodology usually involves uplifting the historical cost of the asset in the gross book and net book valuations by an inflation index, or equivalently by the ratio between current and historic unit costs.

Modern equivalent asset (MEA) / Optimised replacement cost (ORC)

This methodology values assets at the cost of purchasing new assets to perform the same function.[1] Technological change is accounted for, as the assets are valued at the cost of purchasing the most modern technology to fulfil their function at any point in time. It is also optimised to reflect either today’s capacity requirement, the geographical distribution of customers, or both.[2] As an example, the initial asset value in the German electricity transmission and distribution market was determined based on this valuation methodology. In addition, this methodology is widely used in the telecoms industry, for example as part of mobile termination cost models.

Depreciated optimised replacement cost (DORC)

This methodology, in a manner similar to MEA / ORC, values assets at the cost of purchasing the optimal configuration and level of assets to perform the necessary functions. However, it also depreciates the asset values according to the age of the existing assets.

2.2.4 Financial methodologies

Financial methodologies are forward-looking: they aim to value assets based on the future cash flows they will generate, or using a proxy that reflects, at least in theory, these future cash flows. Although they are widely used to determine the value of companies as a whole, they are less well suited to value a specific asset.

---

1 There is a conceptual issue here because duct is built to carry telecoms cables, and it is the total cost of the system (capital and operational expenditure) which ought to be minimised. Different cable technologies (e.g. fibre) or deployment styles (e.g. less ‘tapering’ (where the number of pairs in each cable decrease as we move towards the edges of the network), fewer joints, more cable sheaths) could lead to slightly different requirements for duct layout, so optimising duct in isolation from the cable network is not appropriate.

2 In theory it would be possible to have an un-optimised modern equivalent asset, for example using new duct designs in the old locations, but this seems a rather odd choice given that a rebuild with modern materials would be able to choose not to build redundant routes. It might be justifiable if the redundant routes were thought to be as a result of demand evolution over time rather than inefficient past decisions.

In the context of setting the values of specific assets, financial methods require that either the specific asset is responsible for all of its owner's cash flows, or that the cash flows accounted for by the specific asset can be easily separated from those of the company as a whole.

Net present value (NPV) of future cash flows

The asset is valued at the net present value of the future cash flows generated over the lifetime of the asset, discounted by the cost of capital (either the cost of capital of the company or for this specific investment). This methodology explicitly accounts for all operational and capital expenditure required to maintain the asset, as well as the cost of financial capital tied up in it. It does, however, require long-term forecasts of the cash flows generated by the asset.

Sale price

The sale price approach is useful in the case of newly privatised companies or recently traded assets. The value of the asset is taken to be equal to the market valuation of equity plus net debt, at or shortly after launch. Cash balances are excluded as they are remunerated via interest receipts, and so do not require additional remuneration. In practice, this method uses the valuation of the entire company that owns the asset to value the asset itself. This is most appropriate for companies that are made up substantially of one single asset – otherwise adjustments must be made to account for other assets owned by the company. This approach was adopted in the Great Britain to determine the initial value of assets in the electricity, gas and water industries, and in Northern Ireland for the electricity industry.

Market capitalisation

The market capitalisation approach is similar to the sale price approach but is used for companies already possessing a stock market listing. The value of the company is set at the market valuation of equity plus net debt at some specified point in time, or as an average over a period of time.

Proxy asset valuation

This methodology uses the sale price or market capitalisation of a different asset that is similar enough to act as a reasonable proxy for the regulated asset. This might be a listed company operating in a similar market under similar conditions, or a recent past transaction that involved a similar asset. Proxy asset valuation was used by the UK postal regulator, Postcomm, to set the value of Royal Mail, which remains publicly owned.

2.3 Roll-forward methodologies

As discussed above, roll-forward methodologies seek to update the value of the regulated asset on a regular basis (usually annually). In the following, we discuss the various roll-forward methodologies that are commonly used in regulated industries.

2.3.1 The elements of roll-forward methodologies

The initial value of an asset – the *regulated asset base* (RAB) or *regulated asset value* (RAV) – is first determined using one of the methodologies presented previously. It is then rolled forward over time in a way that captures one or more of:

- Capital expenditure: Additions and improvements made to an asset over time increase its value, while retirement of assets decrease it. Different roll-forward methodologies account for these additions and improvements in different ways.
- Depreciation: Methodologies differ according to how – and whether – they treat the impairment of assets over time, and how they account for recovery of costs in the past.
- Inflation: Certain methodologies account for inflation in the rolling forward of the asset valuation. The key question here is the appropriate index of inflation to use. There are a number of indices available in the UK that track inflation in construction materials and labour, which may be appropriate for duct assets.

The RAB / RAV may be reset at the beginning of each charge-control period according to the methodology for determining its original value, or it may be rolled forward in perpetuity. Again there are several approaches used to account for each of these elements, with implications for the cost allocation over the lifetime of the regulated asset.

Below, we discuss the different methodologies for rolling forward the valuation of the asset. Theoretically, these may be combined with any of the above asset valuation methodologies. However, in terms of logical consistency, only certain combinations make sense. This point is discussed in more detail below, in section 3.6.

2.3.2 Methodologies to account for capital expenditure

The use of capital expenditure in the rolling forward of an asset's value is relatively simple. It involves increasing the asset value by the amount of capital expenditure made in the period, and reducing it by the value of the assets disposed of during the period. The expenditure and asset disposal are typically valued in cash terms (in the current year, current and historic costs are the same).

2.3.3 Methodologies to account for depreciation

There are numerous ways to account for depreciation in rolling forward asset valuations.

- **Accounting methods**. This can be done on an accounting basis, in which the cost of the asset is allocated over an assumed useful life for the asset. This approach is typically used with historic cost methodologies, but can also be used with other methodologies. It does not account for the cost of capital tied up in the asset, which is usually added as a separate term (return on capital employed) in the capital charge part of a calculation of a regulated charge. Current cost accounting methods also have supplementary depreciation, which allows for the change in the asset valuation. This can be negative (if the asset has appreciated in value) or positive (if it has declined in value, e.g. because input unit cost trends are negative). Financial capital maintenance methods also subtract (add) holding gains (losses) from (to) the depreciation charge.

- **Economic depreciation**. The annual cost that economic depreciation associates with assets deployed by the business is calculated as the difference in the earning potential of the asset between the beginning and the end of the year. In practice, it has often been implemented by seeking a unit cost value that will return the same NPV of cost-trend-weighted output as the actual cash flows (capital and operational expenditure) over the life of the network or asset. In the case of constant demand and constant operating costs, this implementation gives the same result as a tilted annuity. Economic depreciation differs from traditional accounting depreciation methods in a number of key ways:
  - Economic depreciation takes a holistic view of cost, including not only the repayment of capital investment in assets, but also the financing of that capital (cost of capital), and the costs of operating those assets (operational expenditure).
  - It aims to recover all of these costs through a charge-per-unit-output that evolves smoothly over time in a manner that is consistent with the total costs of production.

The total cost recovered in each year through economic depreciation is therefore proportional to the level of output achieved in each year (all other things being equal). If there are unit cost trends, these can also be incorporated (as ‘tilts’).

2.3.4 Methodologies to account for changes in asset values

Conceptually, there are two ways to account for the effect of inflation on the valuation of an asset. These coincide with the different ways to calculate the replacement cost of an asset. Absolute asset unit costs may be updated on a yearly basis. Alternatively, the asset value may be inflated using an index – either a general index that accounts for inflation in the broader economy, such as the Consumer Price Index, or an index that accounts for industry-specific costs.

The different types of valuation method treat these changes in significantly different ways

- Historical cost methods do not make such an allowance.
- For financial methods, the impact of changes in asset values will only come through if it is reflected in the future cash flows.
- Finally, current cost accounting methods do make such an allowance: they allow the net asset value to change, with (compared to HCA) additional supplementary depreciation and backlog correction terms in the depreciation. As noted above, there are two major subdivisions within CCA accounting methods:
  - Financial Capital Maintenance (FCM), which seeks to maintain the value of the originally invested capital. FCM has historically been used for BT's regulatory accounts.
  - Operating Capital Maintenance (OCM), which seeks to maintain the operating or output capacity of the asset.

The significant difference between these is that in FCM, the holding gain (loss) is subtracted from (added to) the CCA depreciation. As a result, under FCM, the annual charges are higher than OCM if the asset value is declining, and lower if the asset value is increasing.

The differences between the charges under FCM, OCM and HCA are illustrated in the following three figures using hypothetical asset values, useful life and asset price trend which are the same in each case. The figures show the case for asset prices that are increasing, which is relevant when considering ducts. In the FCM case the charge has the holding gain subtracted.

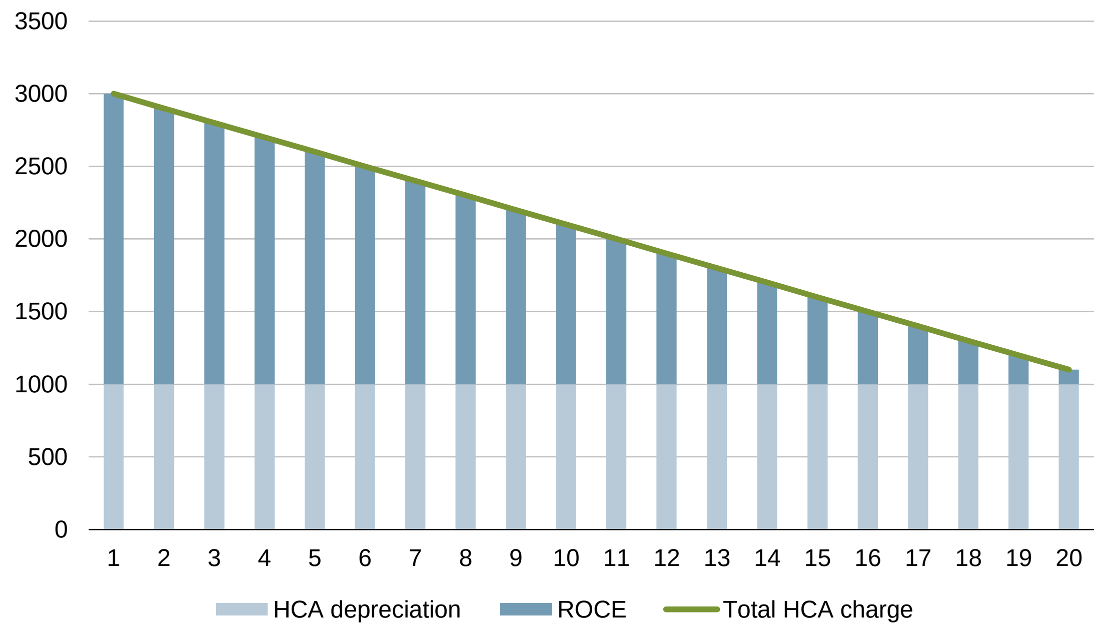

Figure 2.2: Charges under HCA [Source: Analysys Mason]

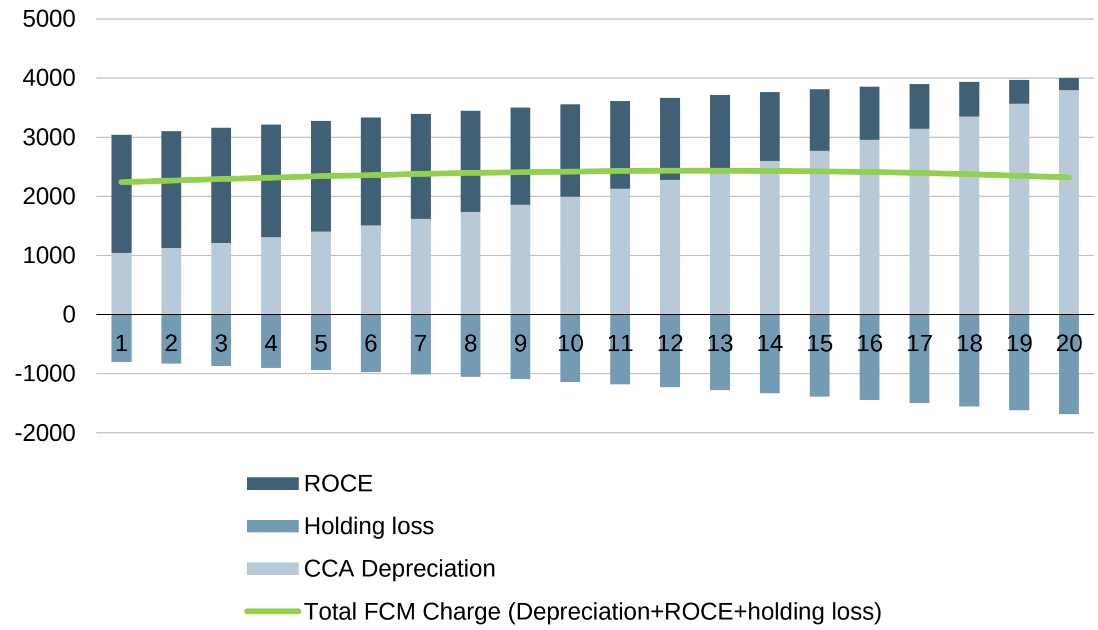

Figure 2.3: *Charges under FCM [Source: Analysys Mason]*

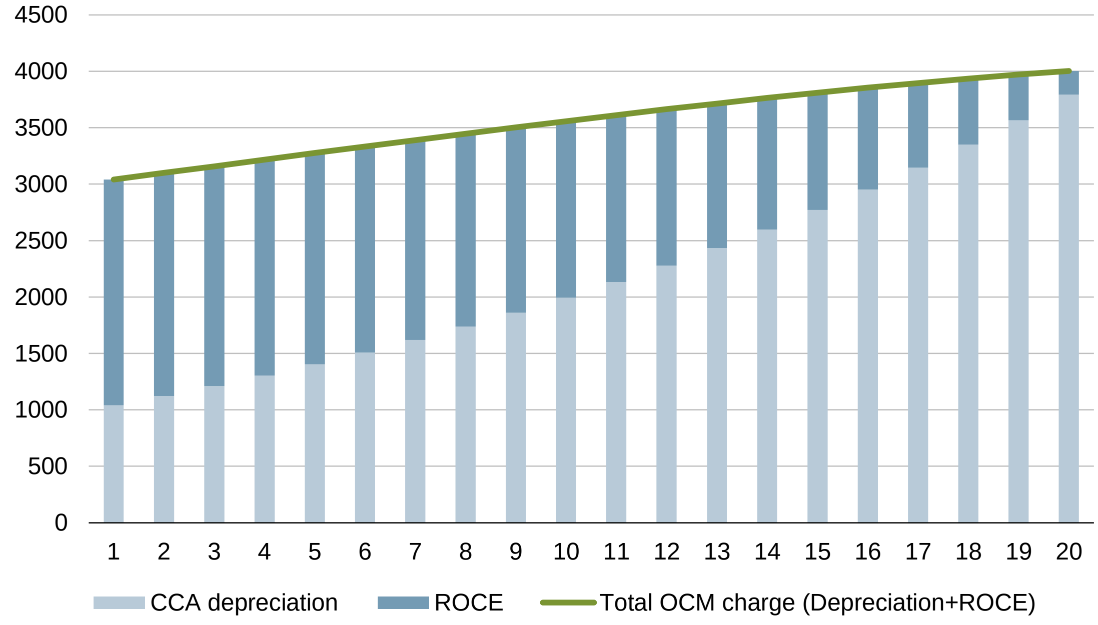

Figure 2.4: *Charges under OCM [Source: Analysys Mason]*

The net effect of the different charges between OCM, FCM and HCA in the illustrative case where there are holding gains is illustrated below, in Figure 2.5.

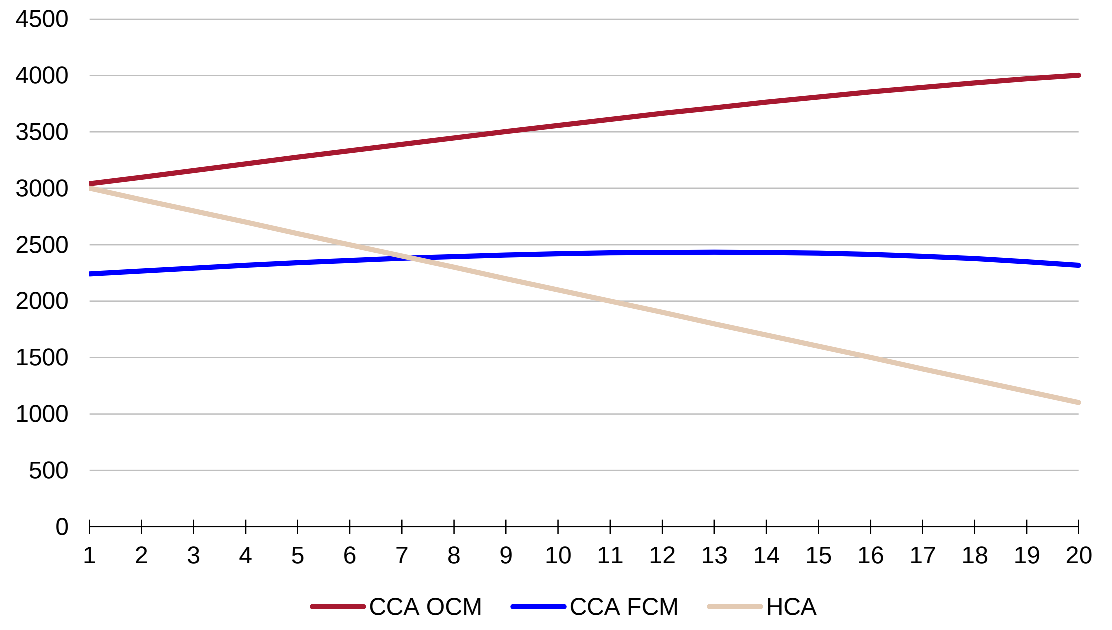

Figure 2.5: Comparison of OCM, FCM and HCA charges [Source: Analysys Mason]

2.3.5 Another roll-forward methodology: the infrastructure renewals charge (IRC)

This approach is appropriate for long-lived assets whose useful lives are difficult to assess accurately and that tend to be repaired or renewed rather than completely replaced. Assets are funded on a 'pay-as-you-go' basis, assuming that they are always maintained at a constant level. This methodology is used by Ofwat, the regulator for the water and sewerage industry in England and Wales.

The IRC is intended to allow both for losses in asset value over time and for the need for asset maintenance, on the basis of retaining a constant level of serviceability for the system as a whole. It is therefore a systems approach, with no concept of individual assets. The IRC is set at the average forecast infrastructure renewals expenditure (IRE) over 15 to 20 years. The IRE is the actual amount that the company spends on renewing and maintaining the asset. Accordingly, whilst the IRC is (by design) broadly stable from year to year, the actual expenditure (the IRE), may fluctuate significantly. Differences between the IRC and IRE are accumulated in the balance sheet as accruals/prepayments and, where significant, are taken into account at the next charge control review.

In essence, the IRC approach is similar to an accounting cost method such as CCA FCM if applied to a situation in which the depreciation is equal to the average annual capital expenditure. The asset valuation will not decline, and the costs recovered will in both cases be the sum of ROCE, operating costs, and depreciation.

An IRC may be combined with a provision for inflation of the asset base, an approach taken by the Water Commission for Scotland.

2.4 Ofcom's current asset valuation methodology

Ofcom revised its asset valuation methodology in 2005 in its statement on the valuation of BT's copper assets.[3] Since 1997, but prior to 2005, Ofcom had required BT to calculate its asset values on the basis of current costs, using an absolute valuation. The asset value was rolled forward by yearly absolute revaluations, although only the valuations used in establishing charge controls directly affected the regulated prices. After 2005, Ofcom changed its methodology such that assets acquired prior to 1997 would be valued differently from assets acquired after 1997. A Regulated Asset Value (RAV) was established for pre-1997 assets. This was based on the historic cost of the assets for the 2004/2005 year. This value is depreciated according to the asset lifetime, and inflated by the Retail Price Index each year. Assets acquired after 1997 continued to be valued on a current cost basis.

3 "Valuing Copper Assets, Final Statement", Ofcom, 18 August 2005

3 Analysis of methodologies

In this section, we present our analysis of each of the asset valuation and roll-forward methodologies presented above. We do this by discussing each methodology and its fit with a set of principles we have devised. These principles include those considered by Ofcom in its 2005 review of the valuation of copper assets (the '2005 Review').[4] We begin by discussing some of the key characteristics of the BT duct network, and how it differs from other asset classes. We then describe each of the principles used in the analysis, then discuss the fit of each of the methodologies with the principles.

3.1 Key characteristics of BT's duct network

3.1.1 Duct in general

A duct is a pipe through which telecoms cables are run. Whilst the cost of the physical asset itself (the pipe) is low, the cost of the civil works to install it and replace the street surface are very substantial. The largest cost driver is therefore labour and civil works costs. These are affected by numerous factors including:

- Increasing urbanisation, which has led to an increase in the area covered by sealed roads, which are more expensive to restore.
- The fact that labour costs have increased faster than inflation in the recent past.

This increase in unit cost has been mitigated somewhat by technological improvements and certain regulatory changes. For example, a technological advance that has decreased the unit cost of duct construction is the development of trenchless construction techniques, also known as "moling". This typically involves a pneumatically-driven machine, known as a mole, tunnelling through the soil, without the need to dig an open trench. This saves costs because it reduces the requirement to cut through pavements and hard surfaces, and decreases the labour time involved.

The main regulatory changes that have affected duct construction are modifications to health and safety regulations that were enacted in 1994, and further revised in 2007,[5] and regulatory changes that encourage utility companies to coordinate their digs. Although the changes in health and safety regulations have made requirements more stringent, this has largely brought regulation in line with industry best practice. As such, the legislation itself did not cause cost increases. However, the regulatory changes that encourage utilities to coordinate their digs *have* gone some way toward reducing costs. This has been more effective for large, centrally managed works

4 "Valuing Copper Assets, Final Statement", Ofcom, 18 August 2005

5 Construction (Design and Management) Regulations 2007

programmes such as the construction for the London Olympics. This is because such works involve a centralised coordinating body. It has been less effective in terms of typical incremental construction or repairs in suburban streets, which are, in practice, typically done on a piecemeal basis by different utilities.[6] Given that the majority of BT's duct is distributed throughout the UK, away from areas such as the Olympic site, it is our view that it is unlikely that such new practices would substantially affect the valuation of the duct.

It may be noted that overall, civil works costs appear to have increased more quickly than the general rate of inflation over the past 25 years.[7]

3.1.2 BTs duct

BT's duct network has certain characteristics that set it apart from other asset classes in telecoms networks. This has a bearing on the appropriate costing methodology. A key characteristic of the duct network is that it is not readily tradable: it is a unique asset that has been installed over a long period of time in conjunction with BT's fixed telecoms network. It has never been bought or sold (other than at the point of privatisation of the whole of BT). There are other, similar, infrastructures, which may serve the same purpose. These include duct already constructed by other operators, such as Virgin Media, or Cable & Wireless. Other examples include public transport infrastructure, such as tramway electricity infrastructure, which may run through duct that is reusable for telecoms purposes. However, these infrastructures are very different in layout and reach from BT's duct network. Moreover, these duct networks have (in the main) never been bought or sold as stand-alone assets.[8] Therefore, there is no current market price.

In addition, BT's duct has been built specifically to house BT's fixed access and core networks, and therefore its layout and configuration are designed to conform with the layout and configuration of the cables that make up this network. For this reason, it is impossible to consider an optimisation of the duct network without also considering an optimisation of the cable that it contains. This has an impact on any calculation that assumes a large-scale optimisation of the network.

6 Source: Interviews

7 Source: Royal Institute of Chartered Surveyors, General Building Cost Index (GBCI)

8 Some small duct networks have been bought and sold, but these were extremely localised

3.2 Principles for the analysis of methodologies

Next, we set out the principles we use for the analysis of the valuation methodologies described above. Methodologies should:

- provide the correct economic signals for efficient decisions regarding market entry ('build-or-buy' decisions)
- ensure regulated entities are able to recover efficiently incurred costs
- be practicable
- be robust and evidence-based, for example not highly reliant on judgement
- be transparent
- be stable, in other words lead to consistent answers from year to year
- be consistent with past valuation and regulatory decisions.

These principles may conflict to some extent and therefore they need to be weighed and traded off against each other. We discuss each of these principles in more detail below.

3.2.1 Provision of efficient economic signals

A methodology should provide the correct economic signals to alternative operators and potential new entrants regarding decisions whether to build their own networks, or rely on access to BT's infrastructure. That is, a methodology should result in regulated charges that cause an efficient allocation of capital to network investments – neither encouraging inefficient entry, nor discouraging efficient entry.

Incentives for efficient entry or network replacement

In practice, a service provider or network operator would 'buy' rather than 'build' if the annualised cost of purchasing the wholesale service were less than the annualised cost of constructing its own network (considering the future stream of revenues it forecasts – including the opportunity to receive wholesale revenues on its own network). In practice, this sets a ceiling price for duct access of the stand-alone current replacement cost,[9] which would deter inefficient building of parallel networks.[10] The opportunity for geographical cherry picking (i.e. building in certain areas and buying in others) complicates this issue slightly, but is not of major importance for charge controls on MPF and WLR as the duct input to these products is national.

Any price which did not cover historic costs would disincentivise future construction (especially by the regulated party). Prices below the current replacement cost could disincentivise future

[9] Or a share of this cost, if there were many potential users.

[10] We are considering a single wholesale product (like duct); a situation in which multiple products at different points in the value chain could be built or bought may be more complex.

construction in two ways. First, by creating additional regulatory risk.[11] And second, by giving an advantage to operators which have not built network in the past (or alternatively by devaluing the assets of those that have built in parallel with BT duct in the past, though at a later date – e.g. Virgin Media, COLT in major cities, etc.). This is to say that operators may defer investments if they believe that those investments might be stranded by the later availability of cheap, regulated wholesale access.

Allocative efficiency

From the perspective purely of allocative efficiency, pricing at incremental cost is preferred, although this has well-known deficiencies (common costs are not recovered). In practice, therefore, apart from the recent and very different example of voice termination, common cost recovery is allowed, often via mark-ups (e.g. in LRIC+ and LRAIC+, where the '+' indicates mark-ups.

The incremental costs of additional duct capacity at the point of construction are relatively low. There is also often spare capacity within existing duct, as building slightly excess capacity is much cheaper than reopening the street later. From a purely static cost perspective, it therefore would be more efficient (less total cost) for there to be only one duct network, shared by many different telecoms users (BT, Virgin and others).

However, if we consider the situation at a later date, if the BT duct could not be re-used, then both BTs incremental cost of expanded capacity (new trenches) and the cost of new build are likely to be similar. In other words, the incremental cost depends on (a) the assumed times at which the initial and the incremental capacity respectively were built, and (b) whether there is in practice spare capacity.

In any situation in which there is spare capacity, parallel construction represents excess cost in terms of static efficiency. Arguments against a single duct network include practical coordination difficulties, and the dynamic efficiency benefits of competing parallel infrastructures (not least, the strong pressure to operate efficiently that would be lost in a monopoly situation).

A price equal to the incremental cost would have the highest allocative efficiency. In practice, for reasons of cost recovery (a different criterion – see below) prices in the region of FAC (or LRAIC + common cost mark-ups) are likely to be the practical minimum.

3.2.2 Ensure operators are able to recover efficiently incurred costs

It is important that the asset valuation and roll-forward methodology does not result in systematic over- or under-recovery of the costs incurred by the regulated party. That is, the regulated party

[11] In that Ofcom has been strongly in favour of current replacement cost as a basis for regulated costing in the past; a change might therefore imply that other prices may also be changed. Reduced certainty may make investors more nervous and increase the rate of return required.

should be able, over the life of the asset, to recover all efficiently occurred costs involved in procuring and maintaining the asset, plus the cost of the capital invested in the asset, but no more.

3.2.3 Practicable

It is important that a methodology is practical to execute. For example, if it is dependent on external data, that data should exist and not be excessively difficult to obtain. Finding data can be a problem if methodologies based on market comparables are used to value unique assets such as BT's duct network.

3.2.4 Robust

It is important that, as far as possible, the methodology used for asset valuation and roll-forward calculation is based on objective and robust inputs, and provides for minimal variability in the way it is implemented. The major reason for this is that, if a methodology depends a great deal on judgements and assumptions, it is likely that a wide range of reasonable asset valuations may result from its application. Beyond the loss of stability that could result (see below), this may also cause difficulties for the regulator (in justifying the resulting charges) and the regulated party, potentially reducing its incentive to invest.

3.2.5 Transparent

The methodology, and its underlying assumptions, should be clear and well documented. The end result – that is, the asset valuation, and its rolled-forward value, should be auditable. As such, the more objective the methodology, and the less judgement required to implement it, the more transparent it will be.

3.2.6 Stable

It is important that the methodology not result in major step changes in valuation at particular times. That is, if the asset value changes substantially, or unpredictably, in response to an event such as the end of useful life of an asset, this could lead to sharp changes in regulated charges, which may cause undesirable effects. For instance, this additional risk could increase the cost of capital in the industry, or suppress new investment.

3.2.7 Consistent with past valuation and regulatory decisions

If a valuation methodology, or the way in which it is implemented, differs from past decisions this can have a significant impact. It could cause windfall gains or windfall losses. Windfall gains or losses are not intrinsically unacceptable and their acceptability will depend on their source. If such gains and losses are caused by external factors, such as a change in the price of a key input such as labour, then they reflect real economic conditions. However, gains and losses that are simply an artefact of a change in costing methodology are undesirable, as they do not reflect economic reality. More widely, operators (investors) appreciate regulatory certainty, and a stable basis for regulation assists in encouraging investment.

It may be appropriate to take into account how other similar (e.g. long-lived) or associated (e.g. cable) assets are valued in regulatory charge controls. This might imply that if a change in methodology was appropriate for duct, then a similar change should be considered for the cable asset, and vice versa.

3.3 Analysis of methodologies

Here we analyse each of the valuation and roll-forward methodologies by examining the various classes of methodology, according to the framework set out above. That is, we examine the appropriate methodologies that are:

- historic, current or financial
- optimised or un-optimised
- depreciated or undepreciated.

In certain cases, where individual methodologies within a given class perform differently, we examine these individually. From this analysis we conclude as to the appropriateness of individual methodologies. Following on from this, we examine the suitability of the different roll-forward methodologies.

3.3.1 Historic cost methodologies

As discussed above, historic cost methodologies are based on the price at which the asset was initially acquired, and in practice are usually combined with an accounting approach to depreciation.

Provision of efficient economic signals

Methodologies based on historic costs typically do not provide efficient signals for market entry. The reason for this is that under these methodologies, the asset is likely to be valued differently from current replacement costs. In the case of BT's duct, where unit costs are rising, these methodologies would value the assets at a cost that is materially below replacement cost. Given this, prices set on this basis would be lower than prices set on the basis of current replacement costs. They would deter future entry. As noted above, this has two additional effects: creating additional regulatory risk, and giving an advantage to operators which have not built network in the past (or devaluing the assets of those that *have* built parallel networks, though at a later date).

Deterring entry may be less of a concern in the case of duct than in other markets, as entry is extremely unlikely: high sunk costs and strong economies of scale mean that barriers to entry are high, and the one-off opportunity given by the exclusive cable franchises will not recur. With regard to past investors in parallel infrastructure, there are also opportunities for these past investors to enhance their offering by renting duct from BT.

As rising asset prices would cause historic costs to be lower, they could be somewhat closer to incremental costs, and are likely to lead to a result slightly closer to allocative efficiency (although they might still be far from this point).

Ensure operators are able to recover efficiently incurred costs

Historic cost methodologies enable the regulated operator to recover all such costs that it has incurred in investing in and constructing its network, since the value of the asset is determined by the money and resources spent in creating it. Therefore it does allow regulated operators to recover all costs involved in the asset. However, there is no guarantee that the costs recovered were efficiently incurred. All actual costs are included in the calculation, which includes those costs that were inefficiently incurred.[12]

However, prices set on the basis of historical cost could deter future infrastructure investment in two ways: (a) where the asset priced on the basis of historic cost was usable, 'buy' would always be preferred to 'build' as asset prices are increasing, and (b) the change in position by Ofcom would indicate additional regulatory risk.

The poor performance of historic cost methods as regards this principle might carry less weight if the network were not likely to be replaced. However, given that costs are rising, prices set on the basis of historic costs could give new entrants renting this access windfall advantages over other parties that have built infrastructure at a later date than BT (e.g. COLT, Cable & Wireless, Virgin Media).

The poor performance of historic cost methods as regards this principle might also carry less weight in parts of the network which are highly unlikely to be competitive (e.g. in rural areas where COLT, Virgin Media, etc. are not present). However, drawing the line between these competitive or prospectively competitive areas and uncompetitive areas might be subjective.

Practicable

Methodologies based on historic costs are typically highly practicable, because the valuation under these methodologies can be prepared on the same basis as company financial reports that are prepared for investors. In the case of BT's duct assets, BT already prepares a valuation of these assets under a historic cost basis for its external reporting.

An extension of this method to use historic costs only in certain geographical areas is less practical because it is unlikely that BT's historic spend is available on a highly disaggregated basis suitable to form inputs to such a method.

12 This can cause an incentive for operators to 'gold-plate' – that is, invest in unnecessary and inefficient improvements, especially if the WACC were too high.

Robust

Historic cost based methodologies are typically highly robust. There are two components of a historic cost valuation – the initial valuation of the asset, and the depreciation applied to the point in time at which the asset value is calculated. The initial valuation of the asset is prepared on the basis of actual past transactions, which have been audited and checked against verifiable external documentation. As such, there can be little dispute as to this value. There is, however, some scope for dispute regarding the level of depreciation between the point at which the asset was acquired and the point at which the asset value is calculated for regulatory purposes. This is because there are a number of acceptable depreciation methodologies. In addition, there is the potential for debate regarding the useful life of the asset, which affects the magnitude of depreciation in each year. However, financial accounting standards, which are typically generally accepted by the industry and the financial community regarding depreciation, do reduce the scope for dispute.

As noted above, historic cost methods could be used in parts of the network which are highly unlikely to be competitive (e.g. in rural areas where COLT, Virgin Media, etc. are not present). However, drawing the line between these competitive or prospectively competitive areas and uncompetitive areas might make the method less robust and stable, by increasing the subjectivity and by taking changed deployment circumstances into account.

Transparent

Historic cost methodologies are transparent: they are based on objective financial data that is typically audited by external auditors. They also do not rely on judgements or assumptions.

Stable

These methods lead to stable valuations in the short term, but in the long term the assets will need replacement and this might be at a substantially higher cost. As a result, the capital base could increase following asset replacement, and, if this asset replacement took place over a short period, the resulting valuation might change quite rapidly. Duct does indeed have an increasing valuation; but on the other hand, it is unlikely to be replaced on a large scale in a short period, so these potential long-term stability issues may not actually be highly significant.

Consistent with past valuation and regulatory decisions

As discussed above, Ofcom has previously employed current cost methodologies in its regulatory decisions, having strongly refuted historic cost methodologies in its 2005 Review. Accordingly, historic cost methods are not consistent with past decisions.

Conclusion

It is our view that methodologies based on historic costs have some significant disadvantages for the purpose of valuing BT’s ducts for regulatory charge control purposes. Despite having advantages in terms of relative objectivity and ease of execution, and the fact that they would not directly discourage investment by BT, they can somewhat discourage efficient investment in new infrastructure for the following reasons:

- parallel build by efficient new entrants would be deterred (a factor which can be overstated, as such an outcome is extremely unlikely)
- the change in treatment would increase regulatory risk
- where parallel infrastructure does exist, access at prices set using historic cost valuations would give an advantage to market players which have yet to invest in infrastructure.

Indeed, incorrect entry signals appear to be the major reason Ofcom rejected historic cost methods in its 2005 Review.

Methods based on historic cost in themselves provide no incentives to minimise spend, and therefore are subject to some risks of inefficient spending ('gold-plating').

An extension of this method to use historic costs only in certain geographical areas suffers less from the point regarding poor economic signals, but is less practical, less robust, and perhaps less stable.

3.3.2 Replacement cost methodologies

Broadly, replacement cost methodologies seek to value assets at the cost required for a new entrant to replicate the asset. The following are replacement cost methodologies:

- un-depreciated current replacement cost
- depreciated current replacement cost
- optimised replacement cost, or modern equivalent assets
- depreciated optimised replacement cost.

Here we analyse current cost methods relative to historic cost and financial methods. We analyse the merits of optimisation and depreciation as part of the asset valuation in the sections below. These methodologies can be separated into those that use *absolute valuation* and those that use *indexing*. The former estimate the current cost of the asset at a given point in time based on what that asset would cost new on the open market at the time of valuation. Indexing-based methods take the absolute valuation at a certain point in the past as a starting point, and then inflate this by an index, such as the general rate of inflation or an industry-specific rate of inflation. In essence, these are therefore absolute methods at a different date, followed by regular application of a roll-forward method. In the discussion below, we treat absolute value-based, and indexing-based approaches separately, as they have different behaviours and characteristics, depending on factors such as the index chosen, and the regularity of revaluations under the absolute value-based approach.[13]

[13] A 'perfect' index would lead to the same result as an absolute-value based method.

Provision of efficient market entry signals

As recognised by Ofcom in its 2005 Review, replacement cost methodologies can provide efficient signals for entry. The reason for this is that current cost methodologies value the regulated asset at the cost to a new entrant operator of constructing or acquiring the asset. This is the case for both absolute valuation-based, and indexing-based methodologies, providing they are implemented in such a way to accurately reflect the current cost of the asset in question (i.e. as long as the index is sufficiently accurate). Alternative operators should therefore be indifferent as to whether to invest in new assets, or buy regulated wholesale services.

Replacement cost methodologies do not disincentivise efficient investment by BT: indeed, if they allow over-recovery of costs they would give strong incentives. However, thanks to the fact that BT's ducts are already highly utilised by BT, unit prices based on a fair allocation of BT's replacement costs are likely to be lower than the stand-alone cost of entrants, and therefore may discourage even efficient operators from parallel build. The impact of the valuation method on the incentives for efficient build is therefore limited.

There is the possibility that a nationally averaged BT unit cost might encourage potentially inefficient geographical 'cherry picking' if used to set prices for duct. However, this is not directly relevant for many of the possible charge control uses of the duct valuation (e.g. in setting MPF and WLR pricing) as these are national products.[14]

Allocative efficiency would be achieved by pricing at the incremental costs. In the case of duct, where so much of the investment is sunk and where additional (spare) capacity is commonly deployed at the time of the initial build, these incremental costs can be very low. Accordingly, even allowing for some new construction costs, incremental costs will be likely to be substantially below the fully allocated current replacement cost or LRAIC (and indeed below HCA FAC). However, pricing based on incremental costs would not recover the total efficiently incurred costs (see below).

Ensure operators are able to recover efficiently incurred costs

Replacement cost methodologies ensure that regulated operators can recover the efficiently incurred costs. In the case of duct assets, whose cost typically rises over time, the capital employed is higher than under HCA. Over-recovery of costs is therefore achieved unless the holding gain modifies the annual capital charge (e.g. under CCA FCM).

We note that the treatment of holding gains differs between the FCM and OCM variants of CCA, as described above. However, this is not necessarily relevant for charge control purposes.

14 As WLR is a national product, its duct inputs are also national.

Practicable

Replacement cost methodologies are practicable:

- Indexing-based methodologies rely on historical data on expenditure which is available from BT's published financial reports, plus index-level data which, depending on the index, is published by either private or governmental third-party providers.
- Absolute valuation methods rely on the availability of:
  - efficient asset volumes (which might be based on the records of BT, if these are accurate, or some model of possible network layout)
  - unit price data for the modern equivalent of the asset in question. This is less likely to be available in the public domain than historic cost or index data, but can be inferred from operator accounts, especially if there has been new investment in the asset. In cases where there has not been major recent investment, it can be estimated from surveys and interviews with contractors and operators.

Robust

Replacement cost methods do involve making more judgements and assumptions than historic cost methods – though significantly fewer than financial methods. As discussed above, index-based methods involve taking the cost of an asset calculated at a particular point in time and then inflating that value over time by an index. Both of these steps involve the use of objectively measured external data – the initial cost value depends on data from actual transactions, and the index, depending on which is chosen, is externally measured from real market data. However, a judgement must be made as to which index to use, and for duct assets there are a number of indices that could reasonably be used. The choice of index is therefore an additional parameter which may be debated – although, as indexes may be chosen on their merits, it is not arbitrary and does not make the method significantly less robust.

Absolute valuation-based methods involve two steps. The first is to determine which modern asset should be used. The second involves determining the unit cost of that asset. The choice of which modern asset to use is less contentious in the case of duct than for other assets which experience a more rapid rate of technological change. However, the unit cost of the asset can vary depending on who is carrying out the construction, their bargaining power with suppliers and contractors, and whether a large amount of duct is constructed at once, yielding economies of scale. It can also vary significantly according to geography (specifically slope, soil type, water table) and the nature of the surface that has to be restored (e.g. marble/stone flags, tarmac road, concrete, pavement slab, grass, ploughed field). The unit cost used in absolute valuation-based methodologies is therefore open to some debate, which can reduce the robustness of these methodologies.

As we understand it, BT's valuation is based on a unit cost derived from a single source as regards a key input (the discount for very large-scale new construction), and this value was not provided in a competitive bidding situation. Neither of these points is ideal from the point of view of robustness.

Transparency

The transparency of replacement cost measures depends on their implementation. Indexing-based methods – assuming the initial asset valuation is based on documented, objective data such as a transaction – are transparent. This is because indices are typically independently measured and published, and are not subject to assumptions by the management of the regulated entity, or the regulator.

Absolute valuation-based methods are potentially less transparent than indexing-based methods. This is because, they require assumptions to be made by the management of the regulated operator or the regulator, to determine the type and amount of modern equivalent assets, as well as their unit cost.

Stable

Replacement cost measures, both indexing-based and absolute valuation-based, do not in principle have significant problems with the stability of the valuation, provided that the absolute-valuation methods have regular revaluations.[15] In an economic environment with moderate, stable inflation, such as has historically been the case in Britain,[16] indexing-based methods result in asset values increasing year by year at a low, relatively constant growth rate. In addition (and perhaps more relevantly for charge control purposes), reputable independent forecasts of inflation, and inflation-related measures, are widely available. This ensures a reasonable level of regulatory certainty for both the regulated operator and alternative operators.

The stability of optimised methods depends on the pace of technological change of the asset in question, and the likelihood of disruptive technological change. For assets such as ducts, which have a long life and involve only incremental changes in technology, these methodologies are likely to be stable and not involve major sudden changes in valuation (unless alternative technologies such as wireless make certain duct assets unnecessary).

Consistent with past valuation and regulatory decisions

Ofcom has used replacement cost methodologies extensively in the past, and therefore these are consistent with past regulatory decisions.

15 The recent significant difference in BT's valuation shows, however, that this stability can in practice be low.

16 In the current economic climate, it is subject to debate whether this stable inflation environment will continue.

Conclusion

Replacement cost methodologies perform well against all principles, and do not have any major shortfall that rules them out. However, within the overall category of replacement cost methodologies, there are a number of variations. As discussed, methodologies may be absolute or indexed based on a previous valuation (which may be either an absolute valuation or historic cost-based). For a discussion of the use of indexing, please refer to section 3.7. Replacement cost methodologies may also be optimised or un-optimised, and depreciated or un-depreciated. We discuss optimisation and depreciation below.

3.3.3 Financial methodologies

Financial methodologies, rather than beginning with a physical asset that must be valued, seek to calculate the value of the future cash flows that arise from ownership of the asset: they seek to capture the true economic value of the asset to the owner. There are a number of methodologies that may be classified as financial methods:

- proxy asset valuation
- sale price
- market capitalisation
- net present value of future cash flows.

For an asset whose outputs are essentially consumed by regulated products, the net present value method is ruled out by its circularity – that is, the value of the asset depends on the regulated charge for services, which in turn depends on the value of the asset. It therefore fails the practicability principle even before the consideration of other principles. In the following, therefore, we analyse only the other three methods.

Provision of efficient market entry signals for build-or-buy decisions

These methodologies perform well against this principle, since the asset value is set at the level at which the open market would value it. Accordingly, it represents the value of the market's expectations of future cash flows arising from the asset, which is the value that, in an efficient and competitive market, another operator would need to pay to acquire the asset. In other words, an investor looking to build the asset would not do so at this price if the future cash flows would not generate sufficient return on capital. If an asset is valued at its market price, therefore, competitive operators should be indifferent as to whether to build or buy. However, this depends on the asset having the same value in the hands of different parties – different parties may have differing costs of capital, or be able to extract synergies or efficiencies from the asset that other parties cannot.

The resulting price would be likely to be higher than the incremental cost and therefore sub-optimal from the point of view of allocative efficiency.

However, if we view all financial methods as in effect looking at future cash flows, then for an asset such as duct they are all just as circular as the NPV calculation, if perhaps less obviously so.

Ensure operators are able to recover efficiently incurred costs

Although financial methods do not expressly calculate or make reference to costs incurred by their owners, they do seek to value assets at their true economic value to their owners. Therefore, assuming the methodology does correctly value the future cash flows of the asset, the valuation is an efficient one. Likewise, costs incurred in excess of the valuation must be inefficient.

Of course, financial methods might lead to a lower valuation than one derived via replacement cost methods – especially if the assets have a long life, are sunk, or there are barriers to exit, and the future cash flows are now expected to be low. In essence this describes a business which could not afford to replace the asset when it reaches the end of its life.

Practicable

Financial methodologies fail on this principle. The net present value method, as discussed above, is circular when used to calculate regulated charges, and is therefore impossible to use. The other methodologies, which rely on comparing the asset to some market comparable measure, are dependent on the existence of such comparable measures. They are also implicitly circular, since, even if these comparables exist, the true value of the cash flows produced by the asset is dependent on the regulated price.

The proxy asset valuation methodology depends on the existence of a past transaction that involved a similar asset that is of a similar value. This is problematic for an asset such as BT's duct network, which is unique.

The successful use of the sale price methodology requires that the asset itself has been sold recently, since it values the asset at that price. But this is not the case with BT's duct, since it is still wholly within BT's ownership. Therefore, the methodology is not practicable.

The market capitalisation methodology requires that the asset is listed on a public securities exchange, as the London Stock Exchange. Although BT itself is a publicly listed company, its duct assets are not, instead being a physical asset owned by BT. But it is very difficult to calculate what proportion of BT's market capitalisation is due to its duct, rather than its other assets.

Robust

These methods are very poor at meeting this criterion: each involves a number of assumptions that can reasonably be challenged, which means that the asset values determined by these methods are easily disputable. These assumptions are set out below for each of the three financial methodologies.

The proxy asset valuation method is dependent on finding a transaction or transactions that involved an asset similar enough to act as a proxy. Since no two assets are exactly alike, particularly in the case of a nationwide telecoms duct network, there is a major, untestable assumption involved that the proxy chosen does in fact represent a fair proxy. As the regulated asset is itself unlikely to be sold, it is impossible to know whether the chosen proxy would in fact result in the correct valuation. This creates significant scope for dispute.

Even assuming that the asset in question is listed separately on a public securities exchange, the market capitalisation methodology rests on assumptions that can be easily disputed. There are two key assumptions. The first is the point of time at which the market capitalisation is measured for the purpose of selecting the comparable. Since publicly listed asset prices fluctuate on a daily basis, driven by factors both internal to the asset, and external (such as movements in response to overall market movements), the time of measurement has a significant effect on the valuation. In addition, it is by no means objectively clear that one point in time is more or less accurate than any other point in time. This has the potential to permit disputes. The second assumption is whether to take an average market capitalisation over time, and the time period over which to calculate the average. Again, there is no clear theoretical means of determining which time period yields a more accurate result. This also has the potential to introduce disputes.

The sale price methodology is more robust than the other financial methodologies. Since it relies on the actual sale price of the regulated asset, it is based on a single piece of objective data. However, the sale of the asset often happens only once, and since market – and even political – conditions that may affect the sale price can vary over time, it is possible to dispute the valuation based on the timing of the sale. For example, if the sale happened at the height of an investment boom, it could be argued that it reflects an inefficiently high value.

Transparency

Financial methodologies are less transparent than replacement cost or historic cost methodologies. This is because, despite the fact that, except for the NPV method, they each use public data, there is judgement involved in the application of that public data. The proxy valuation method depends on judgement exercised in the selection of a proxy. The market capitalisation method relies on assumptions regarding the time period of the market value to take, and how to extract the value of a single asset from the total market capitalisation. It is true that the sale price method, if the asset in question has been recently sold, can be transparent and based on objective data. However, this is not the case with BT's duct assets, since it has not been sold.

Stable

Financial valuation methodologies are not very stable over time as they depend on various market factors: risk-free rate of return, beta, equity premium, valuations of companies (i.e. expectations of future cash flow). Methods based on financial methods followed by roll-forward indexing *can* be stable, as they do not involve significant changes in the value of the asset, beyond the relatively predictable changes as a result of the rolling forward of the asset value.

Consistent with past valuation and regulatory decisions

As discussed above, Ofcom has in the past used asset valuations based on current cost methodologies, which are based on different principles from financial methodologies. Therefore, financial methodologies are not consistent with past decisions, and would reflect a significant change in policy for Ofcom.

Conclusion

It is our view that financial-based methodologies are not suitable for the valuation of BT's duct assets. Whilst there are practical problems in implementation, the most important reason is that they are either explicitly or implicitly circular, and can also have serious problems regarding robustness which could result in significant disputes over the asset value produced by the application of these methodologies.

3.4 Optimisation

As discussed above, it is our view that current cost methodologies are superior to either historic cost or financial methodologies. However, there are a number of variants of current cost available. One difference is whether the methodology is optimised or un-optimised. In the case of the duct network, the assumed network may be optimised according to the capacity of the ducts – that is, the capacity of existing assets is assumed to be optimal, removing unused excesses in the network. It may also be optimised according to the topology of the network – that is, assuming that the network is laid out in such a way as to avoid unnecessary routes.

Of the current cost methodologies considered, two assume a certain level of optimisation – optimised replacement cost (ORC), and depreciated optimised replacement cost (DORC) – while two do not – un-depreciated current replacement cost and depreciated current replacement cost. In this section we analyse the suitability of optimised and non-optimised methods for the valuation of BT's ducts.

Provision of efficient economic signals

Optimised methods provide efficient build-or-buy signals. This is because, assuming the optimisation is performed correctly, they value the asset as though it were efficiently constructed. However, this is dependent on the accuracy of the optimisation process.

Un-optimised methods do not value the assets as efficiently constructed, and therefore theoretically provide less efficient build-or-buy signals.

Ensure operators are able to recover efficiently incurred costs

Optimised methodologies and un-optimised methodologies perform very differently against this principle. Optimised methodologies do not necessarily allow the regulated operator to recover all efficiently incurred costs because they assume a network that is optimised and efficient according to conditions (such as demand and geography) and technologies that are prevalent today. But the actual network was built earlier, under different conditions, and with older technologies. This means that the design, layout and cost of the existing network, which may have been efficient at the time of construction (although we do not know this for sure), is unlikely to be optimal under today's conditions. Therefore, optimised methodologies are likely to value the network at a discount. To the extent to which conditions and technologies have changed, optimised methodologies could exclude a substantial amount of reasonably incurred cost, depending on the nature of the optimisation and the treatment of the resulting windfall losses (if any).

Un-optimised methodologies, by contrast, do not assume any changes to the regulated operator's existing network. Accordingly, there is no penalty implied by changing technologies and conditions that reduce the cost of a newly constructed efficient network. Un-optimised methodologies therefore only perform well against this principle if the network was efficiently built, as otherwise they also allow the recovery of inefficiently incurred cost.

Practicable

Both optimised and un-optimised methods can be practicable, though in the case of duct the former would be more difficult to use, for two reasons:

- Optimising the duct and cable layout is a complex and computationally expensive task, requiring detailed data on the locations and streets served. This is, however, becoming possible with modern computers and modern, high-resolution geographical data sets.
- The continuously changing nature of the demand distribution leads to inefficiencies in the network design in practice. Some of this is unavoidable, and although the particular inefficiencies would not be faced by a new entrant building its duct network today, that entrant's own design would itself become less efficient over time. There is, as a result, some risk of over-optimisation, which might lead to regulated charges that were too low.[17]

Notwithstanding these issues, optimised methods are regularly used in the telecoms industry, and they have well-known, standardised methodologies. As such, optimised methodologies, whilst complex and costly to implement, are perfectly practicable if sufficient data is available.

Un-optimised methods, by contrast, do not require complex models to be constructed. They do, however, rely on the existence of detailed operator information about, for example, duct lengths and locations. Whilst BT should be able to provide such information, it may be of poor quality, or only in paper form. If this is the case, it affects the practicability of un-optimised methods.

[17] Similar concerns sometimes lead regulators to use 'scorched node' , in which the location and number of certain network nodes such as MDF are fixed at their current values rather than 'scorched earth' models (in which these are not so constrained).

Robust

Robustness is the key area of difference between optimised and non-optimised methodologies. Optimised methodologies may require large, complex, bottom-up cost models which require a significant number of assumptions to be made regarding both inputs and aspects of the methodology. Assumptions required for inputs include demand assumptions: because they calculate the cost of a theoretical, efficient network from the bottom up, optimised methodologies require an accurate picture of the expected level of demand for the year of interest – often one or more years into the future. Methodological assumptions required include the level of optimisation, as optimised methodologies allow different levels of optimisation to the assumed network. In the case of the duct network, it is possible to optimise the type and capacity of the ducts that exist, and also to optimise the location and topology of the duct network. The latter requires more complex calculations to be made than the former, since it allows a greater degree of freedom. Optimised methods are for these reasons slightly less robust, as there are questions of degree as to how much optimisation is feasible or reasonable to achieve.

Un-optimised methods, by contrast, do not attempt such complex calculations, instead taking the existing layout and capacity of the regulated network as a given. There is therefore no need to make such assumptions. However, as discussed above, they are critically dependent on operator data on duct location and length, much of which may be of poor quality or only available as paper maps. Un-optimised methodologies can therefore have a significant advantage over optimised methods in robustness, but only if there is good data available.

Transparency

The introduction of optimisation into a costing methodology reduces its transparency. This is because optimisation involves judgment and assumptions, and it may not be feasible to check the results of the optimisation by hand. The greater the level of optimisation, the lower the level of transparency; this is particularly the case when large, complex, bottom-up cost models are required.

Stable

Un-optimised methodologies perform well against this principle. Once constructed, a large, complex asset such as BT's duct network is unlikely to change significantly in its layout or configuration, and so it is likely that the valuation arising from un-optimised methods will not experience large, sudden changes.

The performance of optimised methods, however, depends on whether the asset in question is prone to large, sudden, disruptive technological change that causes the efficient network configuration to change significantly. New technologies such as fibre to the cabinet (FTTC) and fibre to the home (FTTH) may have rather different requirements from duct, and duct built to support these might look quite different.

Consistent with past valuation and regulatory decisions

Ofcom's existing methodology for the valuation of copper and duct assets involves a mix of current cost and historic cost methodologies. In neither case does Ofcom carry out full-scale optimisation of the assets – although some optimisation of operating costs has been performed based on efficiency studies. As such, optimisation of capital costs would represent a departure from past valuation and regulatory decisions.

Conclusion

There is a balance to be struck here. Optimised methods can better reflect the costs to a new entrant. However, at least post-liberalisation, BT has faced retail competition from Virgin Media and other players, and thus has considerable economic incentives to minimise the cost of its network.

Further, given the huge cost of rebuilding duct, it is very likely that the existing duct (built for the PSTN and leased-line network) will continue to be used with only small losses in overall efficiency. In addition, it is possible that BT will be obliged to sell wholesale duct access where there is duct with space.

BT has reasonable data on duct location for those exchanges where it has digitised the network information (in "PiPER"). In such a circumstances, with reasonable existing asset data, likely reuse of existing duct, and the possibility of access to ducts with space (whether these ducts are considered 'efficient' or not), and given the lack of incentive for BT to build unnecessary duct, un-optimised methods (at least as regards capital expenditure[18]) might be preferred. Some reasonable amount of optimisation is an alternative: models could be built to test the extent to which the BT assets are indeed efficient.

3.5 Depreciation

As discussed above, it is our view that current cost methodologies are the most appropriate type for the valuation of BT's duct assets. Some of these methodologies use depreciation and create a net asset value, and some do not. The key difference is that depreciated methodologies account for the elapsed useful life of the asset in the valuation. Un-depreciated methodologies, by contrast, value the asset by assuming it would be replaced in the current year, without taking account of costs already recovered. The following current cost methodologies are depreciated:

- depreciated current replacement cost
- depreciated optimised replacement cost.

18 We note that operating cost efficiency adjustments are a separate matter.

The following current cost methodologies are un-depreciated:

- un-depreciated current replacement cost
- optimised replacement cost.

To result in a capital charge for use in charge setting, undepreciated methods must use an annualisation method such as a tilted annuity or economic depreciation; by comparison, depreciated methods use depreciation and ROCE charges. Here we analyse the suitability of depreciation in the asset valuation for the valuation of BT's duct assets, i.e. depreciated versus un-depreciated methods.

Provision of efficient economic signals

In principle, both methods can lead to the same economic signals. This is because, although un-depreciated methodologies do not account for depreciation in their asset values, they do account for asset lifetimes in the calculation of regulated pricing, through the use of, for example, a tilted annuity.

Ensure operators are able to recover efficiently incurred costs

Both depreciated and un-depreciated methodologies enable the regulated operator to recover efficiently incurred costs. In both cases, given that the cost of duct construction has increased since the asset was originally built, not only is BT compensated for the actual costs incurred, it is also compensated (as appropriate) for holding gains or losses in current cost methodologies. Current cost accounting methodologies differ: FCM will result in lower depreciation charges, as holding gains are subtracted from depreciation, but still results in full recovery of costs; OCM can over-recover costs if asset prices are rising (and *vice versa,* under-recover if they are falling).

We understand that the charge control is forward-looking. If Ofcom had expected a sharp upward revaluation of the duct over the last charge control period, then it might have set a much lower charge control reflecting the CCA FCM nature of BT's RFS. However, we also understand that Ofcom can allow holding gains or losses in the asset valuation for charge control purposes which may differ from the accounting treatment.

Practicable

Both depreciated and un-depreciated methodologies are practicable. Un-depreciated methodologies do not require any information or calculation beyond those already required, and so the lack of depreciation does not add complexity or cause problems with practicability.

Both methodologies require an estimate of the useful life of an asset. Depreciated methods also require the selection of a depreciation methodology. Neither of these pose practicability problems, since both are well understood.

Robust

Depreciated and un-depreciated methods are apparently rather similar in the assumptions they need: asset lives, input unit cost trends and – in order to set prices – a WACC. Un-depreciated asset valuation methods used as inputs for charge control calculations based on economic depreciation also need a forecast of future cash flows and the output demand profile, both of which can be difficult to forecast.

The dependence of the un-depreciated methods capital charge on the WACC is similar to that of depreciated methods (where the WACC will come into the charge control capital charge as the ROCE term). Neither is less robust as a result.

In the case of BT's duct, there is an established view of the accounting depreciation period: 40 years, which is roughly consistent across EU regulators – for example in Norway, Sweden and Denmark – although in Australia a figure of 35 is used.

However, there is a more subtle point relating to the asset lifetime. If the estimated lifetime is incorrect – for example, too short (say the actual lifetime is 50 years and not the modelled 40 years[19]) – then the un-depreciated method will generate excessive prices until the lifetime is corrected. The depreciated method will eventually correct for this, because over time the capital employed will fall (due to the excess depreciation) and the ROCE element of the capital charge will fall as a result; in the end some of the duct would be fully depreciated for (say) 10 years before it had to be replaced. As a result, depreciated methods may be more robust in cases where the asset lifetimes are long and uncertain. An alternative in an un-optimised approach would be to ensure that assets were not included if they were built more than the asset lifetime ago.

Depreciated methods also require a choice of depreciation methodology. Although there are a number of different depreciation methodologies available, there are established precedents in the selection of these for regulatory purposes. Therefore, although this does introduce an element of judgement and assumption, it is not likely to result in significant disputes.

Transparent

The use of depreciation does not significantly reduce the transparency of a valuation methodology. This is because, despite the fact that depreciation involves assumptions, there are well-established accounting conventions and precedents regarding this, as discussed above. This is especially the case with the accounting depreciation period, which, as stated above, is typically set at 40 years for duct assets.

---

19. This is difficult to detect, although capital expenditure figures that are persistently lower than the depreciation charges will suggest that there may be such a problem (assuming that the asset age profile is roughly flat over time).

Stable

Both depreciated and un-depreciated methodologies perform well against this principle. The asset valuation calculated by un-depreciated methods does not change sharply from year to year – although it may change if the replacement cost of the asset changes. The valuation calculated by depreciated methods, once the depreciation mechanism and useful life have been finalised, reduces with depreciation in a manner that is predictable and consistent. There is, however, a potential for step changes in certain circumstances:

- If the assumed useful life of the asset does not match its actual useful life (especially if the useful life is shorter), there may be the need for adjustments to account for this once it has become apparent – in effect to correct the depreciation and capital employed.
- If a large fraction of the assets are replaced regularly on the same timescales, then straight-line depreciation can lead to a 'saw tooth' profile in the capital charges over time (as the capital employed jumps up on asset replacement). In practice this rarely occurs, as different assets have different lifetimes and networks are initially deployed over extended periods.

Therefore, except in exceptional cases, depreciated methodologies are not inferior in terms of stability to un-depreciated methods.

Consistent with past valuation and regulatory decisions

Ofcom's existing methodology for the valuation of copper and duct assets involves a mix of replacement cost absolute and indexed methodologies, depending on the date of acquisition of the asset. Assets acquired prior to 1997 are valued on an indexed basis according to their value in the 2005 accounts. However, assets acquired after 1997 are valued on a depreciated current replacement cost (absolute valuation) basis. As such, the use of depreciation is consistent with certain of Ofcom's previous regulatory decisions.

Conclusion

Both depreciated and un-depreciated methodologies perform well against all criteria. However, depreciated methodologies have the benefit of being able to automatically respond to errors in the useful life of the asset.

3.6 Roll-forward methodologies

3.6.1 Use and classification of roll-forward methodologies

As discussed above (in section 2.3), once an asset's value has been calculated, there are a number of different ways to roll forward this value – that is, update or recalculate it – from year to year. Roll-forward methodologies take account of one or more of: depreciation, capital expenditure and inflation. These are typically accounted for separately. However, as previously mentioned, the infrastructure renewals method takes account of all of these by assuming an annual renewal charge based on the expected average yearly maintenance and capital expenditure over the life of the asset.

One option is not to use a roll-forward methodology, and instead to recalculate the asset valuation every year. This is, however relatively, expensive and time-consuming, and has the potential to result in significant changes in the asset value from year to year. This would not be favoured under the stability principle, as described above.

Only certain combinations of valuation method and roll-forward method are logically consistent. Depreciation is used in the roll-forward calculation by depreciated methodologies, including:

- historic cost-based methods
- depreciated current replacement cost
- depreciated optimised replacement cost.

Capital expenditure is used by methods based on historic cost or replacement cost to take account of additions to the asset base over time. This capital expenditure is accounted for in the asset value at cost (the nominal cost in the year of purchase, which for the current year is the same for both historic and current costs).

The roll-forward calculation for current cost-based methodologies includes the effects of inflation. This is accounted for either by uplifting the asset value according to an index, or by changing the absolute current unit cost of the asset.

As discussed in section 2.3, financial methodologies do not use roll-forward methodologies, as they are already forward-looking. They could however be used to set initial values and rolled forward using depreciation, inflation and capital expenditure.

Finally, the infrastructure renewals method may be conceptually combined with any of the initial valuation methodologies.

3.6.2 Analysis of roll-forward methodologies

Roll-forward methods using depreciation are consistent with depreciated valuation methods. Discussion of their fit with the chosen principles has already been included in discussion of depreciated valuation methods above. Roll-forward methods using inflation are consistent with replacement cost valuation methods and have therefore been included in the above discussion of replacement cost valuation methods. This leaves the following methodologies to be considered: (a) roll-forward of financial valuation methods and (b) infrastructure renewals methods. We have already rejected financial methods as unsuitable in the case of ducts, so we do not propose to examine the merits of suitable roll-forwards methods.

Infrastructure renewals

As discussed above, infrastructure renewals is intended to allow both for losses in the asset value over time and the need for asset maintenance, on the basis of retaining a constant level of serviceability for the system. It is set at the average forecast infrastructure renewals expenditure (IRE) over 15 to 20 years. Differences between the forecast IRC and actual IRE are accumulated in the balance sheet as accruals/prepayments and, where significant, are taken into account at the next charge control review.

As discussed above, Ofwat uses this methodology, as set out in its Regulatory Accounting Guideline 1.04. Ofwat sets out guidelines as to how this is implemented for water assets. Each water company is responsible for determining its own IRC – the key requirement being that it must link to the company’s medium to long term maintenance planning. Ofwat acknowledges that this is likely to be different from company to company. In addition, Ofwat sets out that the IRC must be consistent with the initial asset valuation methodology. For example, if the asset valuation methodology uses indexing, the IRC should be inflated by the same index. Therefore, since Ofwat specifies the use of the RPI for asset valuation, it also specifies the use of the RPI for the IRC. This principle could also be applied to duct valuation to ensure consistency with the asset valuation method.

The infrastructure renewals methodology can consistently be combined with any of the initial asset valuation methodologies, and so we separately analyse the performance of that method against the seven principles.

Efficient build-or-buy signals

This method is designed for long-life assets which, rather than being replaced, are maintained and renewed over a long period of time. The resulting prices reflect the long-run maintenance costs and the ROCE for the asset base. This means that, for this kind of asset, provided the renewal charge is calculated accurately, this method does provide correct incentives for the existing asset owners as long as the asset base is correctly valued. Prices based on such a method for determining the cost to be recovered in each year will be higher than incremental costs and will not reach allocative efficiency; an IRC method is equivalent in its incentives for efficient entry to current replacement cost (if the asset base is inflated from year to year, i.e. holding gains are allowed) or historic cost methods (if the asset base is not inflated).

Recovery of efficiently incurred costs

There are two elements to this: the return on capital employed, and the yearly renewal charge. Whether the figure for the capital employed is correctly allowing efficiently incurred costs to be recovered is an initial valuation issue (affecting the ROCE element of the charge). Capital expenditure is not relevant to the capital employed unless it increases the scope of long-life assets (e.g. if an additional company with more duct were purchased). However, there is a roll-forward issue, which is whether the capital employed (the RAB) is inflated (to reflect replacement costs) or not (mimicking an historic cost approach).

Regarding the yearly renewal charge, this can differ substantially from actual expenditure on renewal from year to year. However, this difference is accounted for as accruals, and – provided correct adjustments are made – these costs can be recovered over time by the regulated operator. However, renewal costs may potentially be recovered several years after they have been incurred.

Practicable

Although the method requires assumptions and forecasts to be made, these forecasts can be based on existing historical expenditure data from BT and other sources. This information is available to Ofcom, although perhaps more detail is required than Ofcom wishes to examine (for example, Ofcom might be asked to approve specific capital expenditure programmes to justify the IRC, requiring very significant involvement in Openreach's future engineering plans). As such, the infrastructure renewal method is practicable.

Robust

This method requires a forecast of the total infrastructure renewal expenditure required over the life of the asset, which is then used to calculate the average yearly renewal charge. This forecast is subjective, and open to dispute. In effect it requires Ofcom to take a view on the necessary maintenance of the duct in the long term. As such, the infrastructure renewal method performs poorly against this principle.

Transparent

This method is dependent on infrastructure renewals expenditure forecasts. These are typically made by the management of the regulated entity, although typically with regulator audit or supervision. As such, it lacks transparency, as any forecast is subject to assumptions and judgements, and is not based on audit financial data.

Stable

This method results in the same infrastructure renewal charge being assumed every year throughout the life of the asset, and it is therefore relatively stable. However, adjustments over time to cope with accrued differences between the IRC and the actual expenditure will reduce the stability.

Consistent with past regulatory decisions

This method has been used by other regulators (e.g. Ofwat and the Water Commission for Scotland), but has not been used in the telecoms industry: copper cables in the ducts are valued, and their regulated charges are set, in a very different way.

Conclusion

The infrastructure renewal charge method is potentially a strong candidate, given that it was designed with long-lived assets similar to BT's duct in mind. However, it is not consistent with other charge control methods currently used by Ofcom, and if it were adopted other assets (specifically, copper cables) might merit a similar approach, though these have a lower lifetime and may in the medium term be partially or fully replaced by fibre cables. Aside from representing a substantial change in approach, its major disadvantage is that it could require Ofcom to become closely involved in forecasting duct maintenance and repair expenditure, to a substantially greater extent than it has in the past.

3.7 The use of indices

As discussed above, certain current cost-based methodologies use indices in the calculation of current asset values, and when rolling forward the value of the asset. Indexation is a possible alternative to absolute valuation for current replacement costs. Two important decisions are:

- The time period over which indexation is relied upon. This is a question of degree: patently, there is a risk that indexation will become less accurate over time, rendering its use over long time periods less justifiable.[20] On the other hand, as indexing is relatively straightforward to use, it is highly appealing for use over shorter time periods, such as within a charge control.
- Which index to use. There are a number of different indices which may be used. which fall broadly into two categories – general indices that measure inflation in the overall economy, and specific indices which may better track inflation in the value of the duct. We discuss each below.

General indices

General economy-wide indices include the Consumer Price Index (CPI) and the Retail Price Index (RPI), which measure the price of a basket of final consumer goods. Also appropriate for duct valuation are indices that measure labour costs, such as the Average Earnings Index (AEI) . The

[20] For example, this point is noted by the RICS report detailing the indices used in this section.

RPI has been in use since 1947. This has been replaced in many, although not all, applications, by the CPI. The key distinction between these indices is that there are some differences in the baskets of goods and services they measure. For example, the RPI includes mortgage interest rates, council tax, building insurance and house depreciation, which are not included in the CPI. The CPI includes certain financial services, such as stockbrokerage fees, that are not included in the RPI. Historically, the RPI has been higher than the CPI.

The current valuation approach used for regulatory price control incorporates a RAV for pre-1997 assets which is indexed by RPI.

Industry-specific indices

There are a number of industry-specific price indices that potential could be used for duct assets. Given that the key cost driver for the construction of ducts is the cost of civil works and labour, it may be appropriate to use construction-sector indices. These are published by the Royal Institute of Chartered Surveyors (RICS), and include both national and regional indices. Some the key indices produced by RICS are the General Building Cost Index (GBCI) and the All-in Tender Price Index (TPI). The GBCI is a national index that measures the cost of construction works, including materials and labour. The TPI measures actual tender prices charged for construction work. This has historically been more volatile than the GBCI, with significant changes due to changing economic conditions. This reflects the fact that it includes margins earned by construction contractors, and not simply input costs, as are measured by the GBCI. RICS also publishes similar indices on a regional basis: there are, for example, separate indices for Scotland, Greater London, and Wales.

Other regulatory authorities, both in the UK and elsewhere, have used indexing in the roll-forward of asset valuations. As discussed above, Ofwat specifies the use of the RPI for indexation. Likewise, the UK's air traffic control regulator, NAT, uses a general index for its price regulation calculations. However, this has changed from RPI to CPI, in recognition that CPI has superseded RPI as the official measure of inflation. In Australia, the electricity regulator, AER, uses general inflation as measured by the Australian CPI. These regulators do not, to the best of our knowledge, explicitly discuss the relative merits of using general or industry-specific indices. However, in the electricity transmission and water industries, costs are driven by more complex factors than those involved in duct construction.

Compound indices

The French telecoms regulator, ARCEP, has – at least until 2006 – taken a more complex approach to the use of indices in the regulation of Market 18 (wholesale broadcasting services), although this has been applied to regulated charges rather than asset valuations. The regulated charge for wholesale broadcasting services were indexed on a basket of indices.[21] The charge was revised every year on 1 January, based on indices chosen to best reflect the evolution of the cost base of TéléDiffusion de France (TDF), the SMP provider of broadcast services. These indices, produced by the national statistics institute, INSEE, were as follows:

- labour cost index in mechanical industries
- production price index in the “energy, intermediate goods and capital goods” industries
- construction cost index
- retail price index for “transport services, communications and hotel trade, cafes, restaurants”.

In its latest review of market 18,[22] ARCEP does not make any further reference to indexation of the regulated charges for wholesale broadcast services.

The 2005/6 BT Detailed Valuation Methodology constructs a “Duct(LDD)” index given by:

(Pay weighting × (Average Earnings)) + (Materials weighting x (40% (Average Earnings + productivity gains) + 60% Oil price index)) + (Contract weighting × an index “based on earnings + productivity indices”) + (Other weighting × RPI)

This index is not used directly for valuation, which uses an absolute method. It is also not clear why the ‘pay’ elements in this weighted index are not assuming productivity gains. More recent BT Detailed Valuation Methodologies do not appear to use such an index.

Comparison

The choice of whether to use general or industry-specific indices depends on whether increases in duct construction costs differ substantially from overall inflation over the lifetime of the asset. The general and industry-specific indices described above are illustrated in Figure 3.1 below.

21 “Avis n° 06-A-01 du 18 janvier 2006 relatif à une demande d’avis de l’Autorité de régulation des télécommunications en application de l’article L. 37-1 du code des postes et communications électroniques, portant sur l’analyse des marchés de gros des services de diffusion audiovisuelle” paragraph 77, 18 January 2006, Conseil de la concurrence (http://www.autoritedelaconcurrence.fr/pdf/avis/06a01.pdf)

22 “Décision n° 2009-0484 de l’Autorité de régulation des communications électroniques et des postes en date du 11 juin 2009 portant sur la définition du marché pertinent de gros des offres de diffusion hertzienne terrestre de programmes télévisuels en mode numérique, sur la désignation d’un opérateur exerçant une influence significative sur ce marché et sur les obligations imposées à cet opérateur sur ce marché“, ARCEP, 11 June 2009. (http://www.arcep.fr/uploads/tx_gsavis/09-0484.pdf)

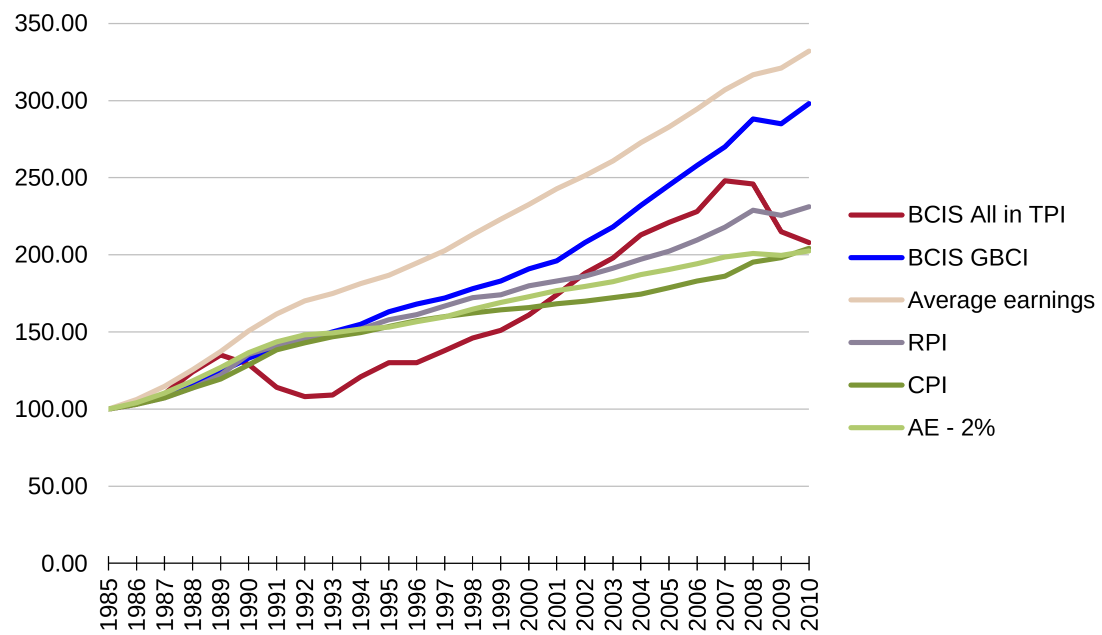

Figure 3.1: *Key UK indices, normalised to 1985 [Source: Office for National Statistics, BCIS data by permission of Royal Institute of Chartered Surveyors]*

It can be seen that there is substantial divergence between these indices. In particular, both the industry-specific GBCI and the AEI have been rising by more than inflation, as measured by the RPI or CPI. Given that these indices are more closely related to the cost of constructing ducts, then unless there are substantial annual efficiency savings, the use of a general measure of inflation such as RPI or CPI for the valuation of duct may not be appropriate (if a current replacement cost method is being used).

Likewise, the AEI has increased by substantially more than the GBCI or the TPI. This is because it includes the level of earnings of all sectors of the economy, including non-construction work. Of course, efficiency (output per man-hour) may also have increased. This index also does not include the price of non-labour input materials. It may therefore require adjustment.

For a number of assets similar to duct or related to it, BT has in the past used indexing based on average earnings less a 2% per annum assumed efficiency gain as the index for the labour costs.[23] This (average earnings + 2% efficiency gain) leads to a result which is lower than RPI in the period 1998–2010 and in the period 1997-2010 (of interest due to the way the current valuation for charge control purposes is performed) as illustrated in Figure 3.2 below. This chart also shows that the start date considered can greatly change the relative performance of these indices.

[23] See footnote 19 of Ofcom's consultation "Valuing copper access- A consultation on principles", 9 December 2004, which says "The index used is based on an average earnings index adjusted by assuming a 2% productivity growth per annum." See also the BT LDD index noted above.

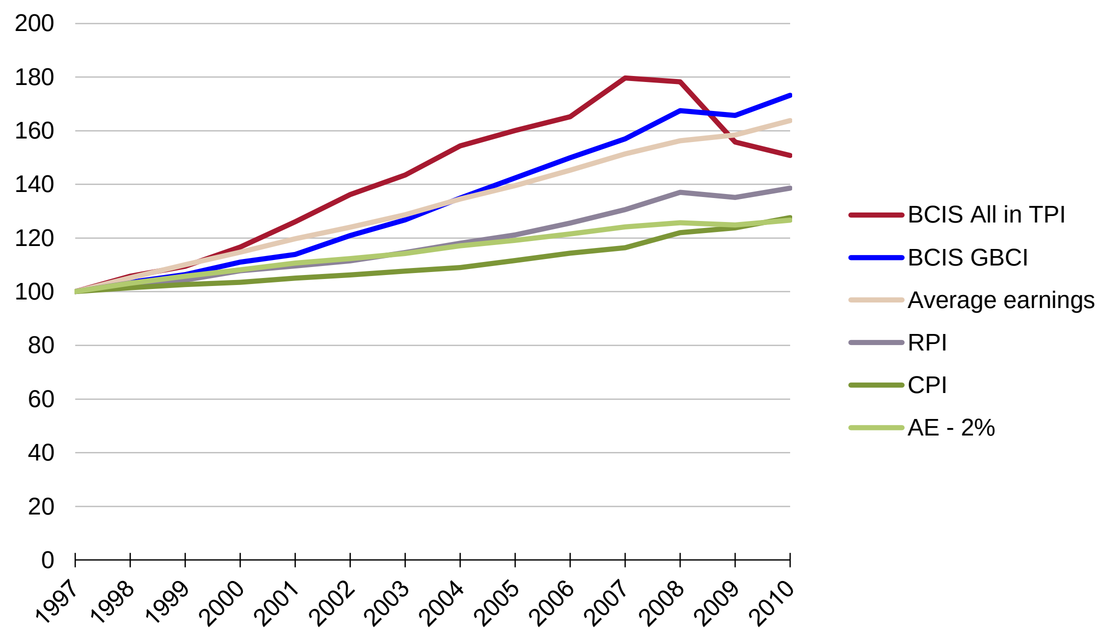

Figure 3.2: Indices normalised to 1997 [Source: Office for National Statistics, BCIS data by permission of Royal Institute of Chartered Surveyors]

Of the industry-specific indices, the question remains whether to use an index that measures tender prices, such as the TPI, or an index that measures construction input costs, such as the GBCI. Both are relevant measures, though the TPI is more volatile, with substantial swings depending on prevailing economic conditions, especially during a recession. This could lead to substantial, unexpected variations in asset value (i.e. a lack of stability). For this reason we propose that GBCI is a more suitable index than TPI for these purposes, although as a measure of input costs it may need to be adjusted for productivity gains. Since 1997, a 2% annual productivity improvement would lead to results slightly higher than the "Average earnings - 2%" figures (as GBCI has risen slightly more than average earnings); however, over the period since 1985, this trend is reversed. A productivity-adjusted GBCI figure would seem an appropriate index, and an improvement over the use of average earnings or RPI indices.

Finally, in a manner similar to ARCEP, it would be possible to construct a basket of indices that seeks to more accurately reflect the actual change in cost of the asset over time. However, duct assets are relatively simple when compared to other regulated assets: the key cost driver is construction and labour costs. It is therefore questionable whether a composite of multiple indices would be more useful than a single, industry-specific index in this case.

A roll-forward methodology that uses indexing leads to rolled-forward asset values that can differ in behaviour from those resulting from absolute methods that revalue assets periodically. The key difference is that an index performs a regular revaluation, based on a well-known, published and (potentially) forecast measure. Depending on the volatility of the index, this gives it an element of stability. Regardless of the volatility of the index, it has a certain amount of predictability, as all of the indices discussed above – and some other available indices – are already forecast by professional bodies.[24] Likewise, historical data for indexes are quite robust, since they are based on objectively measured data. Indexed methods may therefore be preferred for price setting within a charge control period.

3.7.1 Impact on valuation

Ofcom has provided us with the historic cost capital expenditure for BT's duct network in the period since the cut-off for the pre-1997 RAB was formed. In Figure 3.3 below we have used the GBCI - 2% index described above to index the actual costs (HCA), to arrive at an estimated indexed gross replacement cost, accumulated depreciation, and net replacement cost for the post-1997 assets. We have compared this with the same calculation using RPI as the index.

Index	*Gross replacement cost (GBP million)*	*Accumulated depreciation (GBP million)*	*Net replacement cost (GBP million)*
GBCI - 2%	[Confidential]	[Confidential]	[Confidential]
RPI	[Confidential]	[Confidential]	[Confidential]

Figure 3.3: Post-1997 valuation using indexes to 1 Mar 2010 [Source: Analysys Mason based on BT data, ONS and RICS/BCIS]

We note that the difference between the use of a productivity-adjusted GBCI and RPI in terms of the resulting net replacement cost is only 4% over this 12-year period – a relatively small variance.

24 This might be an argument for using an index based on RPI, as it is more widely forecast.

4 Recommendations and conclusions

From the analysis presented above, we can draw some overall conclusions as to the appropriateness of different classes of methodology for the valuation of BT's duct assets, and the rolling forward of the asset value.

- Financial methods are inappropriate because, in the case of assets for which charges are regulated, they are circular.
- Historical methods are less ideal than replacement cost methodologies, although many of the reasons why current replacement cost valuations are generally preferred in a telecoms context are not relevant in the case of duct assets: the fact that they disincentivise efficient investment by an entrant is much less important than for other assets because parallel build is very unlikely to be economic[25]. Instead there remain two arguments which are against the use of historic cost methods:
  - Use of historic costs would give greater advantages to operators who have not built network in the past, and devalue the assets of those who have built in parallel with BT in the past, though often at a later date, e.g., Virgin Media, COLT in major cities, etc.
  - Inconsistency with past valuation and regulatory decisions would create additional regulatory risk.
- Restricting the use of historic cost methods to areas where there is, or will be, no competition makes them less practical and less robust.
- Replacement cost methodologies (either using absolute valuation or by indexing a previous valuation) have specific strengths: they provide efficient market entry signals, do not disincentivise efficient investment by BT, are relatively practical and robust, and can be sufficiently transparent and stable. They are also consistent with past regulatory decisions. Replacement cost methodologies are therefore preferred.

The appropriateness of optimisation is more complex, and needs careful consideration. This is because the extent to which optimisation is performed can vary greatly. Optimisation introduces complexity and the need to make assumptions into the cost calculation. This reduces robustness. However, at the same time, optimisation improves the economic incentives for efficiency. These two considerations need to be balanced against each other: there is certainly a level of modest optimisation which can be appropriate, but there is a point beyond which the method loses its robustness.

[25] As noted in section 3.3.1, high sunk costs and strong economies of scale mean that barriers to entry are high, and the one-off opportunity given by the exclusive cable franchises will not recur

The appropriateness of depreciation is also more complex, although methodologies use depreciation, and those that do not, may both be appropriate (and naturally, the price-setting mechanism needs to be appropriate to the method chosen). One point of difference in favour of the use of depreciation is that this can provide some automatic correction of errors in asset lives.

Finally, in choosing between the different methods of updating an existing valuation, it is our view that indexing is the most appropriate method, though this will require occasional use of absolute valuation to limit any possible loss of accuracy of the index. This preference for indexation is largely due to its practicability and robustness, since it is based on external data sources that are readily available. It is also our view that it is likely to be appropriate in the case of duct assets to use an industry-specific index that takes account of changes in construction and civil works costs, adjusted for productivity gains.